BRITISH SOCIETY FOR DERMATOLOGICAL SURGERY

WORKSHOP MANUAL

NEWCASTLE

Introduction

In July 1982 at the British Association of Dermatologists (BAD) meeting in Dundee, Dr Stanley Comaish, Dr Rodney Dawber, Dr Michael Dahl and Dr Peter Kersey met to consider the formation of a group with an interest in the surgical aspects of dermatology. Stan Comaish had worked in Philadelphia and had been impressed by the rapid growth of dermatological surgery in the USA. The group was also aware of the interest in the subject in Spain and Germany. The four agreed to form a British Dermatological Surgery Group (BDSG) - whose aims would be to promote interest, stimulate research and disseminate information on all aspects of dermatological surgery. The group held an inaugural meeting, one year later, at the BAD meeting in London. The major decision was taken to initiate a series of workshops to enhance surgical skills and the first workshop was held in Newcastle in April 1984. The meeting was co-sponsored by the International Society for Dermatologic Surgery (ISDS) and Perry Robins, Robert Baran, George Popkin and Michael Nix contributed. The local senior plastic surgeon in Newcastle had worked with Perry Robins and Fred Mohs in Wisconsin, but was not a supporter of dermatologists undertaking surgery. Indeed, these pioneering dermatologists were aware of strong resistance from some other surgeons who were opposed to dermatologists undertaking surgery. Debates with surgeons followed in Oxford at a Dowling Club Educational Weekend and at a joint meeting with plastic surgeons at the Royal Society of Medicine in December 1984 in an effort to reconcile differences. However, despite this, in 1984 a formal complaint was laid before the President of the Royal College of Surgeons by the plastic surgeons that dermatologists were attempting procedures beyond their ability and training. A meeting with Sir Terence English , Professor John Alexander - Williams (of Birmingham) and Dr Harvey Baker (then President of BAD) quickly rejected this attack. A youthful Dr Richard Motley was, at that time, the BAD Trainees' representative and he remembers well the quiet dignity with which the case for dermatological surgery was made by Harvey Baker.

For the first six years a simple practical manual was used with kind permission of its American authors, George Popkin and Perry Robins.
Several dermatological surgeons from the USA, including Dan Siegel and Roy Grekin, also joined the faculty for the early meetings and played pivotal roles as lecturers, demonstrators and mentors at early workshop meetings; their experience and enthusiasm for Dermatological Surgery was an inspiration to many participants in the workshops.
There were a lot of challenges to learning the new discipline of dermatological surgery - there were few textbooks or photographs and little professional guidance away from meetings.

At the same time, Mohs surgery started in the UK, with pioneering dermatologists including Neil Walker in St Johns Hospital, London, setting up dermatological surgery practice.

In 1990 the BDSG became the British Society for Dermatological Surgery (BSDS) and in the same year two of its members, Bill Bowers and Peter Kersey produced their own manual for the workshop with help from colleagues who were giving presentations at the meeting. Graham Colver edited the manual from 1994 to 2006 and improved the text without changing emphasis. In subsequent years amendments have reflected changes in ideas and practice as new lecturers were asked to improve the content. The current version of the manual is the synthesis of the work of many dedicated British dermatological surgeons over many years, and the debt to them, and other colleagues, is gratefully acknowledged. All of the artwork was redrawn to a standard format by Pat Elliott, a Medical Artist from Sheffield. In 2004, Peter Kersey created a web based version which is available on the BSDS website (http://www.bsds.org.uk) The most significant change to the latest editions has been the introduction of colour photographs of procedures, new sketches of local skin flaps and the updating of text and references.

This manual will be essential for anyone participating in the Workshop but also contains much helpful background information for those already undertaking cutaneous surgery. Important principles are emphasised to help the reader gain confidence and competence in a range of skin surgical procedures and it also contains lecture notes and references. The manual's primary function is to support the practical sessions. Much of the material in the course lectures can be found in more detail in textbooks of dermatological surgery. The material is however, loosely arranged around the lectures, for ease of reference.

One thing has changed since 1984 - it is no longer difficult to get information about dermatological surgery. The creation of the World Wide Web and search engines such as Google and YouTube, means that information is at our fingertips at all times. There are now many excellent comprehensive textbooks of dermatological surgery and this manual is not a substitute for such resources. However, there is a gap between having the knowledge and being able to competently undertake skin surgery - and practical workshops will remain essential for training future dermatological surgeons.
I hope you find this, the 38th, workshop instructive, stimulating and above all, enjoyable and I wish you every success in your future practice of Dermatological Surgery. Remember that when talent fails, you can triumph with effort.
I hope that the present faculty can inspire you. Ask them questions. Test them out.

"*Perfection is not attainable, but if we chase perfection we can catch excellence*"

Andy Affleck
Manual Editor

ANNUAL WORKSHOPS

1984	Newcastle	Comaish/Dahl/Lawrence
1985	Newcastle	Comaish/Dahl/Lawrence
1986	Plymouth	Peter Kersey
1987	Oxford	Rod Dawber
1988	London	Neil Walker
1989	Cardiff	Holt/Motley
1990	Belfast	Anne Bingham
1991	Nottingham	Les Millard
1992	Portsmouth	John Cook
1993	Birmingham	Jerry Marsden
1994	Chesterfield	Graham Colver
1995	Glasgow	Danny Kemmett
1996	Bristol	Cameron Kennedy
1997	Nottingham	Les Millard
1998	Manchester	Nick Telfer
1999	London	David Harris
2000	Canterbury	Catriona Irvine
2001	Bristol	David de Berker
2002	Nottingham	Les Millard
2003	Leeds	Sheehan Dare / Stables
2004	Newcastle	Lawrence / Ormond
2005	Cardiff	Motley/Morris/Holt
2006	Nottingham	Sandeep Varma
2007	Dundee	Colin Fleming
2008	Sheffield	Ghura/Colver
2009	Newcastle	Langtry/Lawrence
2010	Dublin	Patrick Ormond
2011	Bristol	David de Berker
2012	Bristol	David de Berker
2013	Birmingham	Marsden/Rajpar/Martin-
2014	Birmingham	Rajpar/Martin-Clavigo
2015	Edinburgh	Naysmith / Rice
2016	Edinburgh	Naysmith / Rice
2017	Newcastle	Langtry/Oliphant/Blasdale /Brass/Lawrence
2018	Newcastle	Langtry/Oliphant/Blasdale /Brass/Lawrence
2019	Dundee	Andy Affleck
2020	Cancelled	Due to Covid-19 pandemic
2021	Birmingham	Zaki / Gazzani / Wernham
2022	Dundee	Andy Affleck
2023	Newcastle	Richard Motley
2024	Newcastle	Richard Motley

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CONSENT, PLANNING, FACILITIES AND INSTRUMENTS

Assessment for surgery

"By failing to *prepare*, *you are preparing to fail"*

A thorough assessment of the proposed procedure and any other possible management options is important. This can be done by the surgeon or together with a specialist nurse. It is a duty to explain all the elements of the procedure that the patient or their legal guardian cannot be expected to know. In the UK one should be familiar with the recent Montgomery ruling on informed consent (https://rcpsg.ac.uk/college/influencing-healthcare/policy/consent/the-montgomery-case) which is highly relevant in dermatological surgery especially when dealing with slow-growing low grade skin cancers with minimal morbidity but for which a proposed excision may need a complex reconstruction with associated morbidity. The discussion(s) should include the following

1. The problem to be treated
2. Likely outcome, complications (try and quantify risk), e.g. infection, nerve palsy
3. The unpredictable nature of the scar and where it will lie
4. Alternative treatments and their merits
5. The consequences of doing nothing
6. Where the operation will take place e.g. in an operating theatre or biopsy room. The patient may need to change from their outdoor clothes into theatre clothes
7. What the operation will involve e.g. it will take place under local anaesthesia and not general anaesthesia. The patient will therefore be awake throughout
8. How long it will take
9. What will happen after the procedure e.g. dressings, wound care, follow-up

A consent form should then be signed and a note made in the patient records. A handout may be helpful for the patient containing relevant information on the type of procedure to be performed to read in advance if desired. Recent guidance suggests writing directly to patients and indeed many patients do appreciate a personalised written summary of a pre-op consultation which can be cc to their GP (http://www.aomrc.org.uk/reports-guidance/please-write-to-me-writing-outpatient-clinic-letters-to-patients-guidance/).
You should be familiar with the GMC guidance on good practice and in particular with their publication "Seeking patients consent: the ethical considerations". (www.gmc-uk.org).
Adequate pre-operative assessment of the lesion and the patient's suitability for surgery are essential.

"Plan for the worst, deal with the best"

"A good surgeon doesn't just concentrate on technical ability, but also on the appropriateness of what they are doing"

The size, site and nature of the lesion must be considered. Particular care must be given to the characteristics of the skin and the anatomy at the site of the lesion.
Caution is needed when operating near so-called "danger points" which contain vital structures e.g. in the axilla, femoral triangle, neck - particularly the posterior triangle where the spinal accessory nerve lies, the wrist and the hand. Pulsatile lesions should be avoided. A lesion lying in the region of the nerve may be a neurofibroma. Superficially situated nerves or arteries are vulnerable and great care must be taken to avoid them when possible.
The aesthetic outcome of surgery is important and practitioners should consider whether they have adequate specialist knowledge and experience to achieve a good result. This is particularly important when assessing a facial lesion.
The patient's past history, general health, medication and allergies must be known and considered. Particular aspects of the medical history which may require attention are detailed in Table 1.

Wrong site surgery and Consent

Litigation is not a particularly big problem in dermatological surgery compared to other surgical specialties but the top two reasons skin surgeons get sued are for wrong site surgery and improper consent. **Wrong site surgery** is defined as 'any surgery performed on the wrong site or wrong patient or performance of the wrong procedure'. It is regarded as a 'never event'. A never event is a 'serious, largely preventable patient safety incident that should not occur if existing national guidance or safety recommendations had been implemented by health acre providers' Wrong site surgery can happen if there are multiple lesions, difficulties identifying the scar if a previous biopsy has been taken, record keeping errors etc There is no formal consensus regarding the specific methods that are most valuable for mitigating the risk of wrong site surgery in dermatology but the following tips are helpful: Photograph of the lesion with an arrow identifying site, this could be with the patient's smartphone if medical photography is not available. Providing the patient with a handheld mirror to confirm the site on the face. Using accurate anatomical descriptions. Measurements from fixed landmarks. The important thing is to 'check, mark, confirm'.

"Watch carefully what you do. Function before beauty"

"Acknowledge your limitations so as to do no harm and extend your abilities to do the most good"

Consent The UK law on consent has been modernised and the Bolam test no longer applies. It has been replaced with the Montgomery Judgement (https://rcpsg.ac.uk/college/influencing-healthcare/policy/consent/the-montgomery-case)

With the Montgomery judgement it is the patient rather than medical professionals that decide on the level of risk they wish to take in a particular course of action, given all information available. The Montgomery judgement requires a doctor *'to take reasonable care to ensure that the patient is aware of any material risks involved in any recommended treatment, and of any reasonable alternative or variant treatment'.* This includes no treatment. A material risk is 'either a risk to which a reasonable person in the patient's position would be likely to attach significance or a risk that a doctor knows, or should reasonably know, would probably be deemed of significance by this particular patient'.

This change in law now demands a standard of consent which is in keeping with GMC guidance on good practice "seeking patients consent:the ethical considerations" www.gmc-org.uk The amount of information about a risk that the doctor should share with a patient will depend on the individual patient and what they want or need to know. The focus is on the patient's individual situation and risk to them even if the likelihood of an adverse outcome is very small. Daniel Sokol a barrister and medical ethicist has published in the BMJ 2015;350:H1481 and suggests when obtaining consent you ask yourself the following 5 questions: Does the patient know about the material risks of the treatment? Does the pt know about reasonable alternatives? Have I taken reasonable care to ensure that the patient actually knows all this? Do any of the exceptions to my duty to disclose apply here? Have I properly documented my consent process? Daniel Sokol has also published on how doctors can protect themselves against the allegation that they failed to take 'reasonable and appropriate steps' to satisfy themselves that the patient understood the information. BMJ 2014;349:g6432. A very useful acronym when it comes to obtaining consent is 'PARQI' (procedure, alternatives, risks, questions, information leaflet) along with careful documentation. A statement along the lines of "Procedure, alternatives and risks explained in clear terms. Questions invited but none asked. Patient appears to understand. Leaflet provided. Patient advised to read.'

"A patient is not always right but is never wrong (perhaps uninformed, uneducated or ignorant, but not wrong)"

"Experience is that which allows you to recognize the mistake the second time around"

Table 1

Particular aspects of the medical history which may require attention
(* denotes presence of existing BSDS guideline)

Relevant history	Consideration
Diabetes	Timing of operation in relation to meals. The insulin-dependent diabetic has to time their food intake carefully. Have access to a sugary drink in case of inadvertent hypoglycaemia.
Epilepsy	May theoretically limit the dose of lignocaine or other cerebral stimulants used
Bleeding Tendency*	Important to determine potential risk of excessive bleeding e.g. haemophilia. Drugs such as aspirin, warfarin and prostaglandin inhibitors like clopidogrel, the new DOACs e.g. rivaroxaban as well as vasodilators, such as alcohol. (See BSDS guideline)
Pacemaker / Implantable Defibrillator*	Consider the type of diathermy used - Unipolar v Bipolar. Discuss with cardiologist or pace-maker clinic if any doubt about interference with its function due to electrocautery (see BSDS guideline)
Myocardial Infarction	Operation best deferred until at least six months after a myocardial infarction. If in doubt discuss with a cardiologist
Renal or Liver Failure	May affect drug metabolism
Excessive Anxiety	May require pre-medication e.g. lorazepam, and increased psychological support
Hepatitis B or HIV (with active viral load)	Extra protection needed for staff (double gloves). Only essential operations should be considered and done at end of list
Pregnancy	In first trimester of pregnancy non-essential intervention should be avoided.
Hypertension	May increase superficial oozing and bleeding— postpone elective procedure if BP > 220/140
Poor scarring	Discuss likelihood of formation of further hypertrophic scars or keloids.
Allergies	Check whether allergic to systemic medicaments, e.g. penicillin and local anaesthetics or topicals, e.g. povidone Iodine or colophony in plasters, latex.

Relevant history	**Consideration**
Artificial heart valve	No routine prophylaxis necessary* Consider if dermatological surgery involves infected skin or incision of oral mucosa
Orthopaedic prosthesis	No routine prophylaxis Consider if dermatological surgery involves infected skin or incision of oral mucosa
Child	Play therapist
Thrombocytopenia	< 50—discuss with haematologist re platelet infusion or platelet receptor antibody

"We diagnose only things we think about, we think about things we know, and we only know things we've studied"

"The patient is the most important person in the operating room"

"Treat every patient as they would like to be treated"

"The only thing you truly possess is your ability to make choices (and to use reason and judgement when doing so)"

To be completed by **PATIENT**

Pre-op checklist

Age:	Male Female (please circle)	Occupation:

Previous skin cancer	Yes	No
Family history of skin cancer	Yes	No
Is pregnancy possible?	Yes	No

Past Medical History: (Please tick **yes** or **no** to the following as it pertains to you)

Heart disease/heart valve/murmur	Yes	No
Lung disease	Yes	No
Liver disease	Yes	No
Blood disease e.g. leukaemia	Yes	No
Heart attack or stroke in the last 6 months	Yes	No
Arthritis	Yes	No
Severe back pain	Yes	No
Anxiety disorder or panic attacks	Yes	No
Neurologic disease/dementia	Yes	No
Cancer (other than skin)	Yes	No
Infectious disease, including MRSA, Hepatitis B, C, HIV or CJD	Yes	No
Diabetes	Yes	No
High blood pressure	Yes	No
Bleeding tendencies	Yes	No
Healing problems/keloid scars	Yes	No
Pacemaker	Yes	No
Defibrillator	Yes	No
Do you usually need antibiotics before surgical procedures	Yes	No
Fear of needles	Yes	No
Can you lie flat for 1 hour	Yes	No

Other medical problems we need to be aware of:

Medications: Please list the medications you are currently on – including over-the-counter herbal products:

Aspirin	Yes	No
Warfarin	Yes	No
Clopidogrel	Yes	No
Dipyridamole	Yes	No
Dabagabtrin	Yes	No
Rivaroxaban	Yes	No

Allergies: Please list any allergies you have to medications or tape e.g. Elastoplast, local anaesthetic, latex

Habits	**Yes**	**No**	**Occasional**
Do you smoke?			
Do you use alcohol?			
Any other special needs/requirements? e.g. impaired vision, deafness, carer required, hospital transport required?			

Clinical Frailty Scale*

1 **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 **Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 **Managing Well** – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 **Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 **Mildly Frail** – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 **Moderately Frail** – People need help with **all outside activities** and with **keeping house.** Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **Severely Frail – Completely dependent for personal care,** from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. Terminally Ill - Approaching the end of life. This category applies to people with **a life expectancy <6 months,** who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia,** recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia,** they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

DALHOUSIE UNIVERSITY *Inspiring Minds*

This assessment helps in decision-making re. possible treatments eg at the skin cancer MDT meeting

Notes

FACILITIES AND EQUIPMENT

To perform minor surgery safely and to a satisfactory standard, the operating room and equipment must meet basic criteria. Please refer to: Staffing-and-Facilities-for-Skin-Surgery-Dermatology-Services-V4-Checked.pdf (bad.org.uk)

The room must be of adequate size and used solely for clean purposes. It should have washable walls, floor and ceiling, and be large enough to house all equipment needed. There should be sufficient space for movement around the patient and equipment without the risk of de-sterilisation during the procedure. Within the room should be an area for scrubbing up pre-operatively. This must have taps which are operated without the use of hands.

Adequate lighting must be provided, particularly background general illumination and some form of higher focal illumination on the area you are working on. The angle-poise type of illumination is not satisfactory.

An operating table or adjustable couch in which the height can be adjusted, sufficiently narrow for the patient to be accessible from both sides. There should be a head end which is adjustable for height and either the foot should be able to be raised or the table tilted to place the patient in a head down position.

A mobile trolley with a sterilisable top surface should be available on which instruments will be placed. Suction apparatus is useful for some areas, eg around the eye. Haemostatic equipment, eg mono or bipolar electrocautery should be available. Hot wire cautery has a limited role.

Resuscitation equipment. This should include adequate anaesthetic suction apparatus which should be tested before each session. Staff should have regular CPR updates.

Intubation equipment. Apparatus for providing intravenous fluids and suitable drugs for resuscitation.

A skin surgery suite

INSTRUMENTS

As a general rule, instruments for skin surgery are smaller and more delicate than general surgical equipment. Always try out the instruments, to make certain they fit your hand well, and clamp and unclamp easily. Avoid cheap instruments as these rust and disintegrate quickly. Tungsten jaws for needle-holders are desirable, but not essential, as they are so hard that they may chip and may cut sutures inadvertently. Plain jaws will hold small needles better than grooved ones. Single use instruments may be desirable, are cost-effective and are often of good quality.

Ideally left handed surgeons should use left handed needle holders (with reversed ratchet) or use the Matthieu type which will suit either hand. Scissors are also handed, and if right handed scissors are used left handed there is a marked loss of shear and torque forces. The following are recommended.

Notes on sterilisation are found in appendix 2.

Essential

- Swann Morton Scalpel handle No.3
- Blade no.15
- Skin hooks 2 - Kilner, Gillies or McIndoe
- Forceps - Fine Toothed and Fine Non-Toothed eg Adson's
- Mosquito Forceps Curved eg Halstead (2 minimum)
- Scissors - curved, blunt, fine, eg Metzenbaum/Lahey serrated approx. 125-150mm
- Strong scissors for cutting sutures and dressings
- Scissors - sharp tips eg. Iris Scissors 75-100mm
- Needle Holder - Fine Jaws eg Halsey, Crilewood, 125-150mm.
- Skin Marker, e.g. Summerlad or disposable sterile
- Sponge Forceps
- In Separate Sterile pack:
- Curettes, e.g. Stiefel Ring curettes 4 + 7mm
- Punch Biopsies 3 - 8mm (usually 4mm) (Stiefel)
- Towel clips

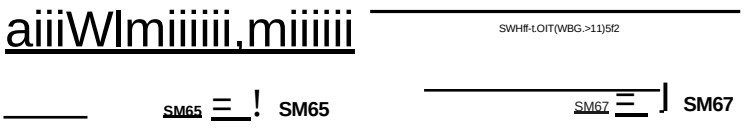
Desirable - in more complex cases e.g. periocular surgery or Mohs

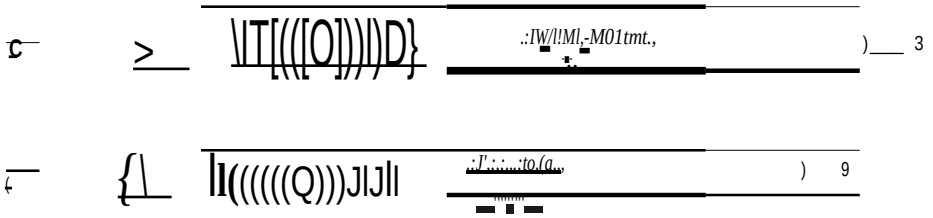
- Cats paw retractor
- Chalazion (Eyelid) Clamp e.g. Desmarres (medium size)
- Beaver Handle for very small scalpel blade.
- Monopolar + bipolar electrocautery
- Dental Syringe.
- Ophthalmic forceps – small toothed eg St Martins

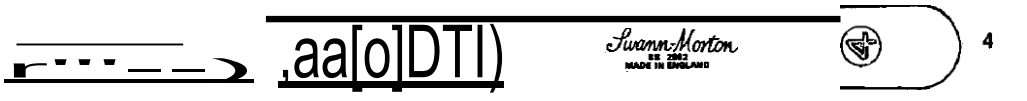
Swann-Morton

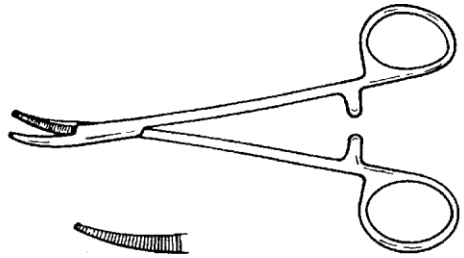
LIMITED

Surgical Blades and Handles

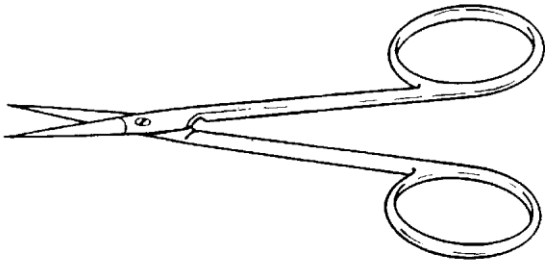




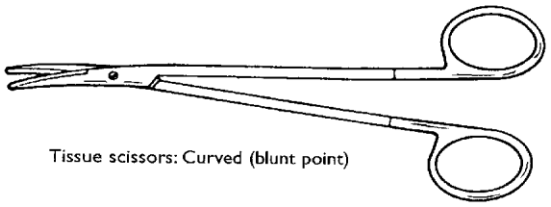




Mosquito forceps



Suture scissors: Left or Right handed



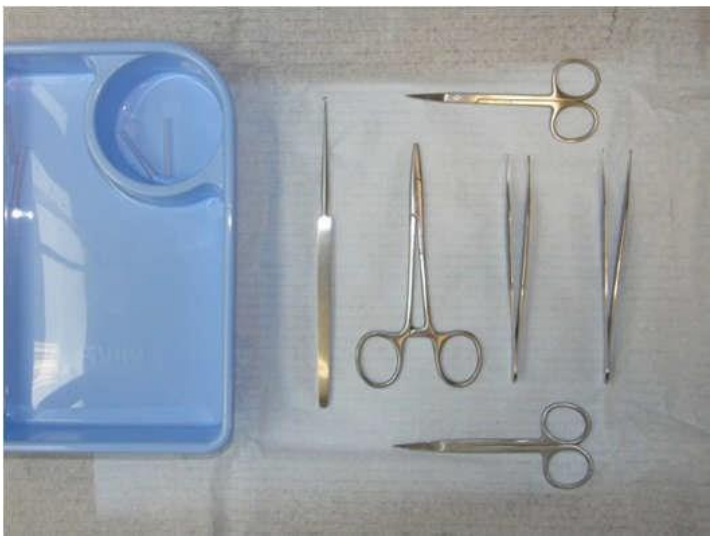
Tissue scissors: Curved (blunt point)

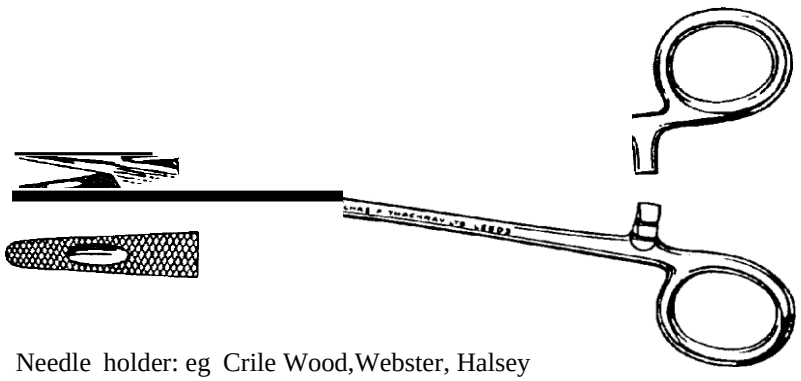
Reusable scalpel handle

no. 15 blade scalpel – the commonest size used for skin surgery

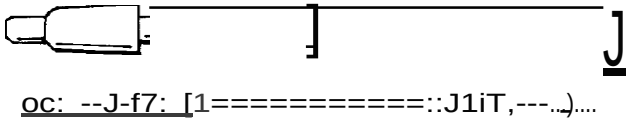
Single use pre-mounted scalpel and plastic handle

A variety of single use skin surgery packs are available





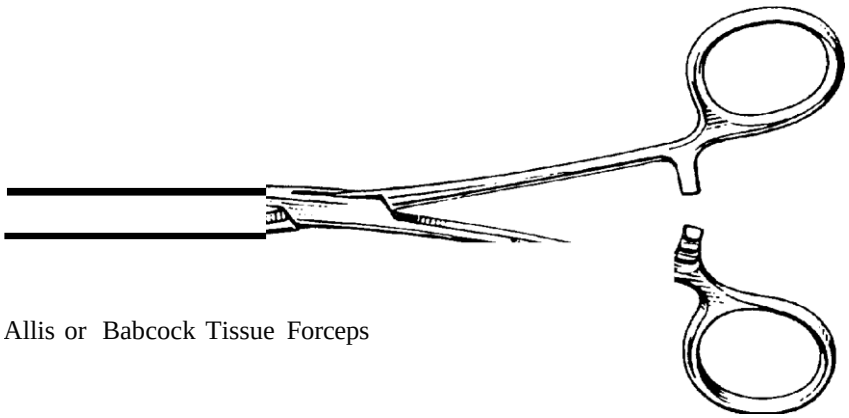
Needle holder: eg Crile Wood,Webster, Halsey
(125- I SOmm, left or right handed)



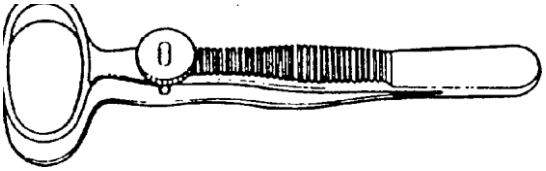
Punch biopsies and ring curettes:
Stiefel - 3,4,5,6mm (most common use 4mm)

Cats Paw retractors

8



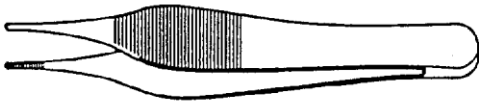
Allis or Babcock Tissue Forceps

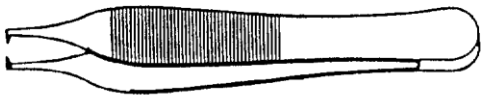


Chalazion (Eyelid) clamp

SKIN HOOKS AND FORCEPS

Skin hooks: Kilner, Gillies or McIndoe





Forceps: Fine Adson's Toothed and Non-toothed

Notes

"Never promise a patient anything that is not in your power to provide"

Preparing the patient for surgery

Consent
As discussed previously. Written advice and photographs of possible cosmetic outcomes can improve patient readiness for the procedure and on line videos are now also available which may be of benefit with more complex procedures.

Relaxed Patient
The more relaxed the patient, the easier it will be for the surgeon. Talk to your patient. Make sure he or she is comfortable.

Preparation of Non Hair Bearing Skin
Dirt or make-up should be removed and the skin cleaned with Hibiscrub (4% Chlorhexidine Aqueous solution) or Betadine (10% Povidone-Iodine solution) for 1 - 3 minutes to reduce skin flora. (Many procedures involve the use of a diathermy or cautery, so ALCOHOL containing preparations such as HIBISOL should NOT be used because of the risk of fire).

Preparation of Hair Bearing Skin
Do NOT shave unless absolutely essential. Shaving increases the infection rate by increasing organisms on the skin surface. If it is necessary to shave hair do it immediately before skin preparation. Cleansing with aqueous detergents and clipping back with scissors or using tape or aquagel is usually all that is required.

Preparation of surgeon

Hand washing
Hard scrubbing is probably not required. Remove visible dirt, especially under nails. They should be kept short. Wash twice in running water using Hibiscrub (4% Chlorhexidine) or Betadine (10% Providone-Iodine) which leave a residual antiseptic film.

Gloves
They protect both the patient and the surgeon and should be worn for all procedures. Double gloving gives better protection against needlestick injury.
Masks

There are case reports of transmission of infectious agents e.g. HIV, through blood splashes, and eye protection is accepted practice e.g. disposable visor with mask.

Scrubs
Are accepted practice in operating theatres, to protect the surgeon and his clothing.

Sterile gowns
Are usually not necessary, but may be useful to reduce the risk of infection in procedures where there is an increased risk of infection.

Theatre Caps
Should be worn for aseptic techniques

Plume extractor
This is desirable when performing ablative laser or electrodessication to minimise risk of inhalation of air-borne carcinogens and viruses.

"Life is short, and the Art long; the crisis fleeting; experience perilous, and decisions difficult. The physician must not only be prepared to do what is right himself, but also to make the patient, the attendants and externals cooperate"

Etiquette in local anaesthetic skin surgery
The patient is the most important person in the room
First do no harm
If in doubt, don't
Seek a second opinion when needed
Do not be afraid to change the procedure that has been requested
Good communication
Introduce all individuals present
Treat the patient as they wish to be treated / individual approach
Discuss and reflect on each case with the other team members
Minimise interruptions
Choose words carefully
Maximise efforts to relax the patient
Use checklists and WHO surgical pause

The Royal College of Surgeons of Edinburgh have produced a succinct manual on
Non-Technical Skills for Surgeons (NOTSS)
Structuring observation, feedback and rating of surgeons' behaviours in the operating theatre which contains some useful guidance relevant to LA surgery—available at—
https://www.rcsed.ac.uk/professional-support-development-resources/learning-resources/non-technical-skills-for-surgeons-notss

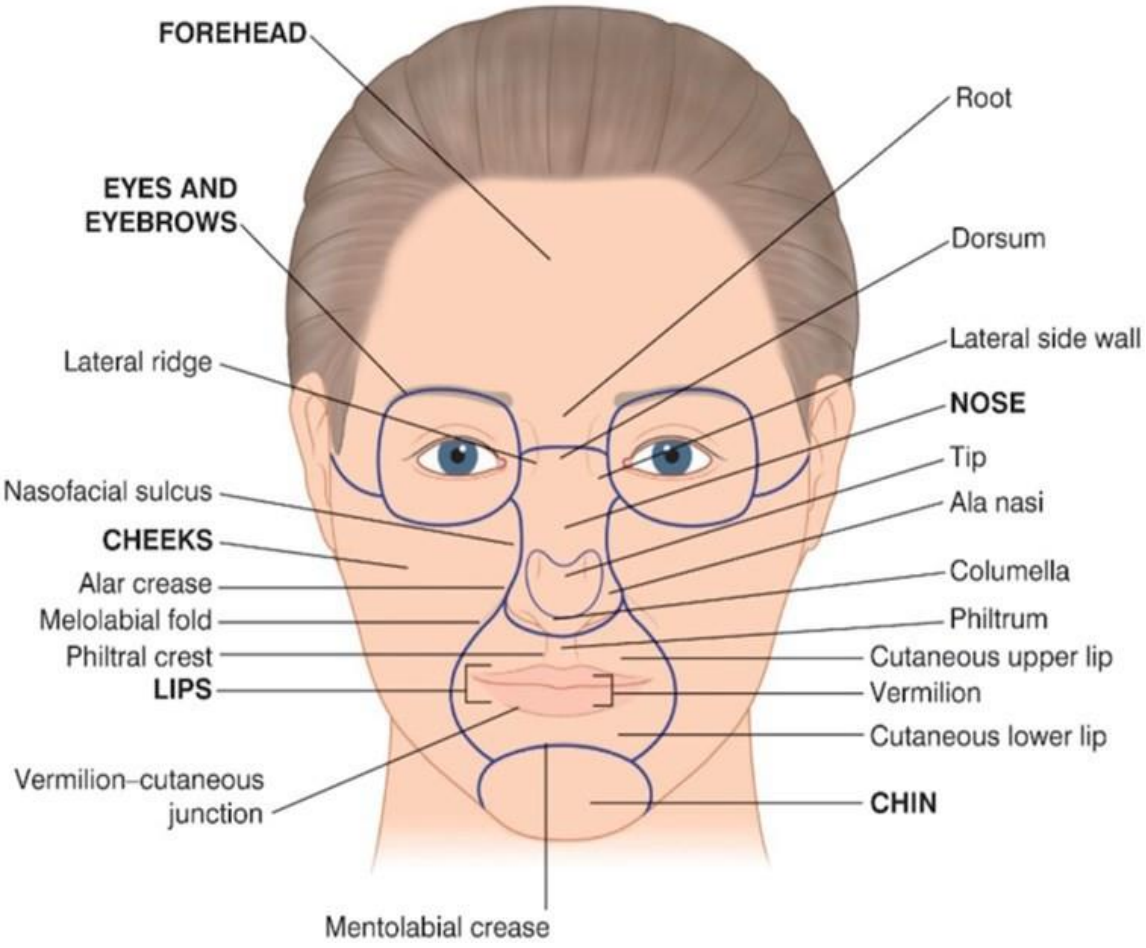
Notes

SURGICAL ANATOMY

A thorough knowledge of superficial anatomy is required and is beyond the scope of this text. Important considerations are highlighted below. Many on line resources are available for reference and a detailed atlas of superficial anatomy is essential for any department performing skin surgery.

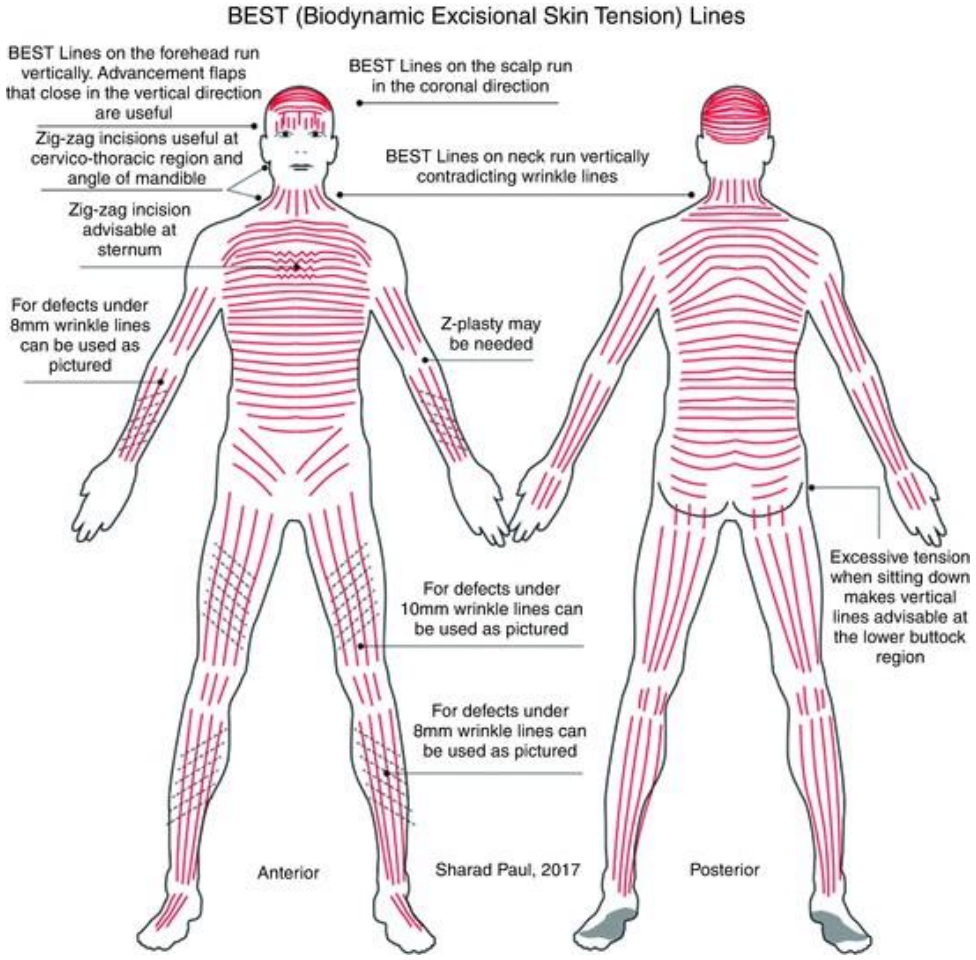
Reference and recommended reading:
Surgery of the Skin: Procedural Dermatology. Robinson, 3rd Edition 2015; Chapter 1

Cosmetic subunits
These are distinct areas of the face with similar skin colour and texture and include the forehead, eyes and eyebrows, cheeks, nose, lips and chin. Scars are often best placed along the borders of cosmetic subunits where possible.



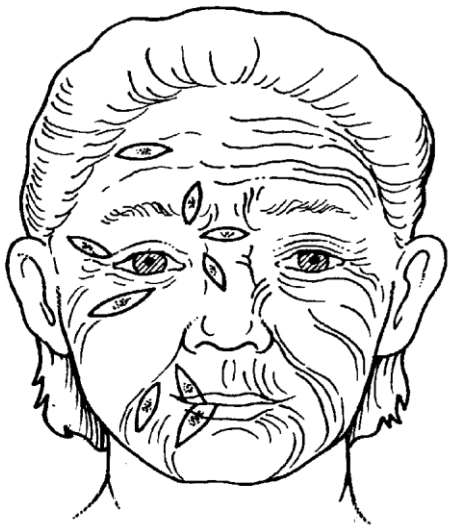
Relaxed Skin Tension Lines (RSTL)

Try to place the line of the sutured wound in the relaxed skin tension lines or wrinkle lines. To find these, if they are not obvious, ask the patient to screw up their eyes, if the lesion is around the eye, or smile if the lesion is on the lower part of the face. Limbs can be bent and stretched to examine the wrinkling of the skin. If none of this manoeuvring is successful in demonstrating skin creases, try pinching up a small part of the skin near or over the lesion and look at the flow of the wrinkle lines, into and out of the pinch and adjust the direction of pinch until the lines are parallel with the pinched direction.

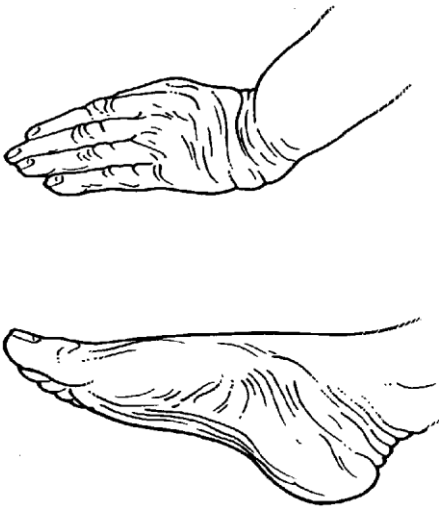


Paul SP. Biodynamic excisional skin tension lines for surgical excisions: untangling the science Ann R Coll Surg Engl 2018; 100: 330-337.

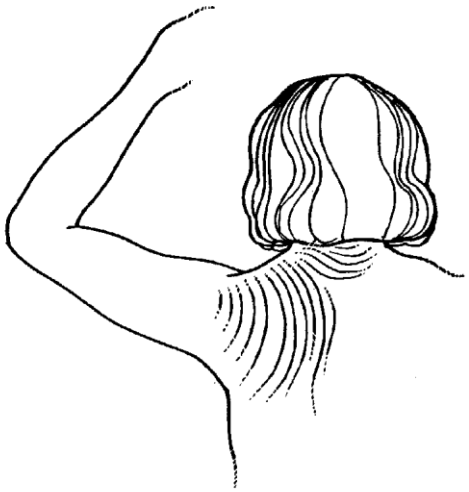
PLACEMENT OF EXCISIONS AND INCISIONS



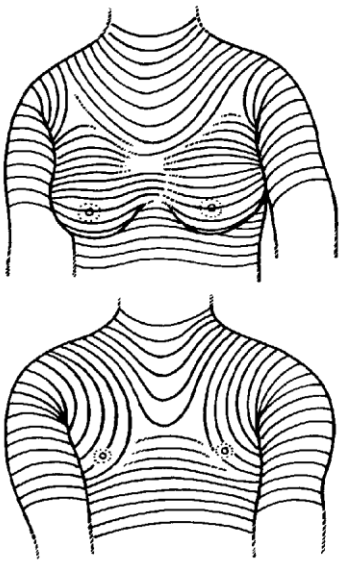
Suggested placement on common skin wrinkle lines



Wrinkle lines made visible by flexing or extending the hand or foot



Wrinkle lines on back when arm raised



Wrinkle lines on torso

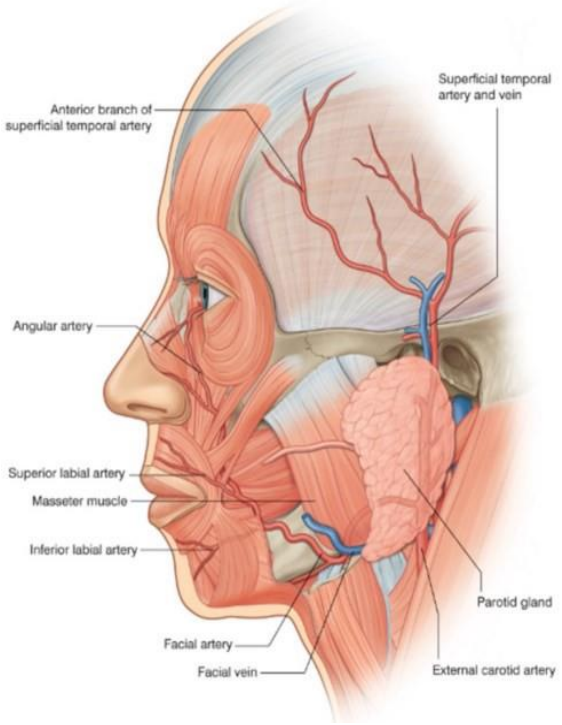
NOTE: RSTL on the limbs run more vertically than horizontally — often an obliquely orientated scar is desirable. Assessment in the natural position ie standing rather than supine or prone will give true RSTLs.

Danger Areas

Some of the structures that are particularly vulnerable in the head and neck are noted below.

Temporal artery. Variable route across the temple. In elderly people it is often tortuous and surrounded by very little subcutaneous fat. If damaged it should be ligated with 4/0 vicryl.

Facial artery. This crosses the mandible at the anterior border of the masseter muscle traverses the lower cheek to a point just lateral to the angle of the mouth and gives off the superior and inferior labial arteries. It then runs up the side of the nose to terminate around the medial canthus of the eye.



External carotid branches include the facial and superficial temporal arteries.

Internal carotid branches include the supra-orbital and infra-orbital arteries.

There is rich arterial anastomosis across the head and neck region.

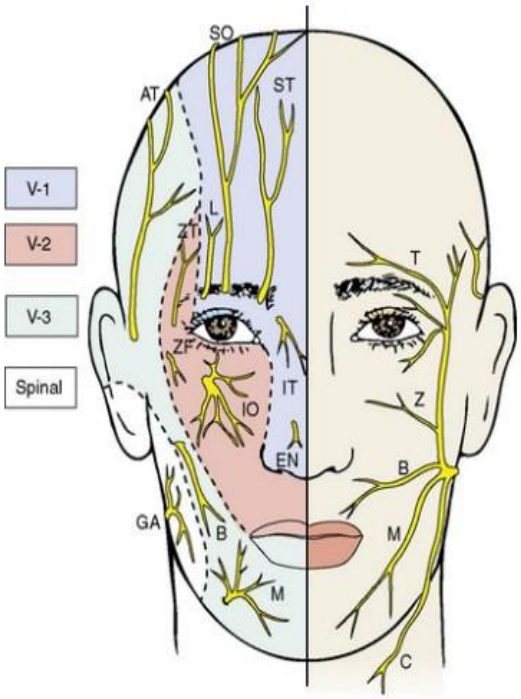
Superficial branches of the trigeminal nerve. Especially vulnerable are the supratrochlear and supraorbital nerves, the zygomaticotemporal nerve and the auriculotemporal nerve on the lateral cheek. In the lower part of the face the mental branch is vulnerable on the chin after it leaves the mental foramen.

Sensory Innervation: Divisions and Branches of the Trigeminal nerve

Trigeminal nerve branches with Facial nerve branches for comparison

Certain sensory nerves can be blocked with local anaesthesia.

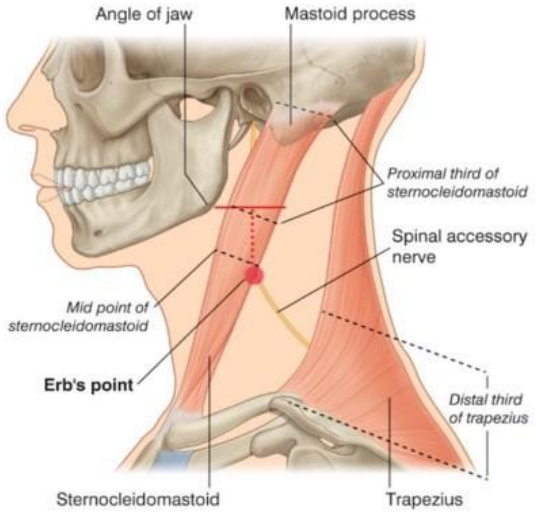
Supra-orbital and supra-trochlear nerves are vulnerable to injury with incisions and undermining above the eyebrow.



Spinal Accessory Nerve. Runs across the base of the posterior triangle emerging from the posterior border of sternocleidomastoid at the junction of upper and middle thirds. It courses posteriorly inferiorly and disappears behind the trapezius muscle in the lower third of the triangle. It is deep to superficial fascia and hence is less likely to be damaged than some of the nerves of the face which lie more superficially.

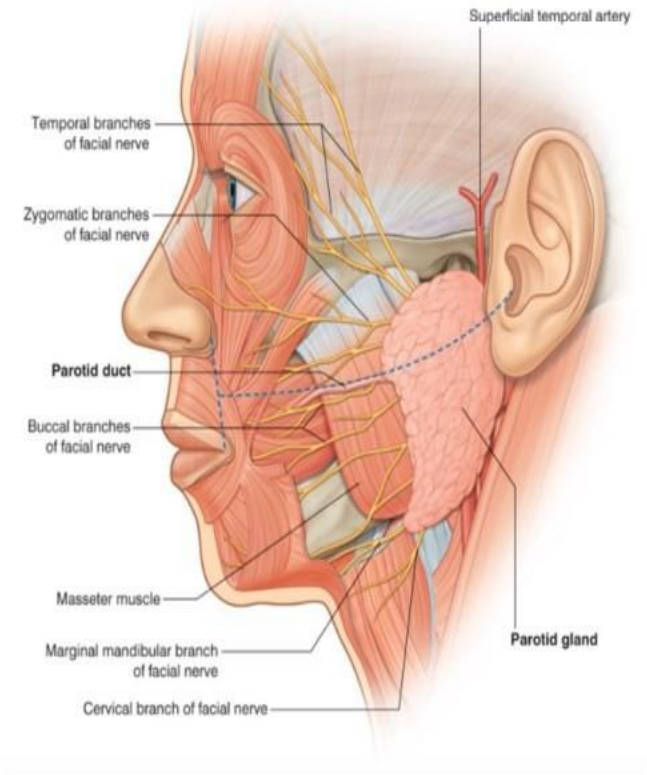
Facial nerve. The temporal branch frequently subdivides shortly after leaving the parotid gland. These branches are very superficial and easily damaged. The marginal mandibular branch is most at risk where it crosses the inferior border of the mandible adjacent to the facial artery at the anterior border of

Danger areas for undermining: Accessory Nerve



The Accessory nerve is vulnerable to injury as it crosses the posterior triangle of the neck.

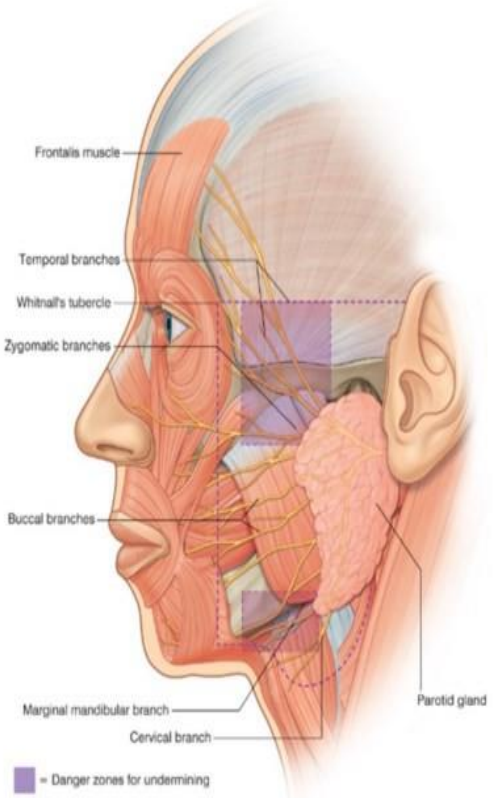
Motor innervation: Branches of the facial Nerve



The facial nerve innervates the muscles of facial expression and consists of temporal, zygomatic, buccal, mandibular and cervical branches.

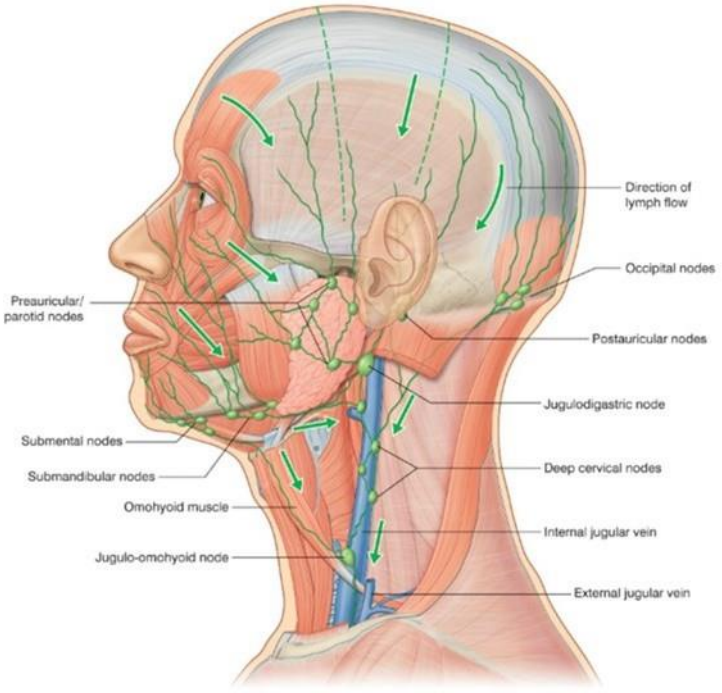
The Facial nerve and its branches are closely related to the parotid. The parotid duct runs close to the buccal branch of the Facial nerve and can be palpated over masseter.

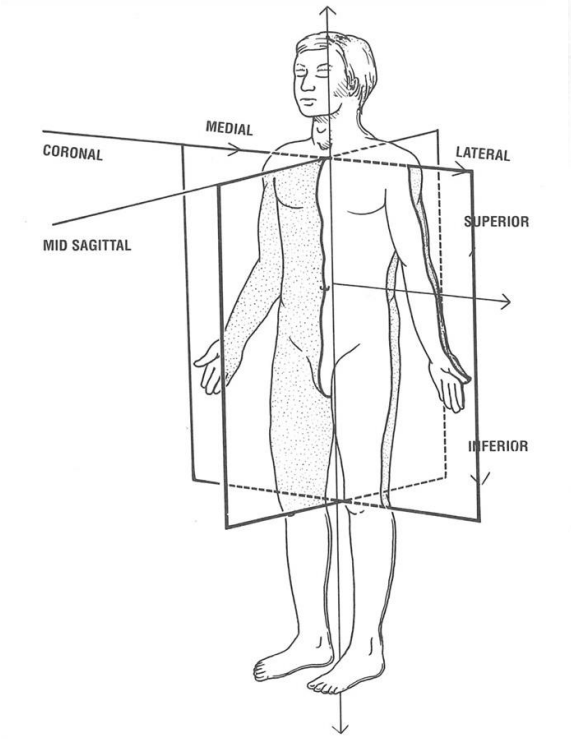
Danger areas for undermining: Branches of the Facial Nerve

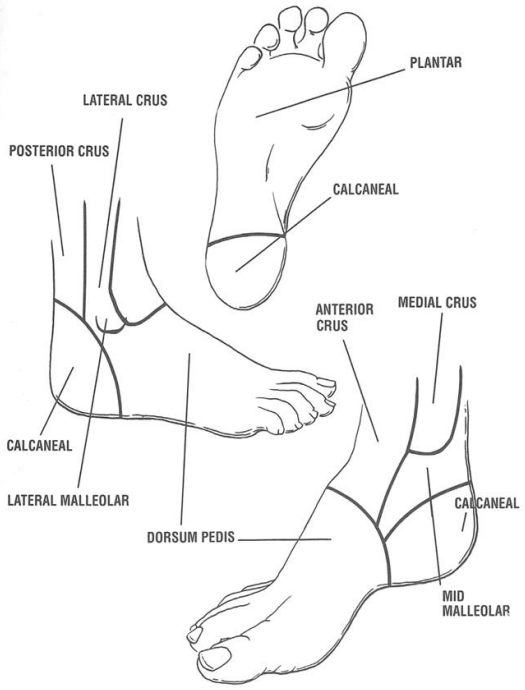


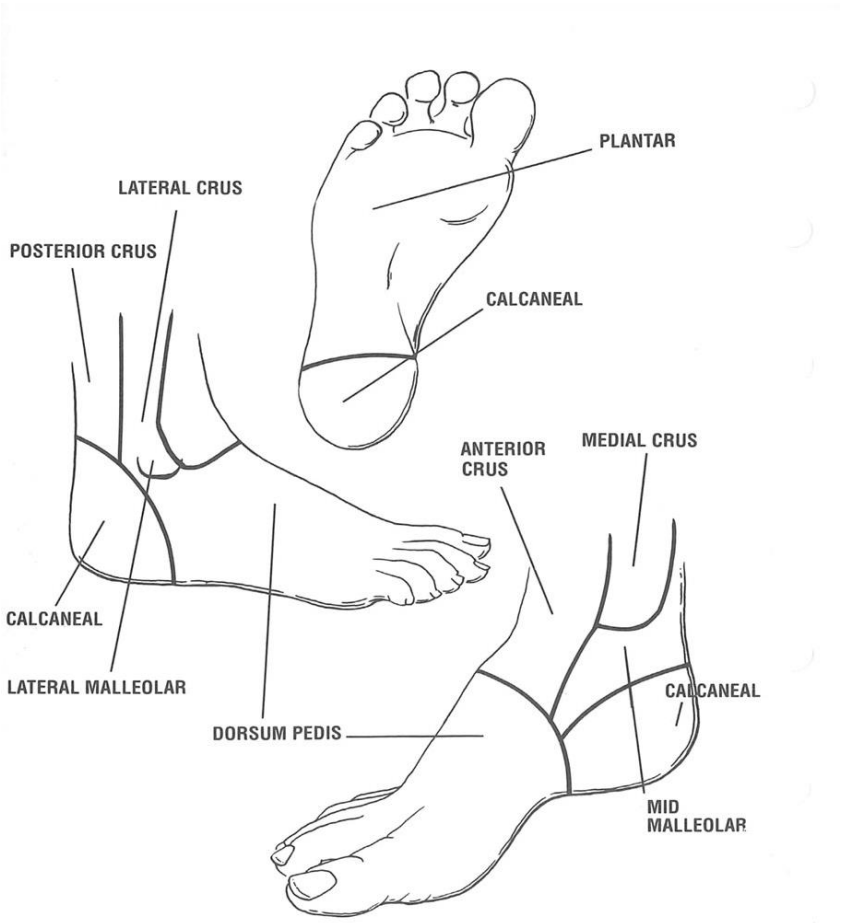
The facial nerve branches are vulnerable to injury where they emerge anterior to the parotid gland, with the temporal and marginal mandibular branches the most susceptible.

Lymphatic drainage—this is important when surveying for skin cancer metastasis




MEDIAL
CORONAL
LATERAL
SUPERIOR
MID SAGITTAL
INFERIOR


PLANTAR
LATERAL CRUS
POSTERIOR CRUS
CALCANEAL
ANTERIOR CRUS
MEDIAL CRUS
CALCANEAL
LATERAL MALLEOLAR
DORSUM PEDIS
CALCANEAL
MID MALLEOLAR


PLANTAR
LATERAL CRUS
POSTERIOR CRUS
CALCANEAL
ANTERIOR CRUS
MEDIAL CRUS
CALCANEAL
LATERAL MALLEOLAR
DORSUM PEDIS
CALCANEAL
MID MALLEOLAR

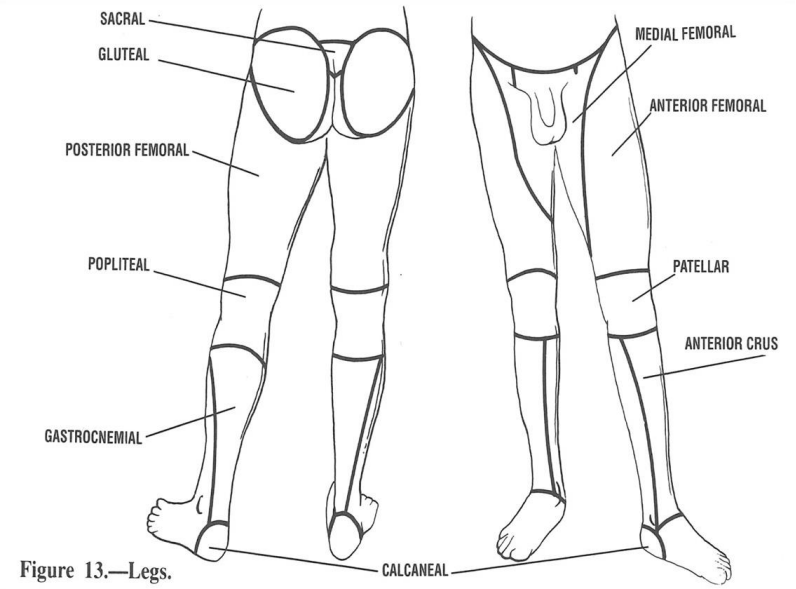
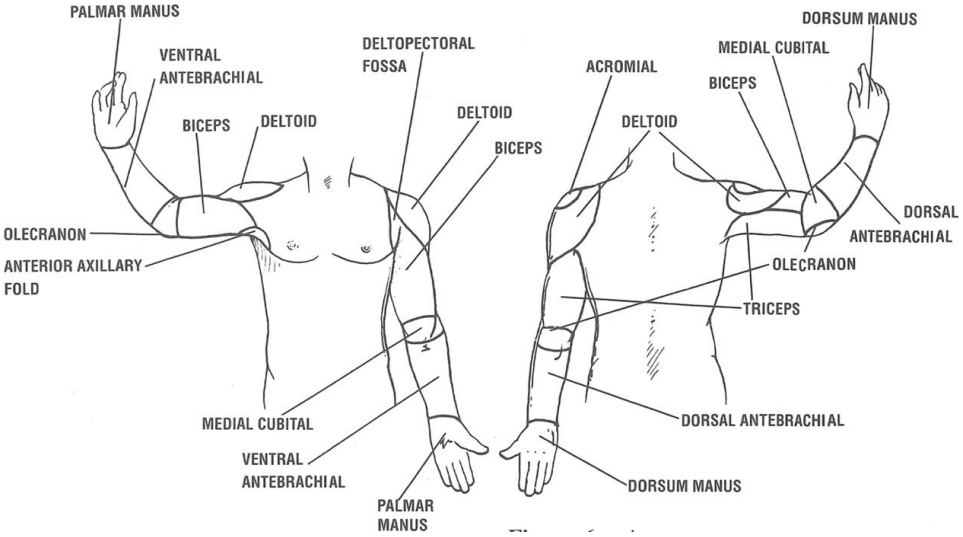
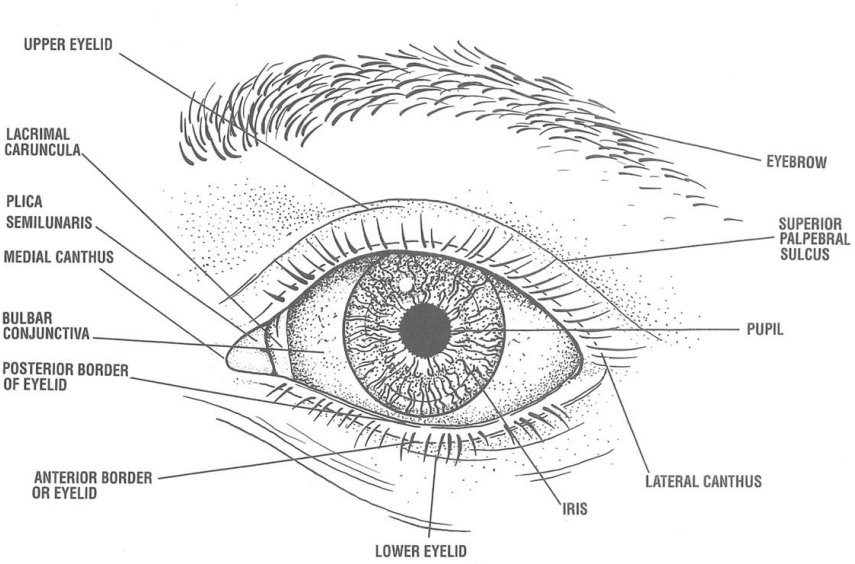
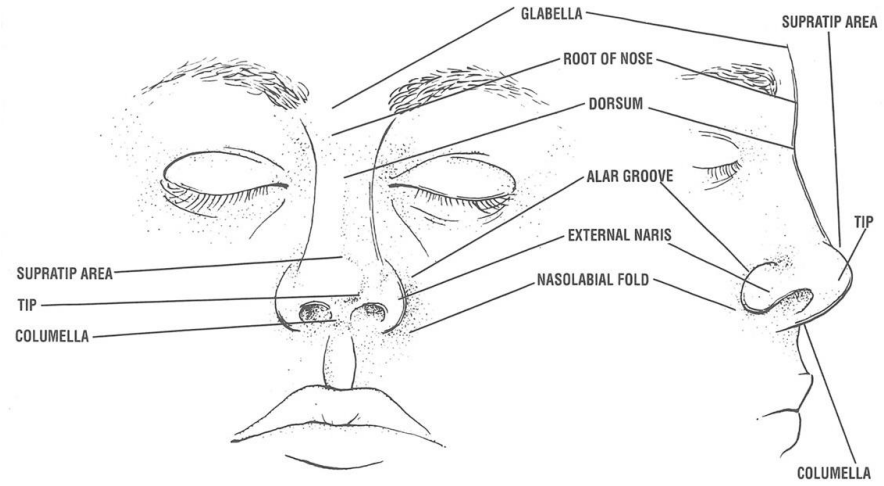
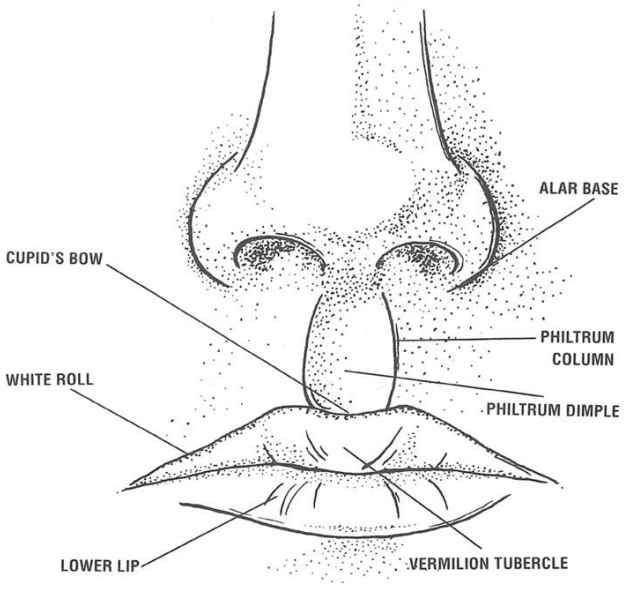


Figure 13.—Legs.

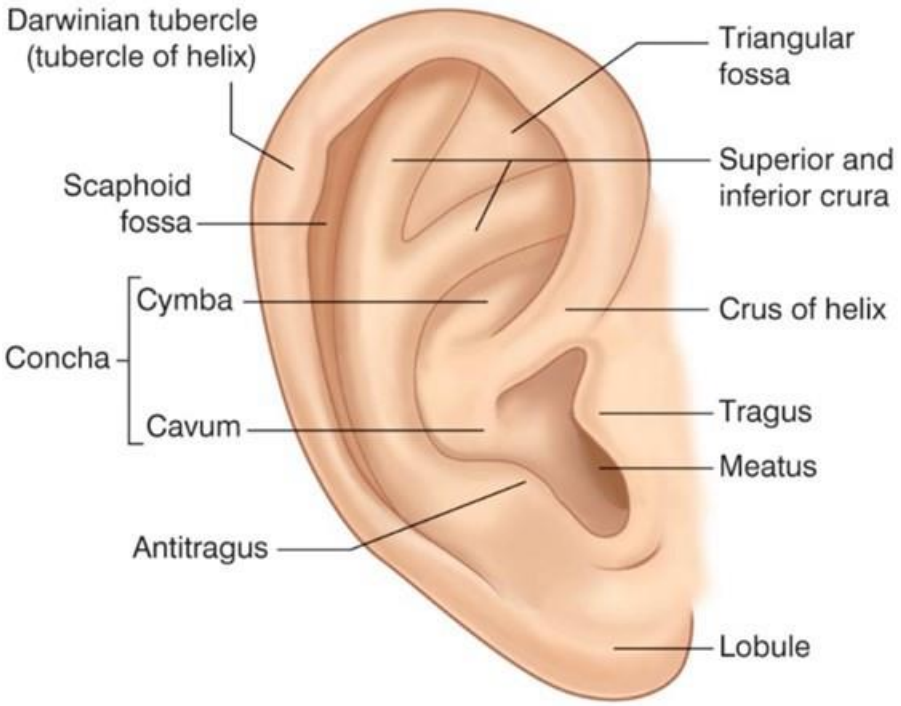



UPPER EYELID
LACRIMAL CARUNCULA
PLICA SEMILUNARIS
MEDIAL CANTHUS
BULBAR CONJUNCTIVA
POSTERIOR BORDER OF EYELID
ANTERIOR BORDER OR EYELID
LOWER EYELID
EYEBROW
SUPERIOR PALPEBRAL SULCUS
PUPIL
LATERAL CANTHUS
IRIS

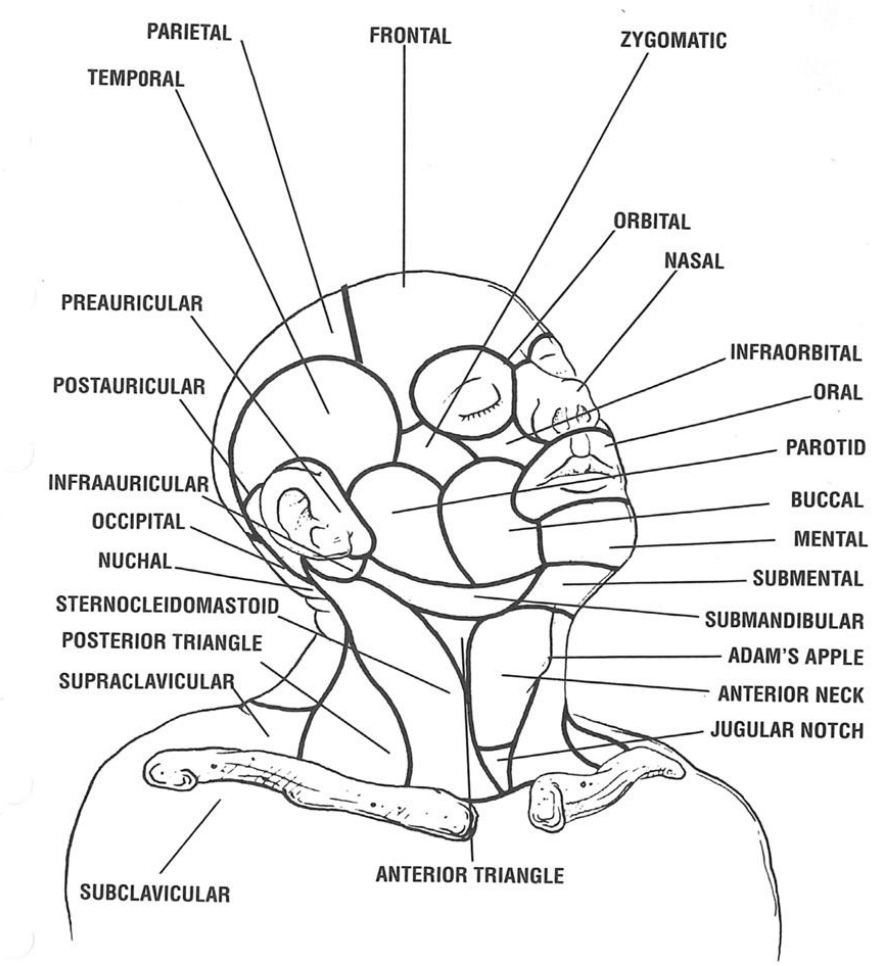

GLABELLA
ROOT OF NOSE
DORSUM
ALAR GROOVE
EXTERNAL NARIS
NASOLABIAL FOLD
SUPRATIP AREA
TIP
COLUMELLA
SUPRATIP AREA
TIP
COLUMELLA

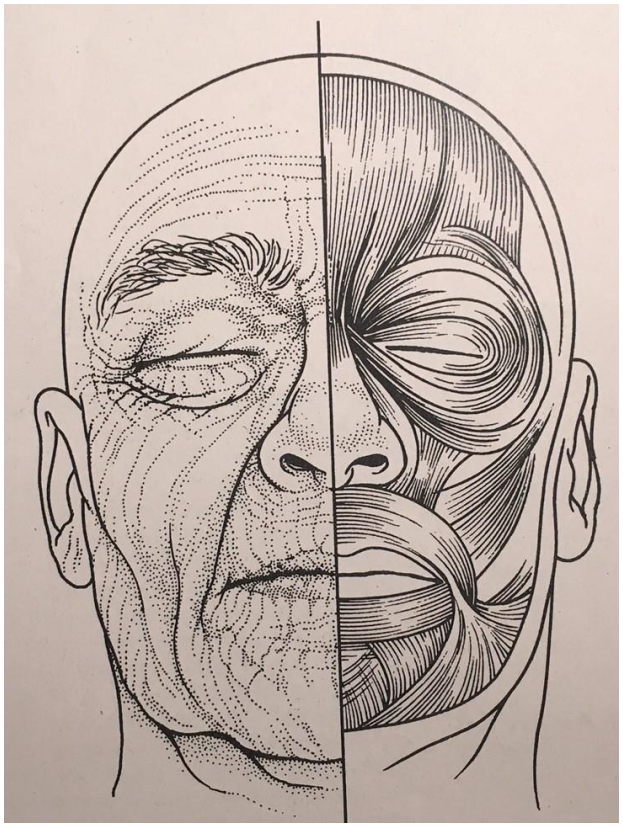

ALAR BASE
CUPID'S BOW
PHILTRUM COLUMN
WHITE ROLL
PHILTRUM DIMPLE
LOWER LIP
VERMILION TUBERCLE

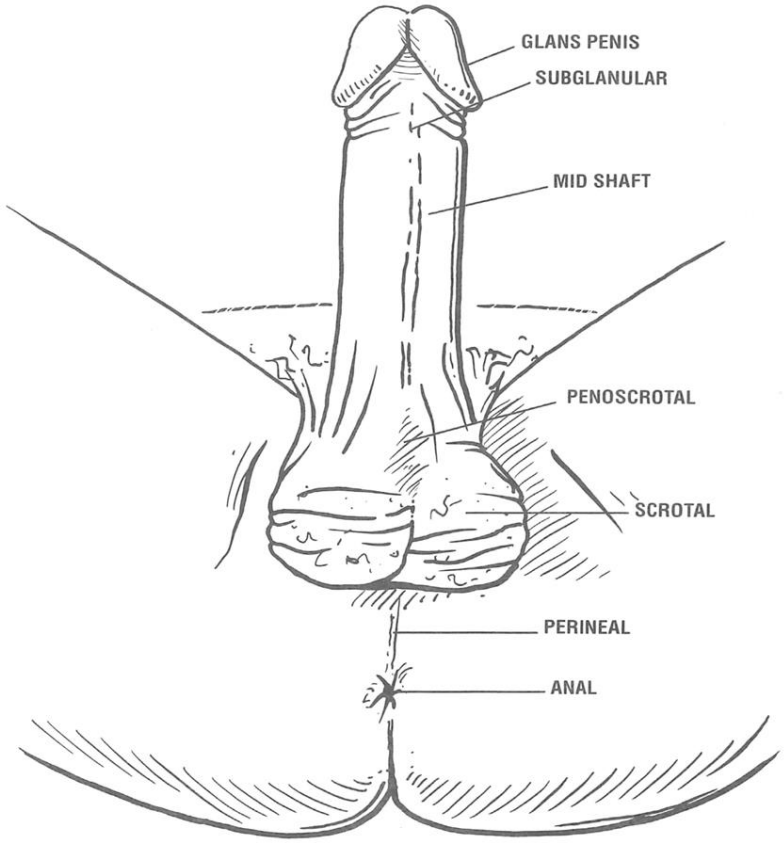
Surface anatomy of the pinna

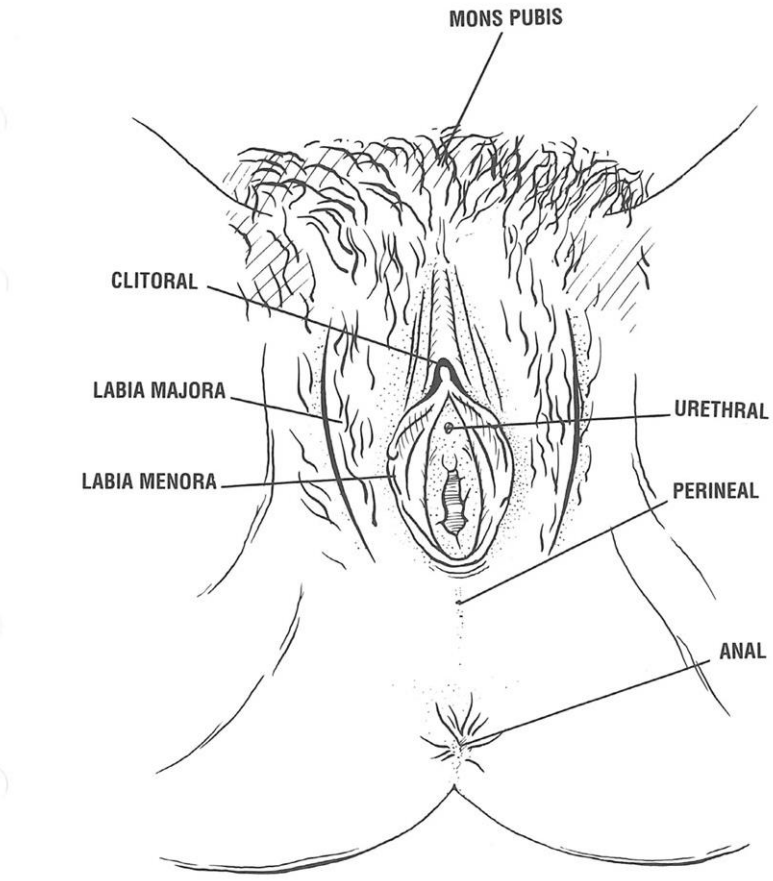


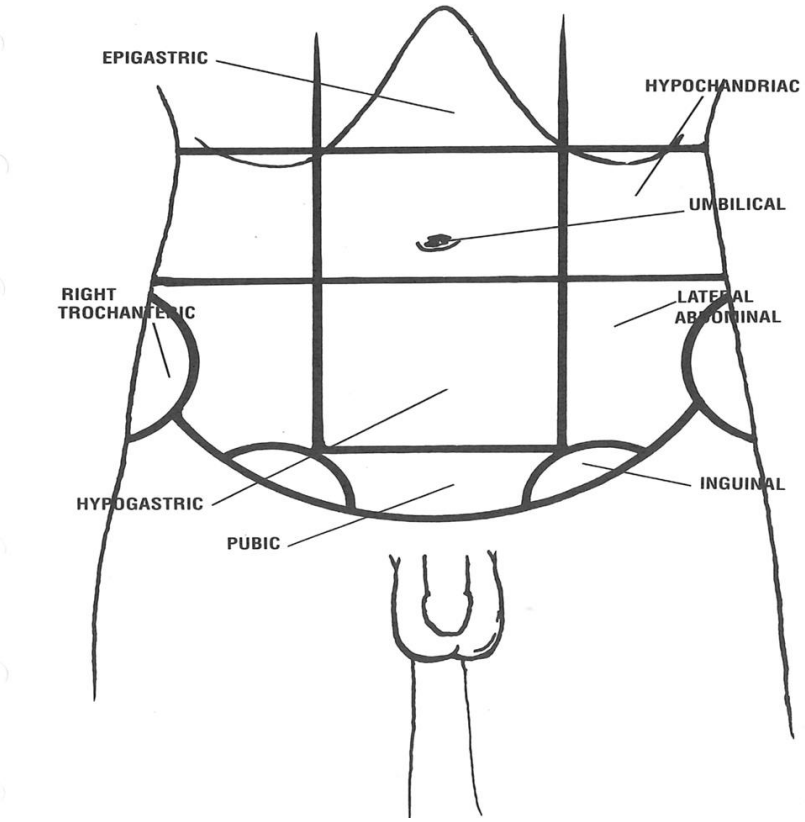
Essential for accurate recording of location of lesions

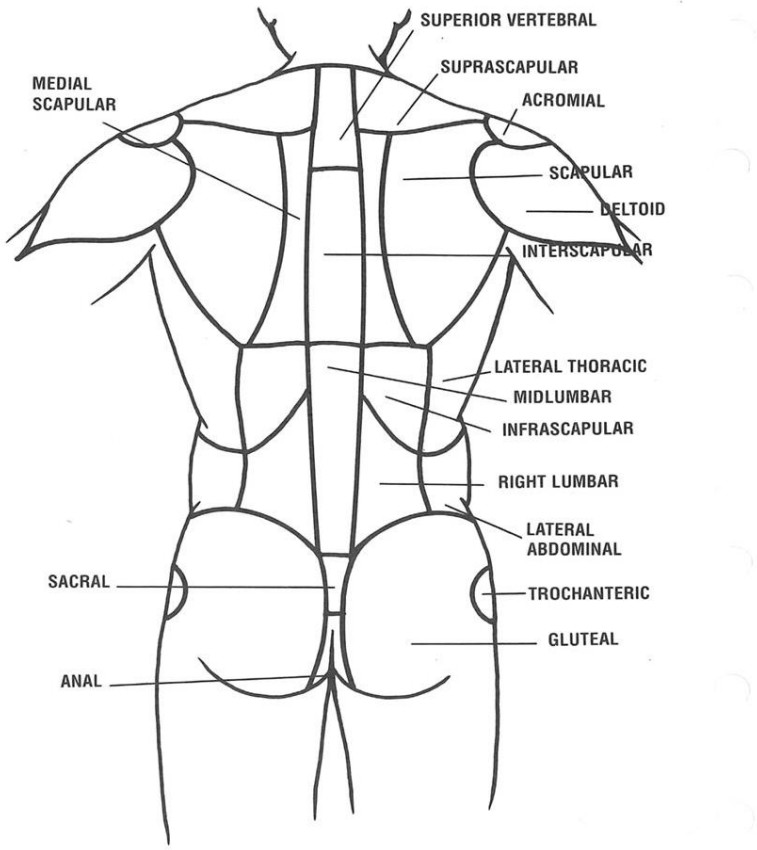

PARIETAL
FRONTAL
ZYGOMATIC
TEMPORAL
ORBITAL
NASAL
PREAURICULAR
INFRAORBITAL
POSTAURICULAR
ORAL
PAROTID
INFRAAURICULAR
BUCCAL
OCCIPITAL
MENTAL
NUCHAL
SUBMENTAL
STERNOCLEIDOMASTOID
SUBMANDIBULAR
POSTERIOR TRIANGLE
ADAM'S APPLE
SUPRACLAVICULAR
ANTERIOR NECK
JUGULAR NOTCH
SUBCLAVICULAR
ANTERIOR TRIANGLE

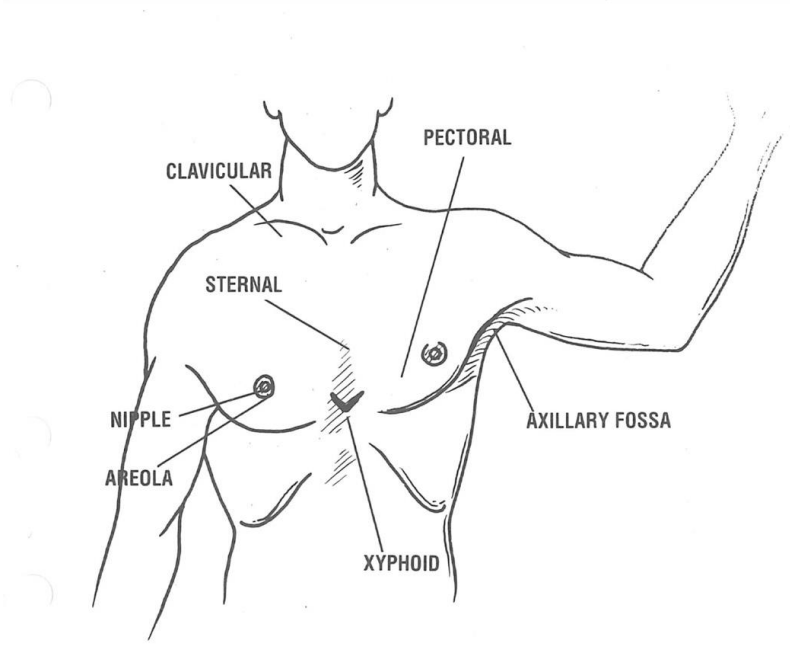


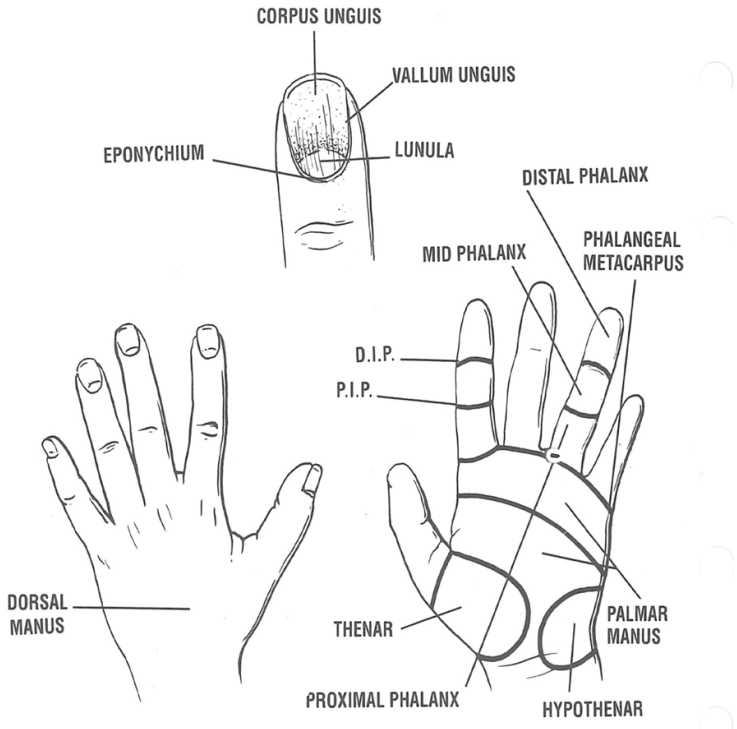

GLANS PENIS
SUBGLANULAR
MID SHAFT
PENOSCROTAL
SCROTAL
PERINEAL
ANAL


MONS PUBIS
CLITORAL
LABIA MAJORA
LABIA MENORA
URETHRAL
PERINEAL
ANAL


EPIGASTRIC
HYPOCHANDRIAC
UMBILICAL
RIGHT
TROCHANTERIC
LATERAL
ABDOMINAL
HYPOGASTRIC
INGUINAL
PUBIC


SUPERIOR VERTEBRAL
SUPRASCAPULAR
MEDIAL
SCAPULAR
ACROMIAL
SCAPULAR
DELTOID
INTERSCAPULAR
LATERAL THORACIC
MIDLUMBAR
INFRASCAPULAR
RIGHT LUMBAR
LATERAL
ABDOMINAL
SACRAL
TROCHANTERIC
GLUTEAL
ANAL


PECTORAL
CLAVICULAR
STERNAL
NIPPLE
AREOLA
AXILLARY FOSSA
XYPHOID


CORPUS UNGUIS
VALLUM UNGUIS
EPONYCHIUM
LUNULA
DISTAL PHALANX
PHALANGEAL METACARPUS
MID PHALANX
D.I.P.
P.I.P.
DORSAL MANUS
THENAR
PALMAR MANUS
PROXIMAL PHALANX
HYPOTHENAR

Upper Limb

Care should be taken in the axilla where nerves arising from parts of the brachial plexus are near the surface. At the wrist the radial artery and many other important structures are present superficially and the operator should refer to an anatomical text to become acquainted with possible dangers.

Lower Limb

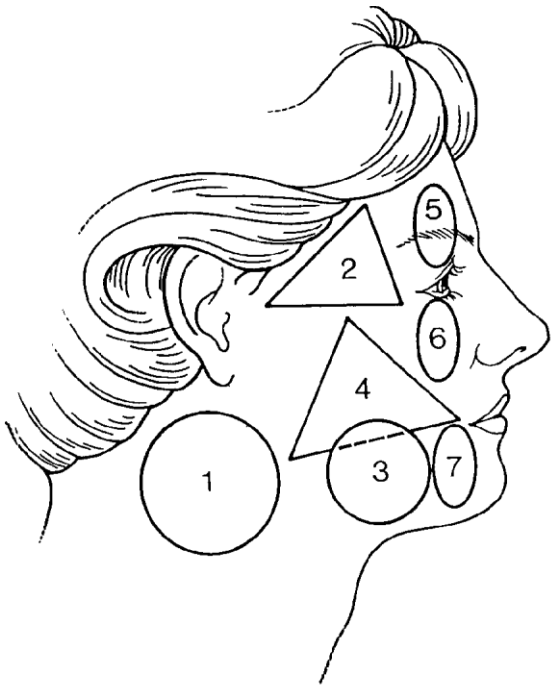
The femoral triangle contains nerve artery and vein all of which are superficial. The lateral cutaneous nerve of the thigh is easily damaged over the upper outer quadrant.

At the knee the lateral popliteal nerve is palpable and superficial where it rounds the head of the fibula. However the popliteal fossa is also an area to be approached with caution. In the lower leg perhaps the greatest risk is from varicose veins which need to be tied off adequately if damaged. Around the ankle there is a little fat and hence all structures are more vulnerable.

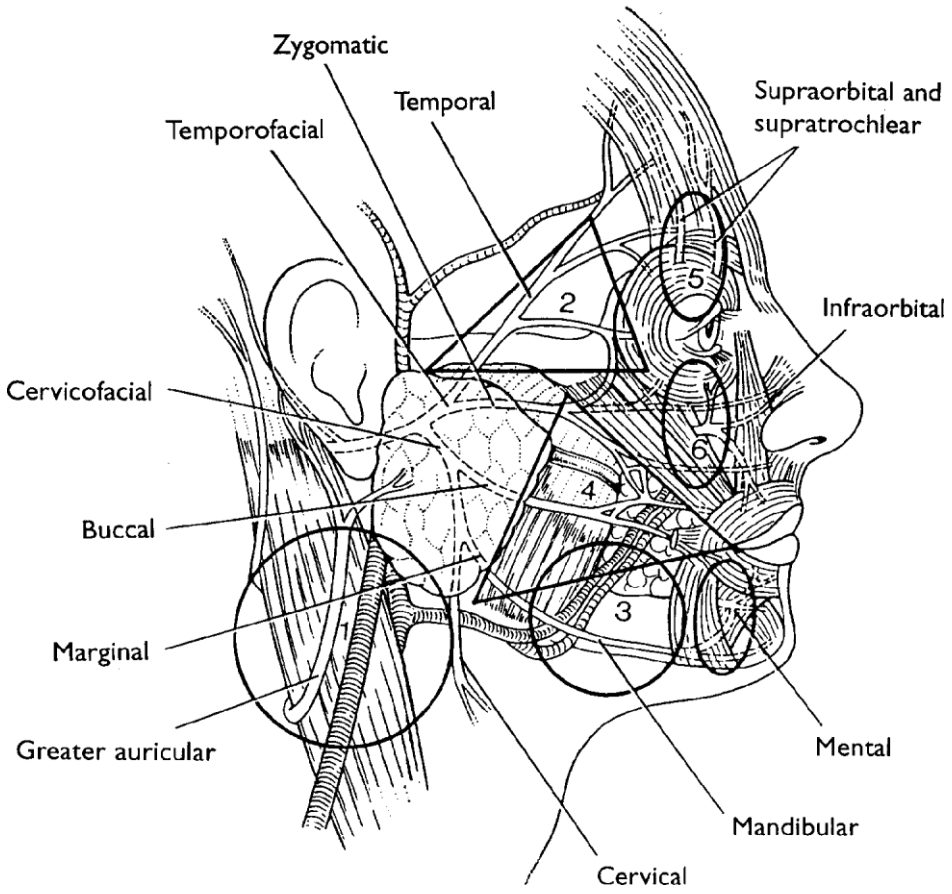
The above is not intended to intimidate the dermatological surgeon as most of the surgical operations will be superficial and well away from any danger areas. However it is essential to know the anatomy of the area in which you are working.

Skin marking

Having considered the relaxed skin tension lines and the danger areas, the skin should now be marked up with a skin marking pen, using Bonney's blue as the marking medium, ordinary felt tip pens should be avoided as some contain particles which may tattoo the skin if cut through. It is frequently helpful, particularly with malignant lesions to mark around the clinical margin of the lesion and then to mark outside to establish the margin of clearance. At this stage it is also worthwhile pinching up the skin to see how much spare skin is available for closure of the wound.



External anatomical outlines of the main facial danger zones



Underlying nerves in each facial danger zone after the skin and SMAS have been removed

LOCAL ANAESTHESIA

Thoughtful use of local anaesthesia can greatly improve the patient's experience of cutaneous surgery.

Types of Local Anaesthetic

- Esters e.g. procaine are derivatives of para-aminobenzoic acid (PABA) and carry a risk of producing allergic reactions in sensitive individuals.

- Amides e.g. lidocaine, bupivacaine and prilocaine are relatively free from reactions.

  Methylparabens is a preservative in multidose vials of lidocaine and may cause severe allergic reactions in PABA-sensitive individuals. The early symptoms include pruritus, urticaria, nausea, coughing and wheezing. The immediate treatment is adrenaline 0.2 to 0.5mg (ie 0.2 to 0.5 mls of 1/1000 solution) by subcutaneous injection. This may be repeated every 5-10 minutes if necessary. It is logical to inject the adrenaline into the site where the anaesthetic was given to delay its absorption.

Differential rates of anaesthesia

Small nerve fibres which carry pain and temperature sensations are anaesthetized more rapidly (onset in 2-4 minutes) than larger myelinated fibres. As a result:-

- Patients may complain that they do not feel completely anaesthetized because they can still appreciate pressure of vibration sensations in the operative field.

- When operating in the vicinity of a superficial branch of the facial nerve, paralysis of the nerve may develop sometime after the operation has started, giving rise to concern that the nerve has been cut during the procedure.

The duration of anaesthesia is 20 minutes if plain lidocaine used to about 2 hours when bupivacaine used with adrenaline

Lidocaine (lignocaine)

Available alone or with adrenaline 1/80,000 or 1/200,000. Its mild vasodilatory effect is counteracted by adrenaline. The maximum safe adult dose is 200mg (or 3mg/kg) for plain lidocaine and 500mg (or 7mg/kg) for lidocaine with adrenaline. For children and the elderly these maximum doses should be halved.

Lidocaine Preparation Maximum Safe Volume (see appendix)

2% plain lidocaine 10mls
1% plain lidocaine 20mls
0.5% plain lidocaine 40mls
1% lidocaine = 10mg/ml
2% with adrenaline 1/200 000 25mls
2% with adrenaline 1/80 000 (dental syringes) 22ml (10 cartridges)
1% with adrenaline 1/200 000 **50mls**
0.5% with adrenaline 1/200 000 100mls Note—
may contain sulfites

Dental Cartridge Syringes. The finest gauge needles are available for dental syringes and the cartridges (2.2ml) can be rapidly changed. The very fine needle results in minimal discomfort on skin penetration. The disadvantage is that the preparations available (1% and 2% lidocaine with and without adrenaline 1/80000) are primarily intended for nerve-block anaesthesia and the common dental syringe cannot be drawn back to check for intravascular placement of the needle although aspirating dental syringes are available.

Ampoules/Multidose Vials. Plain lidocaine is available from 0.5% to 2% strengths in glass ampoules and multidose vials. Lidocaine with adrenaline 1/200,000 is available in multidose vials only. Ampoule preparations are preservative-free and stinging is less severe, whereas multidose vials contain methylparaben. **If multidose vials are used each patient should ideally have their own vial to exclude the possibility of cross infection. Although if a new sterile needle and syringe is used each time to aspirate the local this should not be an issue.**

Recommended Preparations. The least painful is 0.5% lidocaine in an ampoule: the action may be too short for complicated operations. 1% lidocaine combined with adrenaline 1 in 200,000 has a longer action and is the most useful.

Lidocaine Toxicity. Toxic effects of local anaesthetics should not be encountered as long as the dose limits are adhered to (see appendix). Inadvertent intravascular injection, however, may produce side effects when only low volumes of anaesthetic have been used. (Patients with impaired liver function may be more susceptible to toxic effects).
The symptoms of lidocaine toxicity include fidgeting, tinnitus, drowsiness, tingling and numbness of lips and tongue, a metallic taste in the mouth, tremors, convulsions and respiratory arrest. Vaso-vagal episodes are the commonest cause of loss of consciousness during or after cutaneous surgery - especially in adolescents. Pallor, sweating and bradycardia are typically seen and blood pressure is low. Genuine lidicaine allergy is very rare—in such cases prilocaine is a suitable alternative.

Note - lignospan special contains no
methyl parabens and is latex-free

Bupivacaine
Bupivacaine 0.25-0.75% has a prolonged duration of action and is valuable for long procedures and post operative analgesia. It has a slow onset of action and is not usually used as the sole agent in cutaneous surgery. The maximum safe dose is 150mg or 60mls of 0.25% solution. The higher concentrations of 0.5 and 0.75% give a longer duration of action.

Topical anaesthetic preparations

EMLA
EMLA 5% cream is a combination of 2.5% lidocaine (25mg per 1 gram) and 2.5% prilocaine (25mg per 1 gram) was the first licensed topical anaesthetic. Two other brands also are made now—DENELA 5% cream and NULBIA 5% cream These are used to produce topical cutaneous anaesthesia and should be applied under occlusion for approximately 90 minutes. Surface anaesthesia is produced which is sufficient for minor procedures such as removing skin tags or treating vascular blemishes with a tunable dye laser. The amount of anaesthesia is generally inadequate for incisional surgery, but reduces the discomfort associated with needle puncture and so is particularly useful in young children. Other uses include before removal of mollusca, before harvesting a split thickness graft on the donor site, on genital skin before injection of local anaesthetic, and before mechanical cleansing or debridement of a leg ulcer. These preparations are hazardous if they comes into contact with the surface of the eye and care should be taken to avoid this.

Ametop
Ametop, topical amethocaine 4% gel (tetracaine 40mg per gram) is a more rapidly acting topical anaesthetic cream for the skin surface. Unlike EMLA, it does not cause vasoconstriction and its onset of action is more rapid, typically in 30 minutes. Patients may develop localized urticaria if it remains in contact with the skin for longer than this time.

Oxybuprocaine
Oxybuprocaine (Benoxinate) 0.4% is reserved for topical ocular anaesthesia. It has a rapid onset of action and is available in 0.5ml single-use dispensers. A drop should be instilled on to the conjunctival surface with the lower eyelid gently retracted and the patient looking upward to avoid direct contact with the sensitive cornea. Several applications are necessary for maximum effect as reflex lacrimation washes away much of the first instillations. It cross-reacts with ester type local anaesthetics and should not be used in benzocaine sensitive individuals. Proxymetacaine (Ophthaine) 0.5% is also a benzoic acid ester, but due to structural variations does not cross react with benzocaine. It causes less initial sting, but is only available in 15ml bottles.

Following ocular anaesthesia an eye pad should be worn for the rest of the day until normal corneal sensation has returned. Patients should be warned not to drive whilst wearing the pad.

Lignocaine gel
This can be used on mucosa before a biopsy or before a regional anaesthetic nerve block e.g. on a dental roll placed in labial sulcus.

Adrenaline
It is added to lidocaine to promote haemostasis and reduce the rate of lidocaine absorption. Reactions to adrenaline include tachycardia, elevated blood pressure, tremors, anxiety and palpitations and are most likely to result from inadvertent intravenous injection. The vasoconstrictor action of adrenaline takes a few minutes to develop. Adrenaline should be used cautiously or avoided in patients receiving Non selective beta-blockers (e.g. Propranolol) as there is a risk of causing excessive blood pressure elevation if it is absorbed systemically due to the alpha vasoconstrictor action of adrenaline unopposed by Beta-2 receptors which normally dilate vascular smooth muscle.

Adrenaline may lead to ischaemia under certain circumstances. It should be avoided in acral sites in patients with impaired peripheral circulation (e.g. Raynauds phenomenon, diabetic angiopathy) and one should be cautious in ring blocks around the digits. Some patients appear unduly sensitive to the effects of adrenaline.

The presence of adrenaline, and its antioxidant sodium metabisulphite, contribute to the initial stinging sensation caused by local anaesthetics.

The New York Heart Association state that 0.2mg of subcutaneous adrenaline is safe even in cardiac patients. The maximum dose in healthy adults should not exceed 1mg.

Maximum Safe Doses of Adrenaline
1/1000 solution = 1mg/ml

Adrenaline Strength	Maximum Safe Volume
1/1000	1ml
1/80 000	80mls
1/200 000	200mls

Local Anaesthetic Technique
The aim is to deliver local anaesthetic as near to the cutaneous nerves as possible. Direct infiltration just beneath the dermis is the most efficient way of doing this. Topical anaesthesia, subcutaneous anaesthesia and nerve blocks depend on diffusion of the agent to the nerves and therefore require anaesthetics of higher concentration.

Minimising the Discomfort of Local Anaesthesia
There are two components to the discomfort; the needle puncture itself and a stinging sensation caused by the local anaesthetic agent.

Use the finest needle, stretch or pinch the skin and introduce the needle in a smooth, single movement. In areas of accentuated pores eg the nose, inserting the needle through the edge of a pore reduces the discomfort. EMLA cream, refrigerant spray eg ethyl chloride or ice to numb the skin surface can also help. Distraction techniques can be used e.g. talking, music, TV or screen, hand holding or stress ball squeezing.

Injections within the dermis cause more discomfort than subcutaneous injections and rapid injections hurt more than slow ones. Pulsing the injections reduces discomfort versus continuous injection. Higher concentrations of lidocaine and those containing

adrenaline sting more than weaker ones. The addition of sodium bicarbonate has been advocated to raise the pH of lidocaine with adrenaline and this reduces the stinging sensation it causes but this rarely used in practice. Warming the ampoules prior to use reduces the pain versus using a cold ampoule straight from the fridge.

Direct Infiltration - Intradermal or Subcutaneous?
Lidocaine may be injected intradermally producing a wheal but it is painful. It gives instant anaesthesia and also clearly shows the area which is anaesthetic.

Deeper infiltration is less uncomfortable but anaesthesia is of slower onset and shorter duration, and a larger volume of more concentrated anaesthetic is required. It is also difficult to see the anaesthetic field and it is helpful to outline the proposed incision with a skin marker before injecting local anaesthetic under the markings. Subcutaneous infiltration avoids distortion of the operative site which may be an advantage - for example when performing a shave excision.

Skin biopsies in children
EMLA topical anaesthesia followed by infiltration with 0.5% plain lidocaine is least likely to upset a young child requiring a skin biopsy.

Field Block Anaesthesia
Local anaesthetic can be infiltrated circumferentially around the operative site blocking all the nerves supplying the area. This is most commonly used on the scalp where the local anaesthetic should be infiltrated into the dermis and subcutaneous fat not under the galea where there are no nerves.

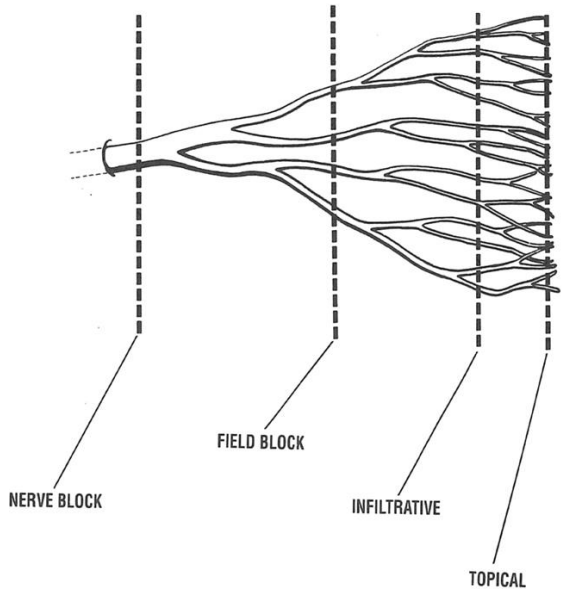
Anaesthesia of the Scalp
Nerves and blood vessels in the scalp lie superficial to the epicranial aponeurosis. Inject superficially and not deep to the aponeurotic fascia (galea).

Anaesthetising the Palm or Sole
Needle puncture directly into the palm or sole is painful. Introduce the needle into the thinner skin on the dorsum of the hand or foot and work around to the palm or sole reinjecting through the anaesthetized skin. Consider nerve blocks– see below.

Digital Ring Block
Local anaesthetic may be injected circumferentially around the base of a digit. Each digit is supplied by two dorsal and two ventral nerves on each side. About 2mls of 2% plain lidocaine is infiltrated both superficially and deeply. The initial injection is made dorsolaterally and from this point down one side of the digit and across its dorsum. The needle is then reinserted into the other side through the already anaesthetized dorsal skin. This block takes 5-10 minutes to work. No more than 4 ml should be given as this may result in compression of the vascular supply.

Tumescent Anaesthesia
This technique can be useful when excising large tumours as it results in a large are of anaesthesia and a bloodless field.

Shareef MS, Affleck A. Use of tumescent anaesthesia in dermatological surgery. Clin Exp Dermatol 2012 Apr;37(3):308-9.

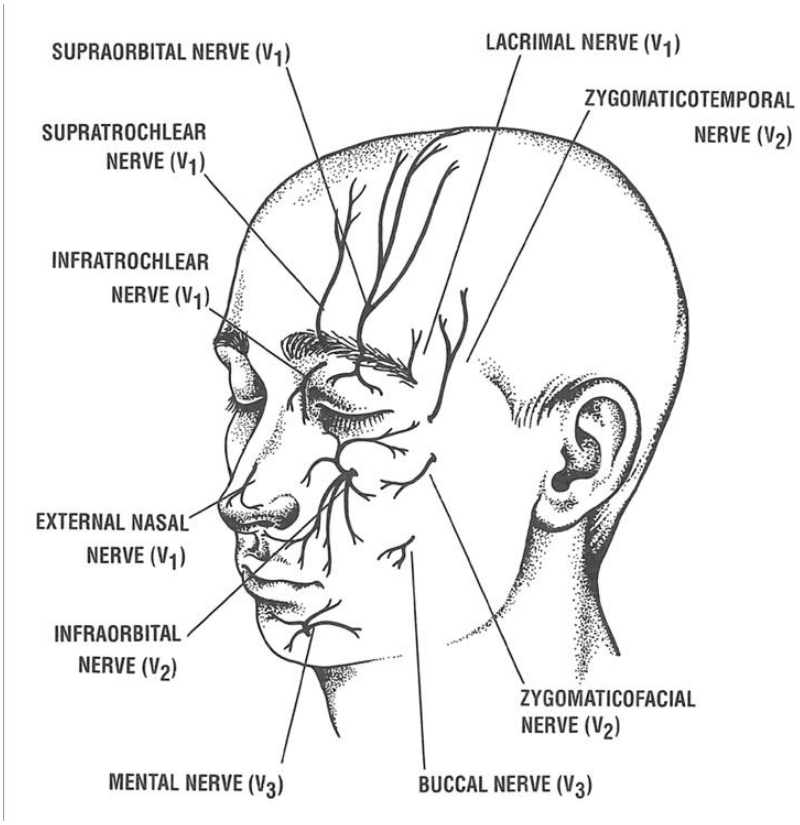


NERVE BLOCKS ON THE HEAD AND NECK

Area	*Nerve*
Forehead	Supraorbital
	Supratrochlear
	Zygomaticotemporal
Nose	Infraorbital
	Infratrochlear
	External nasal branch of anterior ethmoidal
Eyelids	Supraorbital
	Supratrochlear
	Infratrochlear
	Lacrimal
	Infraorbital
Temporal scalp	Auriculotemporal
Occipitoparietal scalp	Greater occipital
	Lesser occipital
Upper lip	Infraorbital
Lower lip	Mental
External Ear	Greater auricular
	Auriculotemporal
Midcheek	Infraorbital
Chin	Mental
Neck	C2, C3, C4

The Trigeminal Nerve

This nerve is made up of three divisions: ophthalmic (V_1), maxillary (V_2), and mandibular (V_3). An understanding of the course of these nerves will allow one to selectively anesthetize areas of the face.



Peripheral Sensory Innervation of the Face

Zones of peripheral sensory

Innervation of the face (side view)

V_1 SO supraorbital

ST supratrochlear

IT infratrochlear

EN external nasal

V_2 ZT zygomaticotemporal

ZF zygomaticofacial

IO infraorbital

V_3 AT auriculotemporal

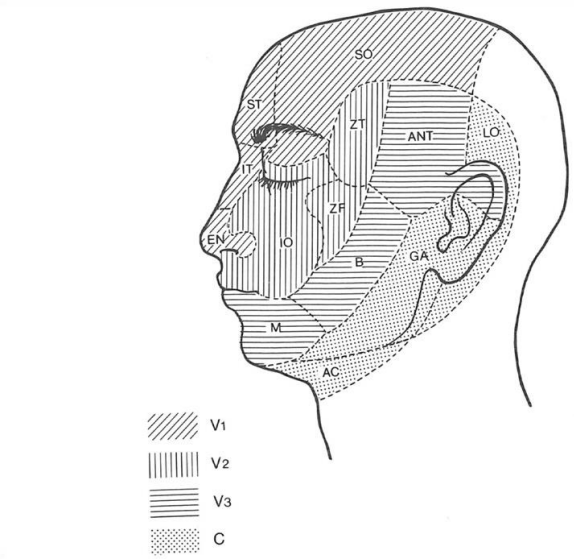
B buccal

M mental

C cervical

LO lesser occipital

GA greater auricular

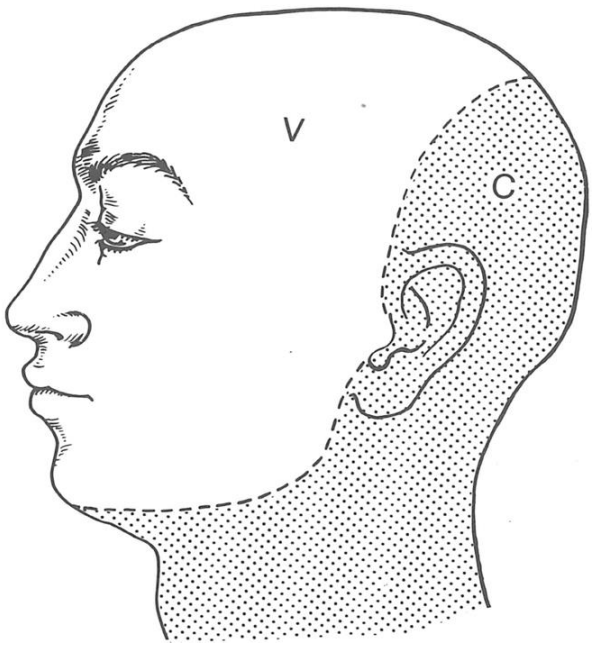


Regional Anesthesia of the Forehead and Scalp
The forehead is supplied by the frontal nerve

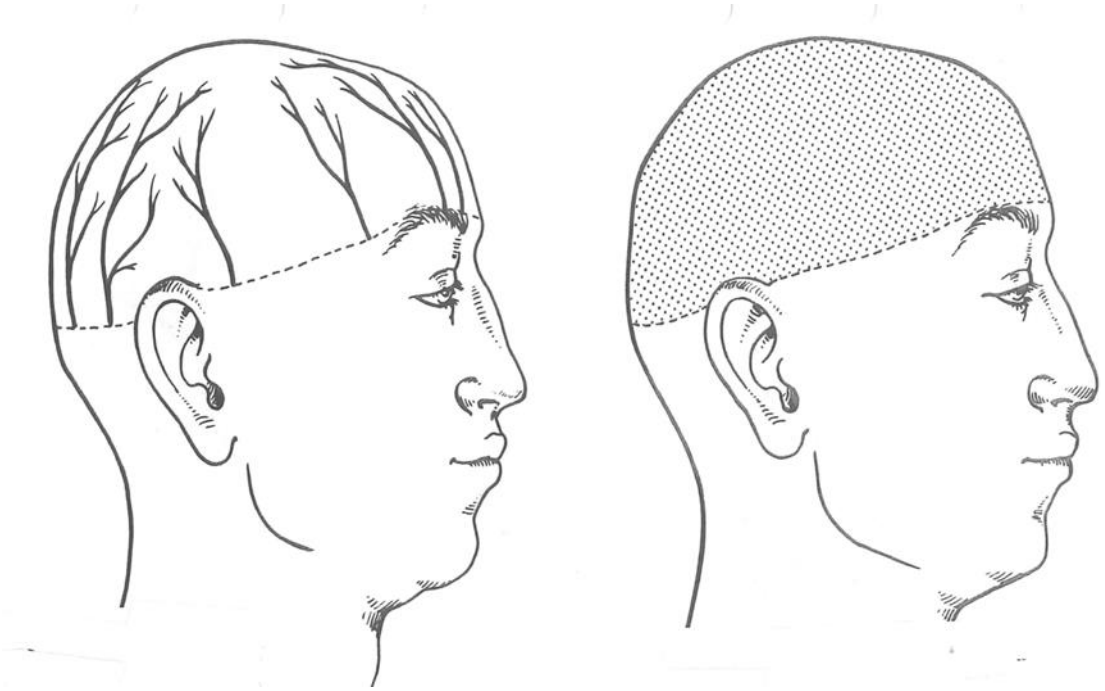
(V_1 supraorbital and supratrochlear) and the zygomatic temporal nerve (V_2),

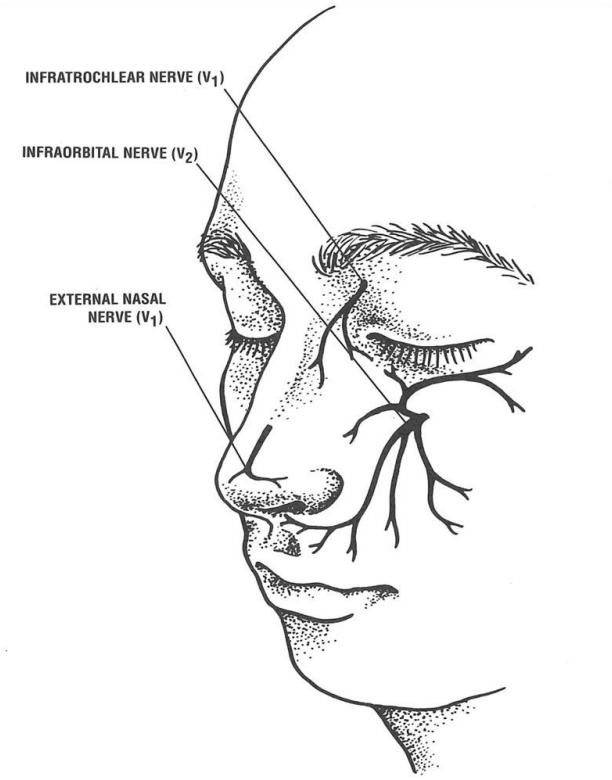
regions of the scalp are supplied by the greater auricular nerve (C) and

the greater and letter occipital (C) nerves



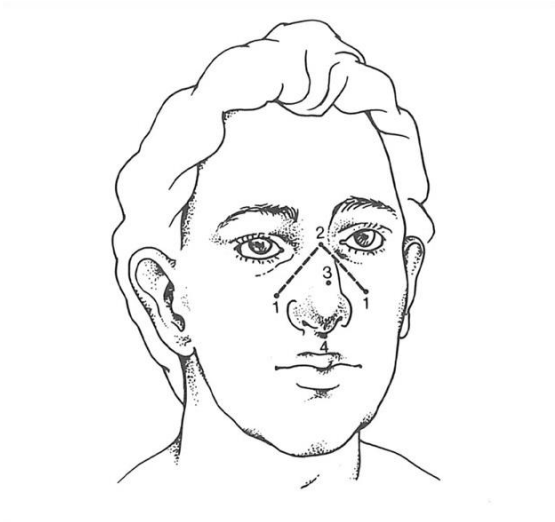
The greater and lesser occipital nerves originate deeply and enter a
subfascial plane on a line encircling the head that passes just above the
ear and through the glabella and occiput. Subcutaneous infections,
producing wheals along the this line will therefore provide regional anaesthesia of the scalp in a skullcap distribution.
The cutaneous surgeon should consider this anatomy when excising scalp



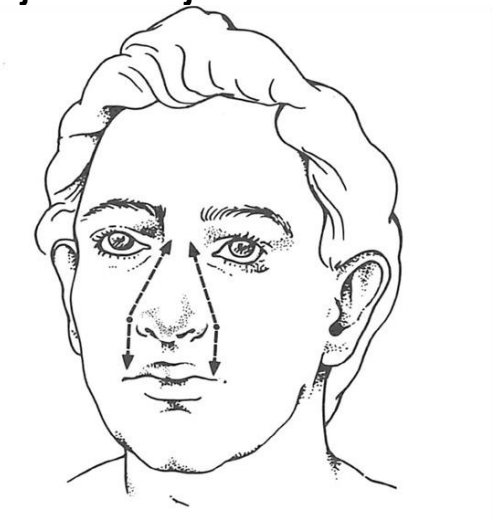


Regional anesthesia of the nose

One can achieve anesthesia of the integument of the external nose by injecting anaesthetic into the infraorbial foramen (1), the junction of the
brow with the nasal root (2), the bridge of the nose at the bony cartilaginous junction (3) and the base of the columella (4).



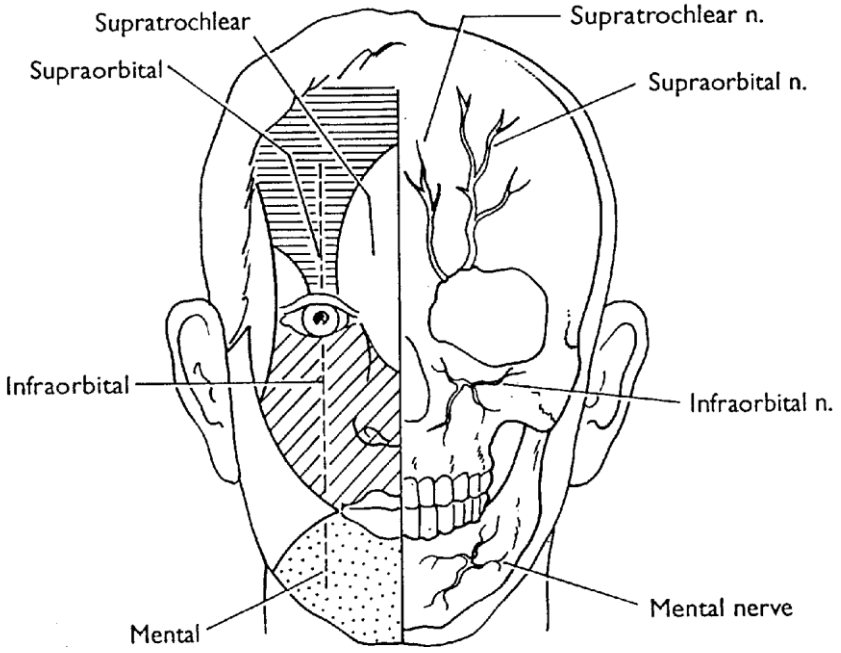
Regional block of the external nose with just two injection sites



Nerve Blocks

The injection is given in the vicinity of a named nerve supply thus anaesthetising the area supplied by the nerve. It allows a relatively large area to be anaesthetized with a small volume. It avoids distortion of the surgical site and reduced the discomfort. It can provide prolonged post operative analgesia when Bupivacaine is used. Nerve blocks do not always work fully, do not produce local vasoconstriction and are best used in combination with local infiltration of the operative site. ***Beware injecting into the nerve or its bony canal. Merely bathe the area with anaesthetic. Avoid inadvertent intravascular injection.***

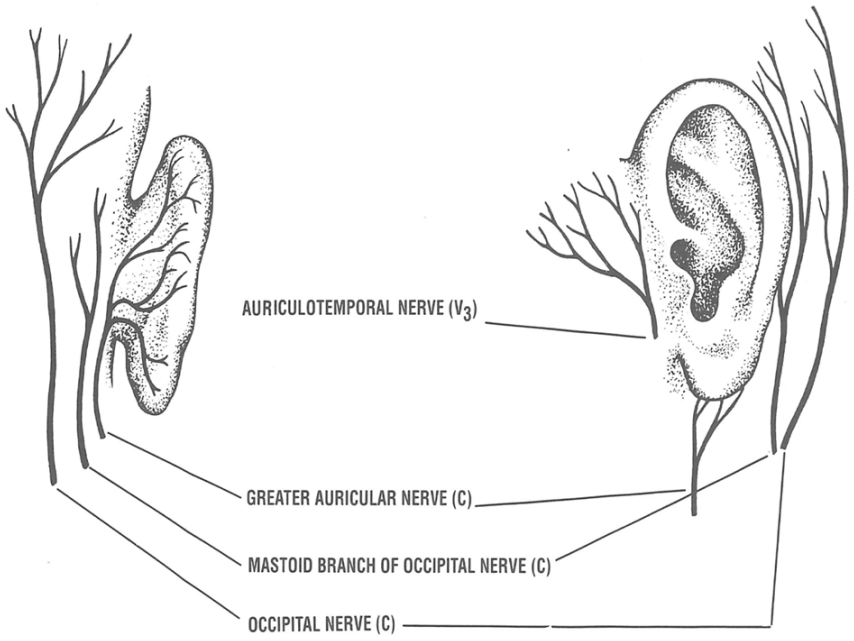
ANATOMICAL LOCATION OF SUPRAORBITAL, SUPRATROCHLEAR, INFRAORBITAL AND MENTAL NERVES WITH THEIR INNERVATION



Supraorbital/Supratrochlear Nerve Block

The supraorbital nerve exits its foramen just below the eyebrow in line with the pupil. It supplies sensation to the lateral forehead. The supratrochlear nerve lies between the superior and medial borders of the orbit and supplies the medial forehead. These nerves can be anaesthetized by raising a wheal over the glabella and injecting 2-3mls of 2% lidocaine along the eyebrow. Both sides of the forehead may be anaesthetized from this entry point.

Nerve supply of the external ear



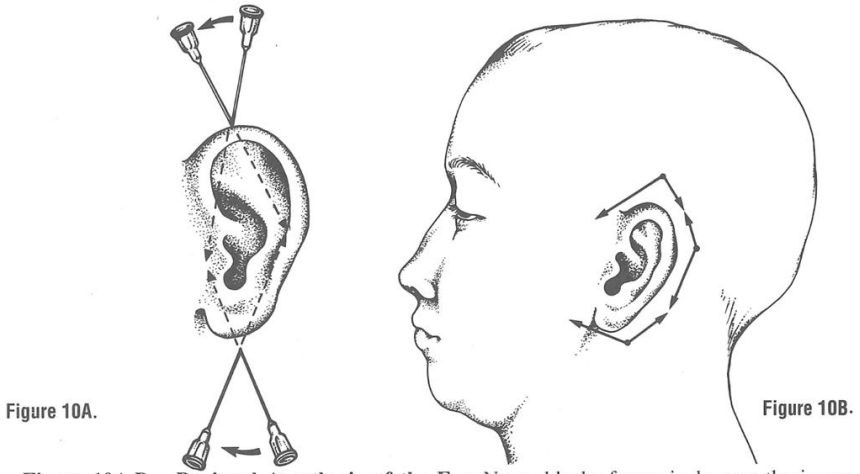
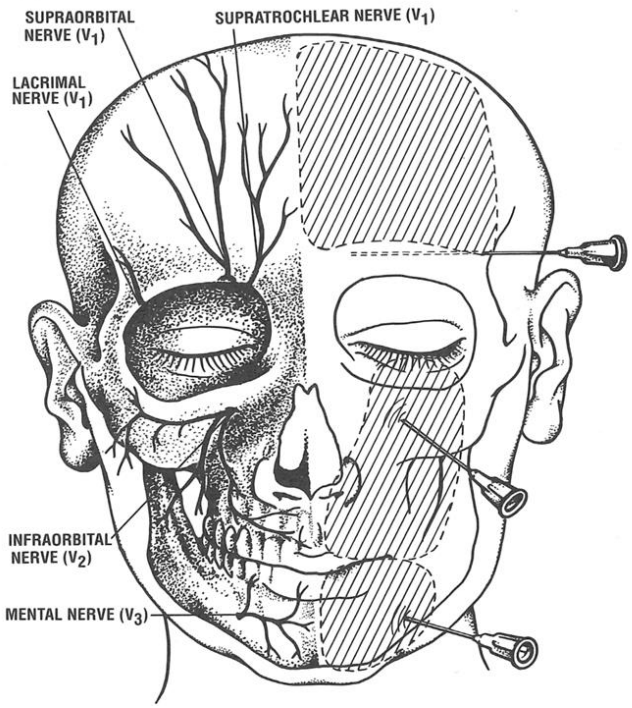


Figure 10A. Figure 10B.

Figure 10A,B.—Regional Anesthesia of the Ear. Nerve blocks for auricular anesthesia are preferable to local infiltrative anesthesia because of the close adherence of skin to cartilage in this area. Selective nerve block of the greater auricular nerve and the auriculotemporal nerve will give good anesthesia to the external ear. These two blocks only partially anesthetize the external auditory canal, since cranial nerves VII, IX, and X also provide sensory innervation to this area.

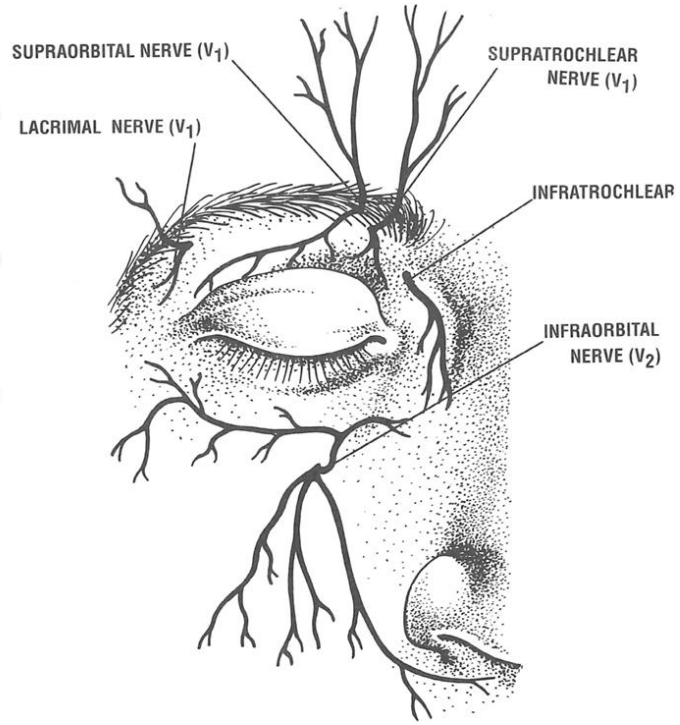
Regional Anaesthesia of the Face

Sites of nerve block anaesthesia for the face with distribution of resultant numbness. Top needle: supraorbital nerve block; middle needle: infraorbital nerve block; bottom needle: mental nerve block. These nerve blocks are very useful for a full face dermabrasion. Note that the foramina through which the supraorbital, infraorbital and mental nerves exit lie in a sagittal plane that includes the pupil of the eye.



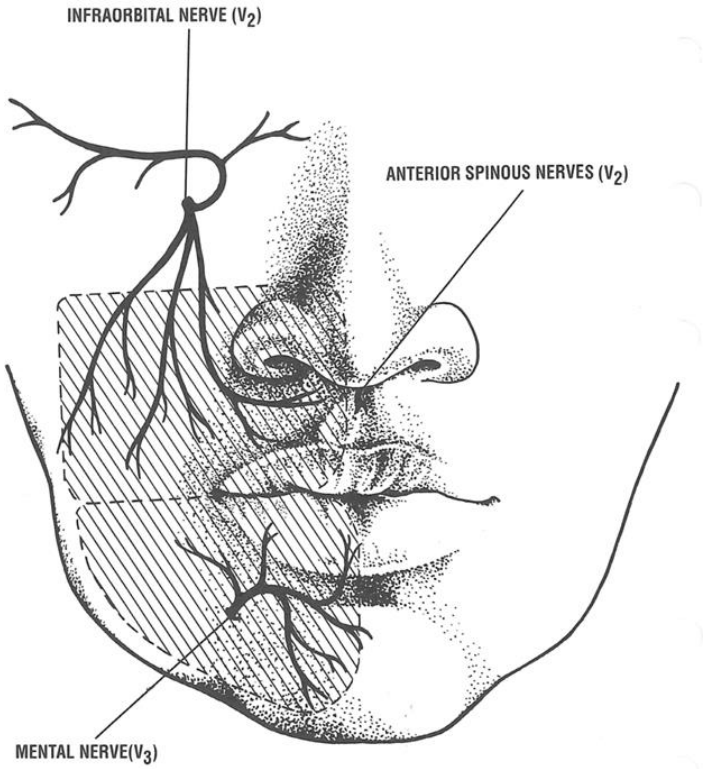
Regional Anesthesia of the Eyelids

The eyelids are innervated by the supraorbital, supratrochlear, infraochlear, lacrimal (V1), and infraorbital (V2) nerves. There are mainly the terminal braches of the ophthalmic nerve, which encircles the orbit at its bony rim. One can therefore achieve outer eyelid anesthesia simply by injecting an anaesthetic along the outer bony limits of the orbit. Deep orbital blocks are not needed, and if incorrectly done, could lead to serious complications such as retrobulbar hemorrhage, blindness or extraocular muscle paresis. To complete anaesthesia of the conjunctival part of the lids, tetracaine or another appropriate solution should be dropped into the conjunctiva.



Regional Anesthesia of the Lips

By performing an infraorbital nerve block as well as injecting the base of the columella (anterior spinous nerves), the entire upper lip is anesthetized. The lower lip is anesthetized by blocking the mental nerve.



Infraorbital Nerve Block

The infraorbital nerve exits its foramen 0.5 to 1cm below the inferior orbital rim, in line with the pupil, and passes medially. It may be anaesthetized by a percutaneous or intraoral approach. In both cases it is best to palpate the nerve and guide the approaching needle tip; digital pressure against the orbital rim can be used to direct the local anaesthetic towards the nerve and protect the eye. With the intraoral approach the needle is inserted through the superior oral sulcus in line with the apex of the second bicuspid tooth / canine (a depression in the maxilla can be felt at this point) the nerve lies about 1cm deep to the sulcus. For the percutaneous approach the needle is inserted through the skin at a point 1cm medial and 1cm inferior to the infraorbital foramen.

Mental Nerve Block

This nerve exits the mandible in line with the pupil and second bicuspid tooth. The foramen lies midway between the upper and lower edges of the mandible in the normal adult, nearer the inferior edge in children, and nearer the superior edge in edentulous patients. It may be approached percutaneously or intraorally. Two millilitres of 2% Lignocaine are injected around the foramen. Bilateral blocks are used for lower lip surgery.

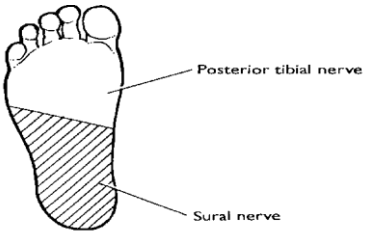
Nerve Block at the Ankle

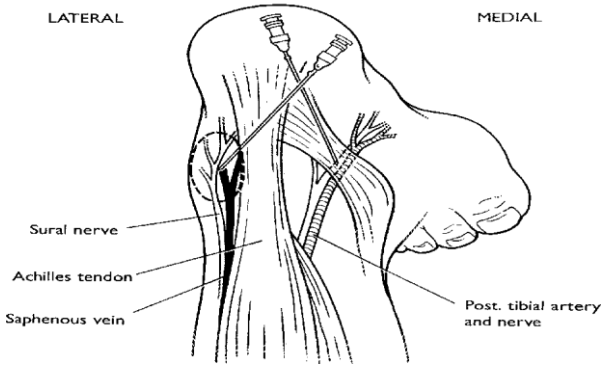
The sole can be anaesthetized by a combined tibial and sural block. The posterior tibial nerve runs medial to the Achilles tendon and innervates the anterior and medial parts of the sole of the foot. With the patient prone and the ankle supported, the posterior tibial artery is palpated at the upper border of the medial malleolus. The tibial nerve lies between this and the medial border of the Achilles tendon. A 4cm needle is inserted at this point and directed anteriorly to lie just lateral to the artery. If paraesthesia is elicited (warn the patient of this) the needle should be withdrawn 2-3mm to avoid injection directly into the nerve. 3-5mls of 2% Lignocaine is injected after aspirating to ensure the needle is not within a blood vessel. If the artery is not palpable the needle should be inserted through the skin just medial to the Achilles tendon, at the level of the upper border of the medial malleolus and directed toward the 2nd toe until the nerve or bone is encountered. This block may take 15-20 minutes to take effect.

The most proximal and lateral part of the sole is supplied by the sural nerve. This is blocked by subcutaneous infiltration of 3-5mls of 1-2% Lignocaine in an area from the lateral border of the Achilles tendon to the outer border of the lateral malleolus. Postoperatively patients should be given a walking stick or crutches to use until the anaesthetic wears off.

Further Reading:

1. Erkisson E (ed) Illustrated handbook of Local Anaesthesia. Lloyd-Luke, London 1979, ISBN 085325 145 7
2. Auletta MK, Grekin RC. Local Anaesthesia for Dermatologic Surgery. Churchill Livingstone, New York 1991. ISBN 0 443 08704.
3. www.emedicine.com/derm/topic824.htm
4. A review of peripheral nerve blockade as local anaesthesia in the treatment of palmar hyperhidrosis British Journal of Dermatology 149 Sep 2003 447-451
5. Kouba DJ et al. Guidelines for the use of local anesthesia in office-based dermatologic surgery. J Am Acad Dermatol. 2016 Jun;74(6):1201-19.
6. Clin Exp Dermatol. 2014 Oct;39(7):777-84. Essential regional nerve blocks for the dermatologist: part 1. Davies T, Karanovic S, Shergill B.
7. Essential regional nerve blocks for the dermatologist: Part 2. Davies T, Karanovic S, Shergill B. Clin Exp Dermatol. 2014 Dec;39(8):861-7.





	Needles for regional anaesthesia			
		Gauge	Length	Bevel (degrees)
	Plastic hubbed spinal needles	22G	3 1/2”	30
	Steriseal metal hubbed spinal	22-25G	1 ¼ - 3”	30
	Braun Plexiflix (with extension)	24G	1-2”	45

See Appendix for Management of possible Lidocaine Allergy
Skin testing and provocative LA challenge are useful to exclude LA allergy, and this testing procedure seems to be appropriate to identify the extremely rare cases with IgE-mediated LA allergy

Regional Anesthesia of a Digit

Digital nerve block anesthesia is done at the base of the finger (Fig. 14).
If a digital block is done gently and slowly, it is almost painless.
A digital nerve block can be performed by injecting anaesthetic into both the ulnar lateral and radial lateral aspects of a finger.
With a single injection on each side, and fanning in a dorsal and volar direction, complete anaesthesia of the finger can be achieved.

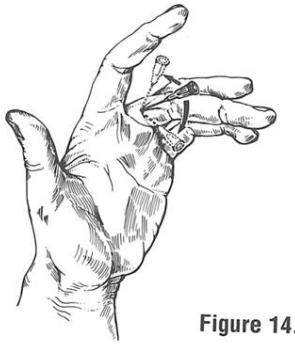


Figure 14.

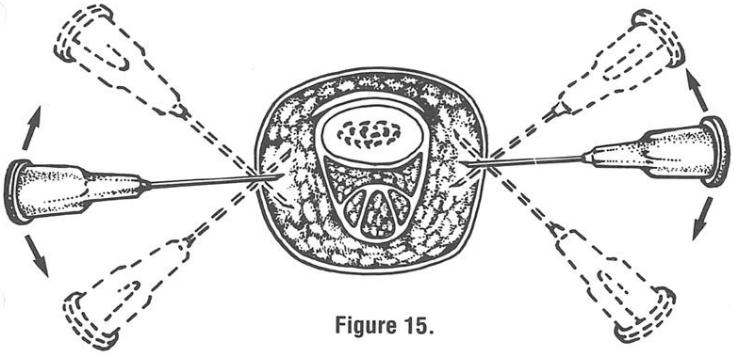


Figure 15.

Notes

BENIGN SKIN LESIONS

For most Dermatologists, working within the NHS, our primary role in the management of benign skin lesions involves using our clinical and dermatoscopic assessment skills to make an accurate clinical diagnosis.

Once provided with a diagnosis and reassurance regarding the benign nature of their lesion, some patients do not wish or require treatment. Funding is limited within the NHS, and funding for treatment of benign Skin lesions is not always available.

We need to inform and advise our patients regarding the advantages and disadvantages of different potential treatment options at our disposal, including no treatment.

Surgery can be used to remove several benign skin lesions such as Seborrhoeic keratoses, benign naevi, dermatofibromas, pyogenic granulomas, epidermoid cysts, lipomas and chondrodermatitis nodularis heilicis.

Surgical techniques include shave excision, curettage and cautery, excision Of cysts and lipoma, and treatment of chondrodermatitis nodularis heilicis. Treatment with laser may be an option for some benign lesions, but is beyond the scope of this course, which will focus on surgical treatment options.

Notes

Simple Surgery Techniques and Management of Benign Lesions

"*There is no minor surgery, just minor surgeons*"

Curettage

Two types of curette are used.

In the UK the ring curette dominates , but the traditional instrument has been the spoon or Volkmann type. The ring curette has been preferred having the advantage that excess soft tissue can escape through the ring. This is not a curette in the strictest sense but rather a refined cutting instrument. They are usually 3 or 7 mm in diameter.

Very small, or "ophthalmic" spoon curettes (1-2mm) are extremely useful for small lesions and for probing small tumour extensions.

These instruments must be kept sharp, and many are now single use.

Advantages -
1. Simple, cheap, quick
2. Good cosmetic results with superficial lesions
3. Good cure rates with small, non-fibrotic tumours
4. Sutures, and sometimes anaesthetic, not required

Disadvantages -
1. Secondary intention healing may be slow
2. The scar is usually hypopigmented
3. Poor cure rates with large, fibrotic or recurrent tumours and at certain sites e.g. ear, naso-labial

Indications

Usually for removal of small growths on the skin surface :-

1. Viral warts
2. Basal cell papillomas (Seborrhoeic keratoses)
3. Pyogenic granulomas
4. Actinic keratoses and Bowen's disease
5. Small BCC's and rarely SCC's (less than 1cm diameter and at low-risk sites)
6. Determination of extent of tumour before formal excision.

Contra-indications

There are minimal studies of the use of the ring curette in the Rx of skin cancer

1. Fibrotic or scarring lesions, e.g. morphoeic BCC's.
2. Recurrent tumours, except as palliative treatment
3. Large tumours (more than 1cm diameter)
4. Tumours penetrating through the dermis
5. Malignant melanomas

Technique

1. After local anaesthetic infiltration, tension the skin with fingers to provide firm surface.

2. Hold the curette like a pen.

3. Scoop the lesion out with downward rotary motion.

4. Scrape all the abnormal tissue away from the base and all round the periphery. It usually separates fairly easily from the normal surrounding skin, but must be done thoroughly.

5. Control bleeding - usually by cautery or electrodesiccation

6. Repeat 5 and 6 if the lesion is malignant ('double curettage and cautery')

7. If the lesion is benign use very light cautery only to obtain haemostasis, or a weak styptic such as aluminium chloride hexahydrate 20% (Anhydrol forte/ Driclor) applied with a cotton bud.

8. Dressings are not necessarily required, but patient instruction (qv) is helpful. Some vaseline is often used to aid healing under a water-resistant dressing eg. tegaderm.

9. Send specimen to histopathology laboratory. It is important to label the specimen as a curette sample.

When treating malignant lesions, you should abandon the curettage technique if the dermis is breached and a formal excision should be considered.

Reference
Sheridan AT, Dunbar RPR. Curettage, electrosurgery and skin cancer.
Austral J Derm 2000;41: 19-30.

SHAVE EXCISION AND SHAVE BIOPSY

The horizontal shave technique is used for biopsy of excision of papular or exophytic skin lesions such as benign papular naevi, seborrhoeic keratoses, basal cell carcinomas and other skin appendage tumours situated in the epidermis or upper dermis. The horizontal shave technique can also be used to take samples of epidermal skin diseases, in particular the bullous dermatoses where lesional and peri-lesional skin can be obtained along with superficial dermis. Other examples include collection of superficial skin for fungal hyphae or epidermal pinch grafts for grafting of leg ulcers. The technique itself is simple and quick and cosmetic consequences after healing are usually very acceptable. A deep shave / scoop technique can be used in individual cases as per clinical need.

The cosmetic outcome is frequently superior to standard excisional techniques in the management of benign papular naevi. In up to 45% of patients there is no evidence of a scar when assessed six months post operatively and in pigmented and hairy naevi there is only a small risk of retained pigment and hair at the site of the original mole (approximately 25% and 20% respectively)[1]

A variety of tools can be used to carry out the shaving process and include No. 15 or 22 blades mounted on a scalpel handle, a flexible razor blade held between the thumb and forefinger.

Because of the vascular nature of most naevi and tumours, it is advisable to use Lignocaine with Adrenaline (or similar local anaesthetic) as the preferred anaesthetic. The methods used for haemostasis include hot beaded tip cautery, hyfrecation and aluminium chloride. The former technique is preferred in benign papular naevi because of the lower incidence of retained pigment at the naevus site, whereas chemical haemostasis may be preferable in tumours, particularly more friable ones, when with cautery one can see tumour burning without necessarily gaining the desired haemostatic effect.

Always use aqueous antiseptic solutions when electrocautery is to be used.

Reference: Hudson-Peacock M, Bishop J and Lawrence C M. Shave excision of benign papular naevocytic naevi. Br. J of Pl Surg 1995; 48: 318-322.

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Technique for benign papular lesions such as naevi

1. Infiltrate local anaesthetic directly into the lesion to raise it up slightly. Infiltrating the lesion this way makes it stiffer and easier to slice off.
2. Using a No. 15 blade mounted on a scalpel handle, or other chosen surgical tool, it is held horizontally and the lesion shaved off flush with the skin using a gentle advancing sawing motion.
3. This process is made easier by stretching the skin either side of the lesion to prevent excessive movement during the sawing process.
4. Always send the lesion for histopathological examination.
5. Haemostasis can be achieved using hot beaded tip cautery or gentle hyfrecation for the best cosmetic outcome.

Technique for shave biopsy of tumours

1. Infiltrate local anaesthetic into the area for sampling.
2. Tissue can then be shaved from a representative part of the tumour (usually the thickest or most unusual part) and sent for histopathological examination.
3. Haemostasis can be achieved using cautery or aluminium chloride, the latter technique being preferred with particularly friable tumours.

Always give clear verbal (and preferably written) after care instructions to patients after the procedure has been completed. This reinforces what should have been discussed when gaining the preoperative informed consent and gives patients more confidence in taking care of their wounds whilst healing is ongoing.

PUNCH BIOPSY

This is a quick, convenient technique for full thickness sampling of skin lesions or inflammatory rashes, with the small resultant defect being allowed to heal by secondary intention or by suturing. The punch excision technique can also be used as one of a number of methods in the management of scars such as those caused by acne, and as a means of harvesting skin and hair for pinch grafts and hair transplants respectively. It is also a useful technique for fenestrating ear cartilage to assist in the secondary intention healing of larger ear defects. Punch sizes range from 2mm to 10mm and come in disposable and non-disposable types.

It is always useful to mark the area or areas to be removed with ink prior to local anaesthetic injection. Tissue removed can be sent for histopathological examination, immunoflourescence, electronmicroscopy or culture.

When performing a biopsy, the dermatologist must choose the best technique and site to gain the most information with the smallest piece of tissue and this is very reliant on the experience of the clinician which in turn is based on knowledge of clinical dermatology and appreciation of histopathology. A full thickness (dermis and subcutis) excision biopsy specimen is necessary for the diagnosis of most tumours, including malignant melanoma or when distinguishing keratoacanthoma from squamous cell carcinoma. Panniculitis and cutaneous morphea are two examples of inflammatory skin processes when a full thickness biopsy is also required. The punch biopsy technique can be used in this circumstance, but only if a full thickness of the fat layer is likely to be sampled and in practice, an ellipse incisional biopsy is easier and more reliable..

When the area for biopsy has been selected it is important to examine the natural skin tension lines in the area so that biopsy orientation can be facilitated. Ideally orientation of the excision should allow closure parallel to the natural skin tension lines. By stretching the skin perpendicular to these lines, the punch blade is placed on the skin and rotated under gentle pressure creating a circular defect which, on relaxation of the counter traction, becomes an oval defect lying along the natural skin tension lines.

Ref

Skin biopsy CME review

Biopsy issues in specific diseases

Dirk Elston. J Am Acad Dermatol 2016;74:1-16.

Technique

1. Local anaesthetic is infiltrated into the pre-inked skin.

2. Stretching the skin perpendicular to the relaxed skin tension lines between thumb and finger either side of the area to be sampled, the punch blade is placed on the skin and rotated under gentle pressure by rolling it between the thumb and finger using a twisting drilling action.

3. One should penetrate to the level of the fat layer to achieve a full thickness biopsy specimen.

4. The specimen will either float up on the fat layer or can be gently lifted using a skin hook or gently applied forceps to allow specimen collection by cutting through the fat layer using sharp scissors.

5. Haemostasis can be achieved with direct pressure and/or interrupted sutures. Choice of suture material may vary depending on the area being biopsied, for example, silk or vicryl sutures may be more appropriate for a mucous membrane, whereas a non-absorbent suture such as nylon may be preferable at other sites. Both absorbent and non-absorbent sutures can be used in a layered closure for larger punch defects.

6. The resultant defect can be allowed to heal by secondary intention as an alternative method although optimal haemostasis and cosmesis as well as reduced healing time are usually seen with sutured wounds.

7. Make sure the specimen is handled carefully to avoid crush artefact which may make histopathological interpretation more difficult. If the specimen is to be divided, it should be done carefully with a sharp blade to give two full thickness specimens. It may be helpful to label the specimen to assist the pathology technicians in orientation eg by applying ink to the epidermal surface.

NB When sampling the scalp always angle the punch in the direction of hair growth to minimise unnecessary follicular disruption. Patient aftercare instructions both verbal and written are helpful and arrangements should be made for removal of sutures if this is necessary with the appropriate practitioner.

SNIP EXCISION

This is a simple and effective treatment for skin tags and some larger fibroepithelial polyps.

The equipment needed for this technique include forceps, sharp scissors, a haemostatic agent or electrocautery device, and local anaesthetic may be needed for larger lesions.

Histopathological examination is not always necessary but is advisable for the larger polyps as a variety of pathologies can give rise to these.

Technique

1. For small skin tags local anaesthetic is not needed as it is more painful than the snip excision. Reserve local anaesthetic for lesions with broader bases when electrocautery is likely to be required.
2. Lift the tag from its tip away from the skin to allow identification of the neck of the tag.
3. Using sharp scissors, snip the lesion through the neck taking care not to cut the skin itself as this makes the procedure more painful.
4. Tiny bleeding points usually stop oozing spontaneously after a few minutes.
5. Larger lesions will need chemical haemostasis or electrocautery and should be pre-injected with local anaesthetic anticipating this.
6. A simple dressing can be used when larger polyps have been treated but are unnecessary for smaller lesions.

NB Patient aftercare instructions both verbal and written are helpful.

CRYOSURGERY

Introduction

The hazards and benefits of tissue injury from cold have been recognised for many years. Successful cryosurgery requires an understanding of the effects of freezing living tissue in order to optimise the therapeutic benefit.

Cellular injury following freezing may be brought about by intra and extra-cellular ice formation, hypertonic damage, disruption of cell membranes and changes in cutaneous circulation during freezing. Much cellular injury occurs during thawing. The critical determinants of the extent of this injury are the rate of freezing, the lowest temperature reached, the duration of the freeze and the rate of thawing. Repetition of the freeze-thaw cycle produces greater tissue destruction than a single freeze-thaw cycle. Temperatures necessary to produce cell death in skin vary according to cell morphology, but most cells are killed at -25°C to -30°C. This temperature can be readily achieved at 3-4 mm depth from the skin surface using appropriate Liquid Nitrogen spray techniques. In contrast, the cotton wool bud method tends to be less effective. Cotton wool buds vary in their volume and compactness; the pressure exerted by them cannot be controlled accurately and they need to be re-dipped frequently into the nitrogen.

These variables lead to a lack of precision and the cottonbud method gives less reproducible results except in very small lesions, e.g. warts.

Patient Selection

Cryotherapy is well tolerated in adults. It is not usually suitable for children under ten years of age, although some young children over five years of age may tolerate single freeze times of 5-10 seconds to a few lesions only. Patients should be warned, before treatment, about post-operative effects (see complications). Darker skin may develop marked hypopigmentation.

Treatment Technique

The open spray technique is the most commonly used in dermatology. The device consists of a metal flask which contains a reservoir of liquid nitrogren. This is delivered to the skin surface via a metal nozzle. Release of liquid nitrogen is controlled by the operator using a trigger. The spray tip comes in several diameters to allow fine control when needed. The tip is held about 1 cm from the skin for treatment. There may be some surface splatter but important structures, e.g. the eye, can be shielded with a plastic spoon.

The dipstick or cotton wool bud is the simplest method. Ideally an amount of liquid nitrogen should be decanted into a metal galipot for each patient. This will prevent contamination of the main supply with HPV which could occur if buds are repeatedly dipped into it. A cotton wool bud, not too tightly packed, is dipped in the nitrogen and applied firmly to the lesion. For larger lesions redipping and reapplication may be necessary.

Reproducible Treatment Schedules (FTC - Freeze Thaw Cycle)

When treating benign lesions most cryosurgeons simply apply the bud or spray until the icefield extends 1 mm beyond the lateral margin of the lesion, and maintain it for a few seconds. If the patient has a huge reaction or conversely there is no benefit, the operator will have no accurate way of determining how to proceed at the next visit. It is useful therefore to record the treatment in the notes. One method of doing this is the spot freeze method which is suitable for lesions up to approximately 1 cm. The spray is applied to the centre until ice has developed within the desired field. This field is then maintained for a given number of seconds (usually for 5-30 depending on the pathology of the lesion) Counting begins only when the desired field has been achieved; not at the commencement of spraying. A 10 second FTC means that the icefield was maintained by intermittent spraying, for 10 seconds after prior establishment of that field. The freeze time used should be recorded in the notes for future reference.

For large lesions it is wise to divide the treatment field into overlapping smaller areas, e.g. 1.5 cm diameter and treating each of these in turn with a full freeze thaw cycle. Slight adjustment in the flow rate from the gun will prevent extension of the ice field beyond the margin outlined. If a second freeze is to be performed (see Table), it is essential to allow a slow thaw to body temperature before re-freezing. Much cellular injury occurs during the thaw time. Complete, not partial thawing, decreases cell survival.

Treatment of Benign Lesions

Benign skin lesion are typically excluded from referral to secondary care within the UK National Health service (NHS). For example viral warts are not usually offered treatment (unless the patient is immunocompromised). Response rates are disappointing and repeat treatment is often required. Children with viral warts and molluscum may not tolerate cryotherapy and in most cases no treatment is recommended. If treatment is offered freeze times up to 10 seconds are often tolerated without any local anaesthesia. For multiple digital viral warts, a ring-block may be a useful technique.

Seborrhoiec keratosis may be successfully treated with cryotherapy however these are also typically excluded from treatment within the NHS. Significant hyperkeratosis overlying a seborrhoiec keratosis or viral mart may prevent the cold injury from penetrating deep enough to be effective. In such cases treatment with either shave excision or curettage and cautery may be preferable.

Successful treatment of digital myxoid cyst with cryotherapy has been reported however a number of other well tolerated and effective treatments are available for this condition including surgery, infrared coagulation and percutaneous sclerotherapy with polidocanol. Surgical techniques have the advantage of resurfacing the site and so avoid a slow healing defect that communicates with the underlying joint and so a risk of infection.

Cryosurgery For Benign Lesions Using Cry-Ac System (C Nozzle)

DISEASE	SPRAY TIME (seconds) times counted after formation of ice field	LATERAL FREEZE
Plane	5	1mm
Common	5-10	1mm
Filiform	5	1mm
Mosaic	5-30	1mm
Plantar	5-30	1mm
Molluscum contagiosum	Ice formation only	none
Seborrhoeic kerotoses	5-20	1mm
Myxoid cyst of finger	30	2mm

Treatment of Pre Malignant and Malignant Lesions

In UK dermatology practice cryotherapy is probably most often used for treatment of actinic keratosis and Bowen's disease. The technique is as described above. Failure to respond to cryotherapy should prompt the clinician to consider the possibility of underlying SCC. In patients with multiple actinic keratoses strong consideration should be given to field directed treatment rather than treating individual lesions. For lesions on the lower leg healing times may be very prolonged and consideration should be given to alternatives such as topical therapy or curettage and cautery.

Small low risk basal cell carcinoma may also be treated with cryotherapy. Ideally the diagnosis should be confirmed histologically prior to treatment. Prolonged freeze times are required which some patients may not be able to tolerate without local anaesthesia. Healing can be prolonged compared with excisional surgery. Small low risk tumours may be better treated with curettage and cautery as this causes little pain other than infiltration of local anaesthesia, provides tissue for diagnosis and results in high cure rates.

Although successful treatment of cutaneous squamous cell carcinoma (SCC) with cryotherapy has been reported, the 2009 UK guidelines advised cautious use only in low risk tumours. Since then use of cryotherapy for cutaneous squamous cell carcinoma has probably all but disappeared from UK dermatology practice. The current UK guideline (not yet published) is likely to discourage it's use altogether. Keratoacanthoma can be clinically indistinguishable from SCC and so excision and histological assessment is recommended.

Cryosurgery for Pre-malignant and Malignant Lesions Using Cry-Ac System (B or C Nozzle)

DISEASE	SPRAY TIME (secs) counted after ice field formed	LATERAL FREEZE
Actinic keratoses	5	1-2 mm
Bowen's disease	5	3 mm
Basal cell carcinoma	2 x 30	3 mm

CONTRAINDICATIONS

There are no absolute contraindications, but it would be best avoided in patients with cryoglobulins or cold urticaria.

Contraindications to Cryosurgery

Cryosurgery should not be used to treat non-melanoma cancer in the following circumstances:

i) Tumour tethered to underlying structures.
ii) Tumour margins indeterminate, eg. morphoeic basal cell carcinoma.
iii) Deeply infiltrating tumour, for example squamous cell carcinoma of the lip or helix of the ear, basal cell carcinoma of the alar crease and basal cell carcinoma in the pre and post auricular area.
iv) Recurrent tumour after previous cryotherapy, X-irradiation or surgery.

Complications of Cryosurgery

Pain, swelling and blistering frequently occur when longer freeze times are used. Hypopigmentation of the treated area is seen in people with dark skin, but this may improve in time. Paraesthesiae occurs but is usually temporary. Prolonged sensory abnormality is very rare indeed, even after using 30 second freeze times around the finger tips. Cryosurgery on the fingers can lead to nail dystrophy and to extensor tendon injury.

Milia formation is often seen two months post-operatively but resolves spontaneously. A thin hypertrophic scar is often seen across the treatment field two months post-operatively, but this will settle spontaneously in the following months. Wound healing usually takes place in 4 to 6 weeks after treatment of non-melanoma skin cancer around the head and neck and forearms and hands, but slow wound healing is commonly seen for lesions treated on the shin and calf. Patients on anticoagulants and corticosteriods tolerate cryosurgery very well.

Post-Cryotherapy Care

A dressing is advisable for those lesions treated with longer freeze times. Some degree of exudation may be expected during the first few days and topical antimicrobials may help prevent secondary infection. Wounds can be washed and it is important that crust and exudate is removed regularly. Adequate analgesics should be prescribed. Patients should be reminded that there will be some pain and discomfort and swelling initially. Swelling can be considerable in the first 48 hour, especially surrounding wounds on the upper face, and blistering is very variable in the first 24 to 48 hours. This should be explained to the patients in order to allay anxiety. Hands and feet will feel sore for several days after treatment of multiple viral warts and fingers may be rather clumsy for 7 to 10 days after treatment.

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Notes

HAEMOSTASIS AND ELECTROSURGERY

"It is better to see the outside of an artery before you see the inside"

Haemostasis

Haemostasis is more difficult in people with bleeding tendencies and in those anticoagulants.

Elderly people with fragile skin, especially with sun and steroid damaged skin, are likely to bleed and bruise easily. Pre-operative assessment is vital.

Intra-operative haemostasis falls into six groups

- **Adrenaline** containing local anaesthetic

- **Pressure**. Only light pressure is needed even for arterial bleeding. In areas such as the nose and forehead pressure on the skin around the wound will control arterial bleeding. Sterile cotton tip buds are very useful in providing local pressure in small wounds; apply directly over the bleeding vessel and roll to one side when ready to use diathermy. With heavy bleeding suction may be needed. If all else fails apply a hot wet pack to the wound and hold it in place under pressure for five minutes.

- **Clamping.** Very small vessels may be picked up with a mosquito forceps and clamped. Often a half turn is sufficient to stop bleeding without ligation of the vessel. **All vessels over 1mm diameter should be ligated with an absorbable suture such as 3/0 or 4/0Vicryl.**

- **Undersewing.** If the source of bleeding cannot be identified use a large needle e.g. 25mm and undersew the area with large bites of the needle

- **Electrocautery.** A wire loop is heated by its resistance to an electric current. No current passes through the body. The temperature, when the tip is red hot, may be more than 40 ºC and is very destructive. Too low a temperature allows coagulated tissue to stick to the loop.

- **Diathermy.** This is the application of high frequency current for the destruction of diseased tissue or for cutting tissue with diminished bleeding. Heat is generated by the resistance to the current which passes through the tissue. Electro dessication dehydrates superficial tissue; electro-coagulation produces greater damage and coagulates larger vessels. A plate electrode is needed. Bipolar forceps localise the damage. At the highest voltages electro cutting occurs.
- **Topical Haemostatic Agents.** Agents such as Oxycel and Gelfoam are slowly absorbed but may lead to increased risk of infection. Agents such as Monsel's solution (ferric subsulphate) and aluminium chloride act as protein precipitating agents. They are most useful for wounds left to heal by secondary intention eg. shave biopsy wounds. Silver nitrate sticks are useful in this context but may cause tattooing and a greater degree of necrosis).

Post Operative Pressure. "Bleeding always stops"
This can be useful in preventing haematomas. It can be combined with elevation of the treated part. A pressure bandage is helpful for twenty four hours and in some sites such as ears is mandatory. The back of the ear should be padded to keep it in the anatomical position when bandaged.

If bleeding occurs post operatively elevate the part and apply pressure for thirty minutes without interruption.

If bleeding still persists the wound must be explored, the bleeding vessel ligated and any haematoma removed.

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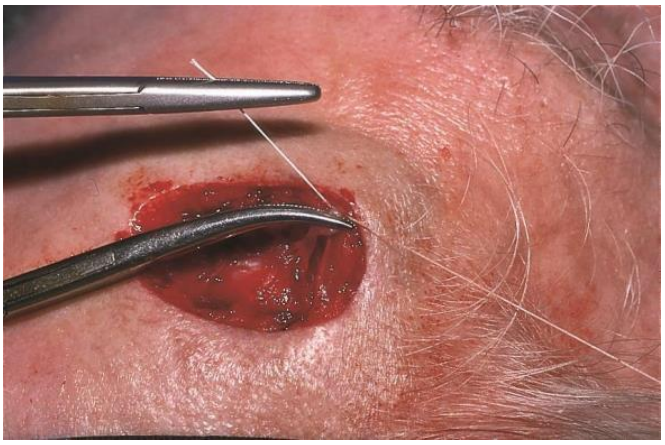

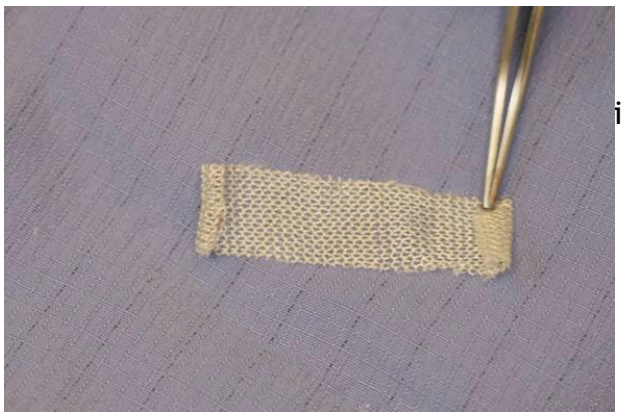

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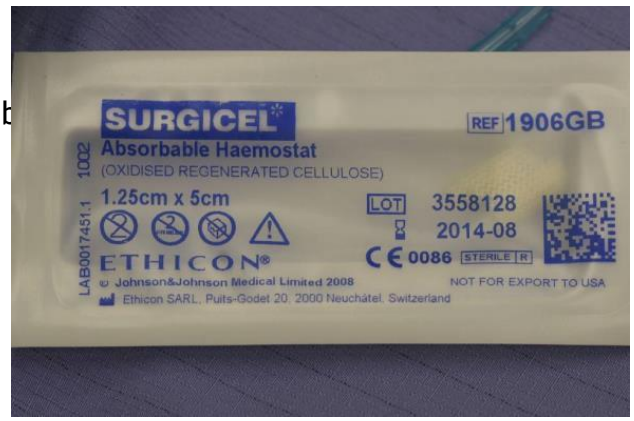


Electrosurgery

Definitions

Electrocautery: the use of a high amperage, low voltage, electric current to heat wire or filament which causes thermal damage eg. hot-tip. The current does not pass through the patient.

Indication - cheap, controlled tissue destruction. Self-sterilising. will work in bloody fields, and on non conductive tissue such as nail. Safe with electronic equipment, such as pacemakers.

Electrolysis or Galvanic Surgery: The negative pole of a galvanic (DC) current liberates hydroxides which liquify protein within the lesion causing its destruction.

Indication - mainly for hair follicle destruction.

High Frequency Electrosurgery: A high frequency (AC) current passes directly into the tissue causing heat. It can be varied to destroy, cut, or coagulate. Unlike an electrocautery, the electrode tip does not itself get hot. It may be **Monoterminal (Monopolar)** in which the patient acts as a capacitor, or **Biterminal (Bipolar)**.

Diathermy: The creation of heat by the passage of a current through tissues. The high frequency generates heat where the current is concentrated at the hand-held electrode tip.

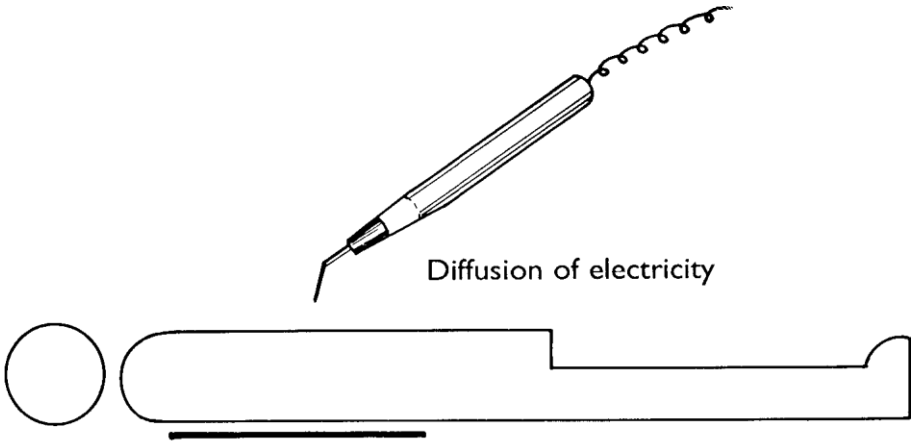
Electrofulguration is produced by a very high voltage, low amperage high frequency damped current using an electrode held above the tissue. The resultant spark produces superficial dehydration and coagulation. The amount of damage done varies with the power setting, but deep penetration does not occur because the charring acts as an insulating barrier.

Advantage - stops bleeding with minimal tissue damage.

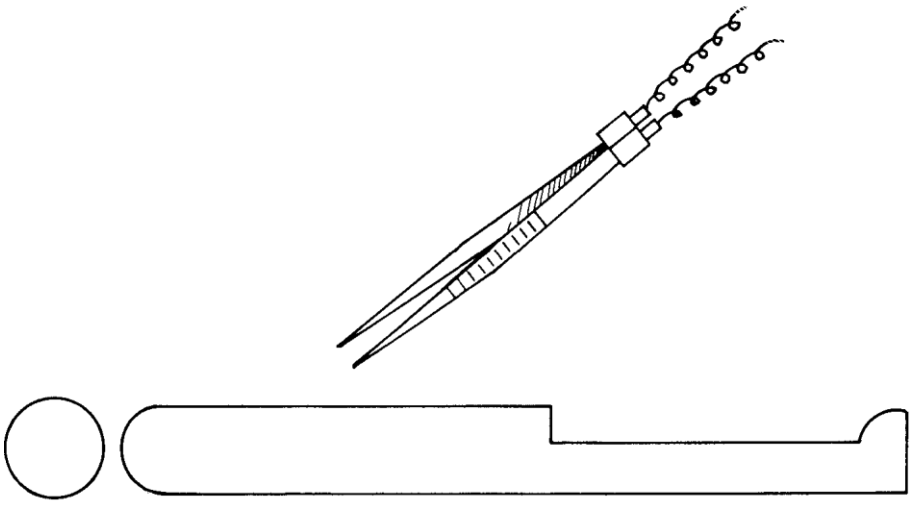
Electrodesiccation: This is similar to electrofulguration but the monopolar electrode tip is held in contact with the skin, producing a more intense dehydration and coagulation. As the current (power) is increased there is widespread tissue destruction which is more likely to result in scarring.

Indication **-** **1.** Destruction of small benign lesions not requiring histology, e.g. skin tags
2. An alternative to cautery after curettage

Diathermy



Unipolar



Bipolar

Electrocoagulation: This uses a biterminal system and a lower voltage, higher amperage moderately damped current, with a dispersive plate or bipolar forceps. If the electrode tip is not in contact with the tissue the current sparks across the gap, causing superficial coagulation. If the electrode is in contact with the patient some deep coagulation can occur.

Indication **-** haemostasis

Electrocutting:
Again uses a biterminal system with low voltage, high amperage undamped current. It is often produced on the same machine as electrocoagulation by varying the damping, so that both cutting and haemostasis can be obtained simultaneously.

Indication - Removal of skin tags and rhinophyma reduction.

The Hyfrectator (CONMED) is the commonly used dermatological electrosurgical unit utilising a spark gap to produce the current surge required. It can supply both monoterminal and biterminal functions. The output is considered by some to be inadequate for controlling extensive bleeding, and it is insufficiently powerful to produce a cutting wave-form.

Safety
1. Avoiding burns
   a) Do not use alcohol based skin preparations.
   b) Do not use excessive power settings, as thermal damage can be extensive.
   c) Good dispersive electrode contact is essential to prevent local burns in this site.
   d) Inadvertent contact with earth or ground (eg through the metal of the table), can produce local burns.
   e) Do not use high power settings on isolated areas such as a finger or penis, as the current may "channel" along a nerve or blood vessel, causing disastrous uncontrolled damage. Use bipolar forceps in these sites.

2. **Pacemaker interference**
   Modern pacemakers are well shielded and usually these are no problem. If wave-form electrosurgery is required, ideally the patient should be monitored, and demand pacemakers switched to fixed rate for the surgical period. Electrocautery (hot wire) machines are safe in these situations.

3. **Infection risk**
   Sterilisable or disposable electrodes are advisable, only the hot wire is self-sterilising. Electrodessication of wounds causes a spattering of minute blood droplets around the wound, and it is possible that an aerosol may be formed. However, the risk of infection from Hepatitis B, Aids, and other viral infections, from this source seems to be extremely low.

4. The equipment must be regularly checked for electrical safety.

Notes

WOUND CARE, DRESSINGS AND SECONDARY INTENTION HEALING

Healing by secondary intention

"In the end, the skin always wins"

Advantages

Simple
Avoids need for reconstruction
Low complication rate
Recurrences not buried under flaps or grafts
Usually good cosmetic results

Disadvantages

Wounds take longer to heal
Increased incidence of hypertrophic scarring
May cause retraction at free edges, eg. lips and eyelids

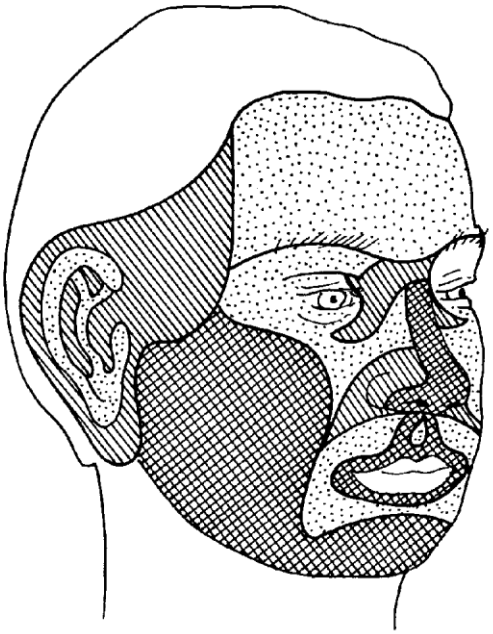
Wound care

Haemostasis must be good
Guiding sutures may be used
Daily dressings with water or saline followed by topical antiseptic/antibacterial e.g. Bacitracin, Mupirocin, Silver Sulphadiazine, Chlorhexidine etc.
Non stick dressing eg. paraffin gauze and absorbent guaze.

The cosmetic result of wounds healed by secondary intention varies according to anatomic site. Healed wounds are often imperceptible in NEET areas (concave surfaces of the nose, eye, ear, and temple). In NOCH areas (convex surfaces of the nose, perioral lips, cheeks and chin, and helix of the ear) superficial wounds heal with an acceptable appearance, but deep wounds heal with depressed or hypertrophic scars acceptable only to some patients. Wounds healed in FAIR areas (forehead, anthelix, eyelids [i], and remainder of the nose, lips, and cheeks) result in flat hypopigmented scars acceptable to many patients.

Good postoperative wound care instruction is particularly important because many practice nurses will not have come across the concept before. The sight of a large open wound often creates panic with the assumption that it has dehisced and requires urgent attention. On the lower leg some very large lesions can be left to heal in this manner. Conceptually they should be thought of as leg ulcers, rather than surgical wounds. So long as the ABPI is satisfactory, healing is facilitated by the application of a 4 layer bandaging system.

THE COSMETIC RESULTS OF SECONDARY INTENTION WOUND HEALING IN DIFFERENT PARTS OF THE FACE



Cosmetic Result

▨	Excellent	(Neet area)
▩	Satisfactory	(Fair area)
▩	Variable	(Noch area)

Dressings for wounds

Individual preferences for dressings will develop and the following notes are intended for initial guidance. A suitable dressing for a routine elliptical excision might consist of a small strip of dressing gauze placed directly over the wound and then the whole cleaned area covered with a transparent semi permeable membrane such as Bioclusive, Tegaderm or Op-Site. This type of dressing enables observation of the area around the wound without disturbing it. Small wounds may be covered directly with adhesive strips which need to be clean but not necessarily sterile. To obtain this unroll sufficient tape from its roll so that previously covered tape is exposed; cut this off and discard. Use the next portion of tape to cover the wound. Flesh coloured tape eg. micropore gives an almost invisible cover to a small wound.

Antiseptics

- designed for application to intact skin to reduce bacteria
- inactivated by organic matter
- effects on wounds: leucocytotoxic, cytotoxic to fibroblasts and keratinocytes, tissue necrosis, retard epithelialisation

Topical antibiotics

- little benefit in sutured wounds as most contamination ceases with wound closure
- no significant difference in infection rate when comparing white petrolatum and bacitracin
- regular application may suppress cutaneous flora and select pathogens

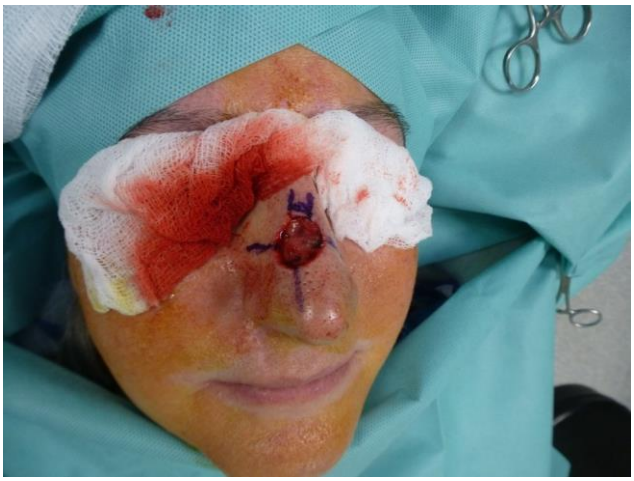
Occlusive wound dressings

- Back as 1960 it was realised that blisters heal faster if left unbroken and wound occlusion with polythene more than doubled epithelialisation
- moist wound healing 40% faster than air-exposed
- epidermal migration facilitated by moist conditions and absence of crust
- increased bacterial colonisation but no higher rate of infection

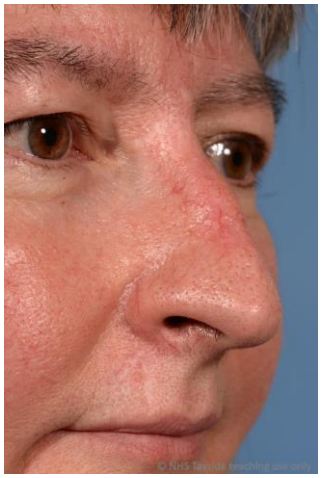
A good surgical wound dressing should:

- provide a moist environment
- wick exudate away from the wound
- protected against infection, foreign material and mechanical trauma
- aid in haemostasis
- limit motion in surrounding tissues

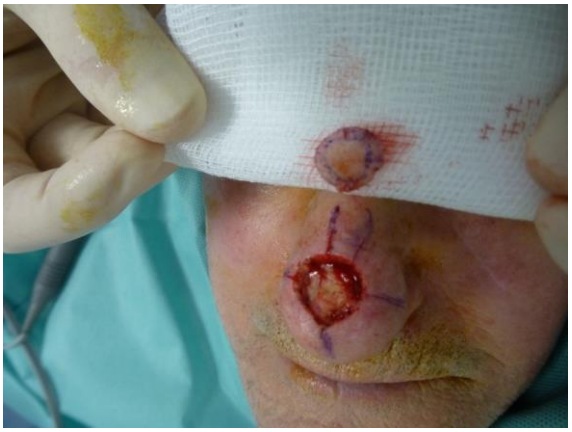
14x13mm Mohs defect nasal dorsum / right sidewall

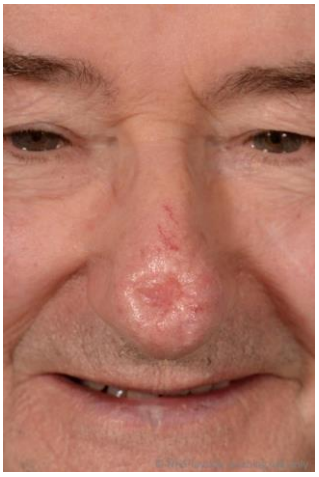


good aesthetic outcome at 3 months after SIH



15mm Mohs defect nasal tip





poor aesthetic outcome at 6 weeks after SIH

Dressing design

- ointments - antibiotic, petrolatum
- contact layer - non-adherent
- absorbent layer - gauze pads
- contouring layer - gauze pads, dental rolls
- securing layer - tape, tubular bandage, elasticated bandages

Dressing complications

- excessive pressure - bulla, ulcer, flap/graft failure
- insufficient pressure - risk of bleeding, haematoma
- excessive occlusion - bacterial overgrowth
- inappropriate contact layer - pain and bleeding with dressing changes

Wound dressings

- dressing pads Melolin, Release, Mepore, Primapore
- alginate Kaltostat, Sorbsan
- foam Lyofoam, Allevyn
- hydrogel Debrisan, Intrasite Gel
- hydrocolloid Granuflex, Comfeel, Duoderm
- vapour-permeable Opsite, Tegaderm

Changing dressings

Daily dressing is not necessary for clean wounds. It is needed for excessive exudates but take care not to disrupt reepithelialisation.

Post operative care

Even after a local anaesthetic, some patients will feel faint and need to lie down. At least one couch will be required for recovery. Most patients can remain seated in a chair until they feel fit enough to return home. Ideally patients who are having minor procedures should be brought to hospital and taken home afterwards by a friend or relative. Procedures on the upper face eg around the eyes may need dressings which restrict or impair vision.

Many patients feel slightly ‘odd’ post-operatively, and therefore may not really be fit to drive. It is helpful for patients who have had bigger procedures to have some instructions for home dressings. The following information can be used as a patient handout.

WOUND CARE INSTRUCTIONS FOLLOWING MINOR SURGERY

After your surgery, a pressure may be placed over the area that has stitches. This will prevent bleeding. Please follow these instructions over the next 7 to 14 days. They will help prevent any complications as your wound heals.

NB: Longer time if wound is large or patient 'dozy' during procedure.

For the First 24 or 48 Hours After Your Surgery

I. Leave the pressure bandage on and keep it dry. If it should come loose, you may retape it, but do not take it off.
II. Relax and take it easy. No vigorous exercise or heavy lifting. This could cause the wound to bleed.

III. Post-operative pain is usually mild. You may take paracetamol, t tablets every 6 hours as needed. This can be started as soon as you get home. Do not take aspirin or any drugs such as Nurofen.

IV. You may see a small amount of drainage or blood on your pressure bandage. This is normal. However, if the drainage or bleeding continues and saturates the bandage, please do as follows:-

A. Apply firm pressure with a gauze swab over the bandage for 15 minutes.

B. If bleeding still continues, apply an ice-pack for 15 minutes to the bandaged area. A simple ice-pack can be made by placing a bag of frozen peas into a dry plastic bag, this avoids wetting the bandage.

C. If bleeding still continues, call our department during office hours or go to the nearest casualty department.

***48 Hours After Your Surgery** (If you are not attending the department)*

I. Carefully remove the pressure bandage. If it seems very sticky or difficult to get off, you may need to soak it off in the shower.

II. After the pressure bandage is off, you may shower and get the wound wet. However, do not let the forceful stream of the shower hit the wound directly.

III. Follow these simple wound care and dressing change instructions:-

A. Once a day, clean the stitch line by wetting a Q-tip/cotton bud with 3% hydrogen peroxide. Then gently roll it along the line of the wound. The hydrogen peroxide will help loosen any crust. Do not worry about the 'frothing' whilst cleaning.

B. Take a dry Q-tip/cotton bud and gently roll it along the stitch line. This will help to remove any crust or drainage.

C. Apply a thin layer of the ointment provided over the stitch line with a Q-tip/cotton bud. Be sure to total cover its length.

D. Cover the stitch line with a Telfa (non-stick) dressing. You may tape a piece of gauze over the Telfa for extra protection if you wish.

E. Continue this wound care process every day until you return to have your stitches removed in clinic.

What is Normal

1. *The first couple of days your wound may be tender and may bleed slightly when doing wound care.*
2. *There may be swelling and bruising around the wound, especially if it is near the eyes.*
3. *The area around your wound may be numb for several weeks or even months.*
4. *You may experience periodic sharp pain as the wound heals.*
5. *The stitch line will look dark pink at first and the edges of the wound will be reddened. This will lighten day by day.*

Call Us If

1. *You have bleeding that will not stop after applying pressure and ice.*
2. *You have excessive pain*
3. *You have signs or symptoms of an infection such as fever over 100°F, or redness, warmth or foul-smelling drainage from the wound.*
4. *You have any questions or are not sure how to take care of the wound.*

Contact Phone Number - Department of Dermatology

Notes

SURGICAL MANAGEMENT OF NON MELANOMA SKIN CANCER

This section deals with the surgical management of basal and squamous cell carcinomas (BCCs and SCCs). Less reference is made to the relative merits of non-surgical treatment options. Material has been drawn from a number of sources which attempt to give the dermatological surgeon useful information before embarking on a particular operation. They should not be seen as strict guidelines. Guidelines for the management of BCCs and SCCs have been drawn up by the B.A.D. and these should be familiar to any dermatologist performing surgery.

When dealing with a patient with a tumour the first question is whether to treat at all (i.e. in cases of serious concomitant disease it may be more appropriate not to intervene). The desired outcome of surgery is generally a cure. However, occasionally debulking with a curette or using cryosurgery on extensive tumours can have a great impact on symptoms without offering any chance of a cure.

NICE guidelines on skin cancer management are important to be familiar with. The modalities of treatment do not come under great scrutiny as the British Guidelines deal with this aspect. They do however go into great detail about who should be treating skin cancer and where it should be done. Essentially squamous cell carcinoma and malignant melanoma should always be treated in secondary care. Basal cell carcinoma and pre-malignant melanoma should only be treated in primary care if the practitioner has demonstrated competency, has suitable facilities, has ongoing CPD supervised by a dermatologist and attends some MDT meetings. These constraints are likely to reduce treatment of these lesions in the short term though in future polyclinics may reverse this trend.

Basal Cell Carcinoma

When treating BCCs there are numerous options available. These include:

- Excision
- Mohs micrographic surgery
- Curetage and cautery
- Cryosurgery
- Radiotherapy
- Photodynamic therapy
- Topical therapy (i.e. 5-FU, imiquimod)
- No treatment / active non-intervention

In addition to treatment, several factors independently affect the likelihood of cure. These are:

- Recurrent tumours (much harder to deal with)
- Anatomical site
- Size
- BCC sub-type

Basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC) are now more commonly termed 'keratinocyte carcinoma' rather than non-melanoma skin cancer (NMSC).
BCC is the commonest human cancer, and UK incidence continues to increase.[1]
There are no universally accepted guidelines on BCC treatment. An internet search using

the terms "guidelines for BCC management" will produce results demonstrating

international, national and even UK regional standards of care. Dermatologists

and dermatological surgeons need to familiarise themselves with the various clinical

standards available, the population group they refer to, the studies from which

recommendations are made, and finally the date of publication.

Diagnosis

BCC is typically asymptomatic, slow growing and in in many cases can be diagnosed clinically. Patients may give a short history of weeks or a couple of months related to the time when they noticed any bleeding, crusting or oozing, especially in hard to see places like the back or behind the ear. Remember to examine the skin under appropriate illumination, use a dermatoscope and document tumour size. Palpate the area to assess depth and stretch the surrounding skin to look for surface irregularities. This can often reveal the characteristic pearly appearance of a nodular, morphoeic or even a superficial BCC. It can also help to unmask a nodular BCC with a morphoeic component that can extend further than originally noted. If there is surface crust obscuring the lesion, and the patient is amenable, see if this can be gently removed after a soak with gauze and sterile saline.
If the diagnosis is unclear, then a 3mm or 4mm punch biopsy from involved skin (including a cuff of fat) will usually suffice. Consider a shave biopsy in cosmetically sensitive areas such as the nose or ear.

Surgical management

Successful treatment of BCC relies on completely removing the visible tumour as well as any (often asymmetric) subclinical/microscopic extension, whilst respecting functional and cosmetic outcomes. Understanding different BCC subtypes and growth patterns is crucial when choosing a treatment modality. Mohs micrographic surgery (MMS) is considered the surgical gold standard but may not be suitable (or necessary) in all instances.

MMS - recommended for high risk BCC
(Facial) BCC recurrence rate 4.4% @ 10 years

Surgical excision with standard/predetermined margins - low risk BCC
Standard excision to mid fat with 4mm margins is suitable for low risk, primary BCC. Recurrence rates up to 12.2% @ 10 years for facial BCC

Curettage and Cautery (C&C) - low risk BCC - operator and lesion dependant, no marginal clearance information gained, no randomised comparative trials, no standardised technique, and published cure rates vary.

References for BCC

1 Levell NJ et al. Basal cell carcinoma epidemiology in the UK: the elephant in the room.
Clin Exp Dermatol. 2013 Jun;38(4):367-9

2 Van Loo E, et al. Surgical excision versus Mohs' micrographic surgery for basal cell carcinoma of the face: a randomised clinical trial with 10-year follow-up.
Eur J Cancer. 2014;50(17):3011-3020.

2 Smeets NW, et al. Surgical excision vs Mohs' micrographic surgery for basal-cell carcinoma of the face: randomised controlled trial.
Lancet. 2004;364(9447): 1766-1772.

3 Rhodes LE, et al. Five-year follow-up of a randomized, prospective trial of topical methyl aminolevulinate photodynamic therapy vs surgery for nodular basal cell carcinoma . *Arch Dermatol. 2007;143(9):1131-1136.*

4 Gulleth Y, et al. What is the best surgical margin for a basal cell carcinoma: a meta-analysis of the literature. *Plast Reconstr Surg. 2010;126(4):1222-1231.*

5 Rowe DE, et al. Long-term recurrence rates in previously untreated (primary) basal cell carcinoma: implications for patient follow-up.
J Dermatol Surg Oncol 1989; 15:315-28.

6. Codazzi D, et al. Positive compared with negative margins in a single-centre retrospective study on 3957 consecutive excisions of basal cell carcinomas. Associated risk factors and preferred surgical management
J Plast Surg Hand Surg. 2014;48(1):38-43.

Which of these treatments offer the best chance of cure?

A systematic review of treatment modalities for primary BCCs looked at all studies between 1970 and 1997 which prospectively examined recurrence rates in 50 or more patients with primary BCCs observed for 5 or more years[4]. The study concluded that Mohs' surgery offered the lowest recurrence rate, followed by surgical excision. However, of the 298 studies examined, only 18 met the requirements for meta-analysis.

Recurrent tumours

A study of recurrence rates of 5755 treated BCCs in 4324 patients showed that 15% of previously treated BCCs recurred within 5 years, compared to 10% of primary BCCs[5]. In addition, recurrent tumours are generally associated with greater morbidity.

Anatomical site

The 'H zone' on the face (fig.1) is often referred to as a site where tumours are most difficult to eradicate.

BCC sub-type

BCCs with a morphoeic growth pattern often have indistinct margins with a large extent of sub-clinical tumour invasion.

In each of these clinical scenarios surgical approaches with the highest cure rates should generally be used.

All BCCs are not the same - risk stratification is important to influence management choice

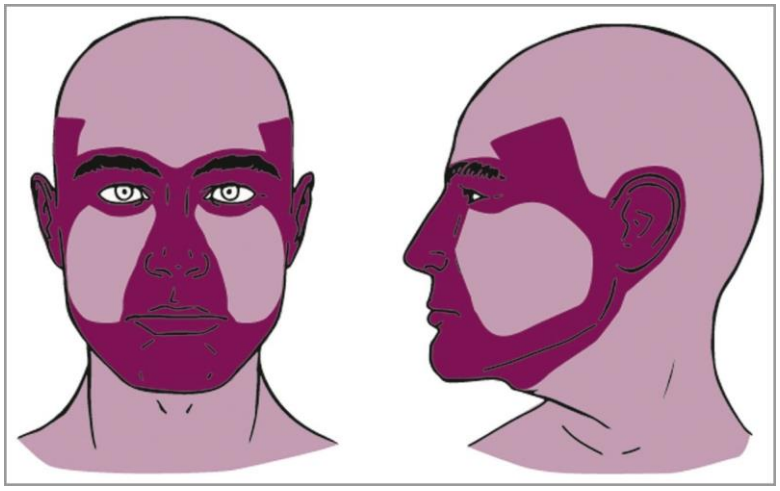


Figure 1. Areas H (darker shade) and M (lighter shade) on the head and neck.
©2021 British Association of Dermatologists British Journal of Dermatology (2021)185, pp899–920902BAD guidelines for adults with BCC 2021, I. Nasretal.

Which treatment to use for BCCs?

The BAD guidelines for the management of BCC published in 2021 by Nasi et al outlines the following recommendations for the management of BCC.

Surgical treatment recommendations:

- Offer standard surgical excision as a first-line treatment option to adults with low-risk BCC.
- Offer standard surgical excision with immediate reconstruction as a first-line treatment option to adults with primary BCC with a high-risk factor if the BCC has well-de-fined clinical margins under bright lighting and magnification or dermoscopy.
- Offer standard surgical excision with delayed definitive reconstruction, or Mohs micrographic surgery, as the first-line treatment option to adults with high-risk BCC within a high-risk anatomical site if the BCC has poorly defined clinical margins under bright lighting and magnification or dermoscopy.
- Excise low-risk BCC using a 4 mm peripheral clinical surgical margin.
- Excise primary BCC with a high-risk factor using at least a 5 mm peripheral clinical surgical margin
- Excise BCC by ensuring adequate excision at the deep margin to a clear plane, including a fat layer where present, and other deeper structures if needed.
- Consider Mohs micrographic surgery in adults with primary BCC with at least one high-risk factor
- Offer Mohs micrographic surgery as a first line treatment option to adults with recurrent BCC with at least one other high-risk factor, especially if the tumour is at a high-risk site. Following discussion at an MDT, consider standard surgical excision with at least a 5 mm margin and delayed definitive reconstruction as a treatment option to adults with recurrent with at least one other high-risk factor.
- Offer standard surgical excision or radiotherapy as a treatment option to adults with advanced BCC. Consider Mohs micrographic surgery as a treatment option to adults with advanced BCC.

Note: It is important not to diminish the width of the margin in order to improve the chance of a good cosmetic result, even if it becomes apparent that using a narrower margin does not result in a decrease in reports of complete excisions. The usual bread-loaf slicing used to view histological specimens only enables the pathologist to look at a minute fraction of the excision margins. A tumour with finger-like projections may appear to have been fully removed and reported as such

Curetage and Cautery/ electrodesiccation: This surgical treatment modality can also be used as a first line option for low risk superficial subtype BCCs. Although it is cost effective procedure, it does not allow for histological margin assessment, it is operator dependent and can be associated with higher recurrence rates specially if performed by non-experienced practitioners.

What do you do if the excision of a BCC is reported as being incomplete?

Various studies have shown that many BCCs reported as inadequately excised do not recur. However, if you look at the problem from a different angle the conclusions are at variance. An audit of 1392 excised BCCs, where 99 (7%) were histologically incompletely excised, found that residual tumour was reported histologically in 54% of the BCCs that were re-excised [7]. There is a greater chance that a tumour with a positive deep margin will recur than a tumour with a positive lateral margin.

There seems little doubt that the body can clear residual tumour in some cases but at the same time it is recognised that some tumours show a remarkable ability to infiltrate widely, to spread along tissue planes, to invade cartilage and bone, to spread along nerves and arteries and wreak havoc. Our aim should be to clear tumours at the first procedure whenever possible.

Cryosurgery: This treatment modality use of liquid nitrogen to destroy BCC tumour cells. It is a cost-effective method of treating low risk well defined BCCs but it has been associated with poor cosmetic outcome and highly variable 5 year recurrence ranging from 7.5-20%. This variability could be explained by clinician's patient selection, technique used and level of skill. Cryotherapy is not recommended in patients with BCC that are at high risk of recurrence or those concerned about poor cosmetic outcome.

Radiotherapy:

- Offer radiotherapy as a treatment option to adults (suggested age≥60 years) with low-risk and high-risk BCC who are unsuitable for or decline Mohs micrographic surgery or standard surgical excision and who express a preference for radiotherapy, and in whom the lesion is a nodular BCC, an infiltrative subtype of BCC, provided a sufficient planning margin is used an excised BCC with involved margin
- Do not offer radiotherapy as a treatment option to adults with BCC who are unsuitable for or decline Mohs micrographic surgery or standard surgical excision, and in whom the lesion is a recurrent BCC following previous radiotherapy, associated with certain genetic syndromes predisposing to skin cancers, for example Gorlin syndrome or xeroderma pigmentosum. Discuss alternative treatment modalities at an MDT
- Do not routinely offer radiotherapy as a treatment option to adults with BCC who are unsuitable for or decline Mohs micrographic surgery or standard surgical excision, and in whom the lesion

Imiquimod:

Imiquimod is a toll-like receptor 7 agonist that induces a tumour-directed cellular immune response. Many studies support its use in superficial BCC and it is licensed in a regimen of 5 days per week over 6 weeks. Studies support its efficacy in treating single or multiple small, superficial, low-risk BCCs, particularly those on the trunk and limbs, PDT and topical 5-FU 5% cream. In Randomised controlled trials, imiquimod was found to be inferior to surgical excision but superior to MAL PTD and 5-FU. Bear in mind that up to 56% of patients report severe local skin reactions and discomfort with 5% patients reporting systemic symptoms.

Photodynamic Therapy:

- Offer Topical PDT as a treatment option to people with superficial BCC, particularly for poorly healing or cos-metically sensitive skin sites, multiple lesions and large-area lesions.
- Consider topical PDT for people with thin (<2 mm) nodular BCC in situations where other treatments are not practical or are contraindicated.
- Offer a further cycle of PDT to patients with residual lesions where the BCCs have shown a good response to the preceding treatment.
- Do not offer topical PDT as a standard treatment for nodular BCC at high-risk sites
- Use red light and not that of a shorter wavelength (blue or green light, or daylight) for enhanced penetration for BCC.

Other treatment options (summary points):

- Offer topical imiquimod, topical 5-fluorouracil,cryosurgery or topical PDT as treatment options to adults with low-risk BCC who are unsuitable for or decline standard surgical excision.
- Do not offer topical imiquimod, topical 5-fluo-rouracil, cryosurgery, curettage and cautery, or topical PDT as treatment options to adults with high-risk BCC who are unsuitable for or decline Mohs micrographic surgery or standard surgical excision.
- Do not offer topical imiquimod, topical 5-fluo-rouracil, cryosurgery or topical PDT as a treatment option to adults with advanced BCC unless for palliation of symptoms, following discussion at an MDT. Advise adults with BCC who decline all treat-methods that the risk of significant progression of the tumour is at least 25% over 2–5 years. There is insufficient evidence to support any recommendation for the following interventions for low- risk (including recurrent, low-risk) BCC: Mohs micrographic surgery, vismodegib.
- There is insufficient evidence to support any recommendation for the following interventions for BCC: topical ingenol mebutate gel. topical Curaderm-BEC5 cream. electrochemotherapy (ECT), CO2laser, pulsed-dye laser or combination of these.

"*Every clinical decision is a calculated gamble.*
Good decisions come from experience, and
experience comes from bad decisions"

Key Resources: (in order of publication date)

Guidelines of care for the management of basal cell carcinoma
J Am Acad Dermatol. 2018 Mar;78(3):560-578

National Comprehensive Cancer Network
Clinical Practice Guidelines in Oncology
Basal Cell Skin Cancer v1.2016 (May 2016)

Update of the (2006) European guidelines for basal cell carcinoma management
Trakatelli M. et al. Eur J Dermatol. 2014 May-Jun;24(3):312-29

a - National Institute for Health and Care Excellence (NICE) (UK)
Improving outcomes for people with skin tumours including melanoma –
The management of low risk basal cell carcinomas in the community (May 2010)

b - NICE - Vismodegib for treating basal cell carcinoma TA489 (November 2017)

c - NICE - Electrochemotherapy for primary basal cell carcinoma and primary squamous cell carcinoma, IPG478 (Feb 2014)

d - NICE - Photodynamic therapy for non-melanoma skin tumours (including premalignant and primary non-metastatic skin lesions), IPG155 (February 2006)

Guidelines for the management of basal cell carcinoma
(BAD guidance- currently being updated)
Telfer NR. et al. Br J Dermatol. 2008 Jul;159(1):35-48

SQUAMOUS CELL CARCINOMA

Compared to BCCs, SCCs are more aggressive with a greater propensity to metastasise. A review of all studies since 1940 on the prognosis of SCC on the skin and lips found the following factors to be important[8]:

SITE

	Sun-exposed skin	Ear	Lip
Local recurrence	8%	19%	11%
Metastasis	5%	12%	14%

size	<2cm	>2cm
Local recurrence	6%	16%
Metastasis	8%	30%
5-year survival	98%	75%

Further factors which render an SCC as a difficult or aggressive tumour are:
Tumours arising in areas of **prior radiation** or **thermal injury**, **chronic draining sinuses**, **chronic ulcers** or **chronic inflammation** – These tumours have the highest malignant potential.
Tumours arising in **non-exposed sites** – These tumours have more malignant potential than those in exposed sites.
Tumours greater than 4mm in **depth** or extending down to the subcutaneous tissue (metastatic rate 45.7%).

Poorly differentiated tumours – 25% local recurrence; 16% metastasis; 61% 5-year survival (cf. 12%;6%;95% 5-year for well differentiated).

Tumours with **perineural** involvement

Tumours arising in patients who are **immunosuppressed**

Tumours which are locally **recurrent**

Which treatment to use?

Curettage and cautery has been reported in several series as offering excellent cure rates. Experience suggests it can be used for **small (<1cm), well- differentiated, primary, slow growing tumours on sun-exposed sites**. Generally, however, surgical excision is favoured and many authors lean towards use of Mohs' excision for the majority of SCC.

Margins ranging from 2-10mm have been recommended depending on the size, site etc. In another study using marking of concentric circles prior to Mohs' surgery, a 4mm margin would have been necessary to clear 95% of tumours. A diameter greater than 2cm, aggressive histology, and 'high risk' sites each called for 6mm to achieve the same benefit. Size greater than 2cm in a 'high risk' site needed a 9mm margin. This study was not looking at cure rates, but at excision of sub- clinical tumour spread[9].

The following table was published in the BAD 'Guidelines for the management of cutaneous squamous cell carcinoma[2]':

Size Location risk Disease risk Treatment recommendations

Size	Location risk	Disease risk	Treatment recommendations
<1cm	Low	Low	Excision / C&C /Cryotherapy
<1cm	Low	High	Excision
<1cm	High	Low/High	Mohs' surgery
1-2cm	Low	Low	Excision
1-2cm	Low	High	Excision /Mohs' surgery
1-2cm	High	Low	Excision / Mohs' surgery
1-2cm	High	High	Mohs' surgery
>2cm	Low	Low	Excision / Mohs'surgery
>2cm	Low	High	Mohs' surgery
>2cm	High	Low	Mohs' micrographic surgery
>2cm	Rapidly growing tumours		Radiotherapy

Surgical Management of Cutaneous Squamous Cell Carcinoma (cSCC)

Introduction

Primary cSCC is the second most common skin cancer and its incidence is on the increase.

cSCC has a more diverse prognostic profile than BCC, and a risk of metastasis (around 3.7% to 5.2%) and death (around 2% to 3.5%) making it important to be familiar with tumour risk categories and staging systems. Classifying tumours into high or low risk allows the clinician to decide on treatment modality. Stratifying tumours into 'grades' gives prognostic information re likelihood of recurrence/metastasis, and thus can guide follow up recommendations.

No universal systems exist, but we suggest making yourself familiar with those provided by the BAD (update in progress), the NCNN, the American Joint Committee on Cancer 8 (AJCC 8) and Brigham and Women's Hospital (BWH). There is evidence to suggest the BWH staging criteria offers greater prognostic stratification that provided by AJCC8. [ref 35] We suggest reading the guidance first, and then the papers regarding staging criteria comparisons with respect to cSCC outcomes.

Key Resources (order of publication)

Guidelines of care for the management of cutaneous squamous cell carcinoma.
J Am Acad Dermatol. 2018 March; 78(3): 560–578

National Comprehensive Cancer Network (NCCN) guidelines v2.2018
https://oncolife.com.ua/doc/nccn/Squamous_Cell_Skin_Cancer.pdf

Diagnosis and treatment of invasive squamous cell carcinoma of the skin: European consensus-based interdisciplinary guideline
European Journal of Cancer 2015
Eur J Cancer. 2015 Sep;51(14):1989-2007

Management of primary cutaneous squamous cell carcinoma (SIGN 140)
Scottish Intercollegiate Guidelines Network (SIGN) June 2014
https://www.sign.ac.uk/assets/sign140.pdf

Multi-professional guidelines for the management of the patient with primary cutaneous squamous cell carcinoma
B.A.D. guidance 2009 http://www.bad.org.uk/librarymedia%5Cdocuments%5CSCC_2009.pdf
*Update of the original guideline which appeared in Br J Dermatol 2002; **146**: 18-25.*

Diagnosis

Suspect cSCC in any fast growing (weeks to months) keratinising tumour. They are sometimes painful. Look for background changes of sun damage. The usual differential is Bowen's disease, hypertrophic actinic keratosis (AK) or a BCC. Also think about amelanotic melanoma, atypical fibroxanthoma (AFX, especially on the scalp) and its counterpart pleomorphic dermal sarcoma (PDS). Don't list patients for routine biopsy if anything that has metastatic potential is in the differential. Consider your biopsy choice – a superficial shave will not give crucial information about invasion. If you clinically suspect cSCC and a punch biopsy only shows AK or Bowens, clinical correlation is advised. In large, Bowenoid plaque like lesions (also applies to BCC) consider several 'mapping' biopsies together with photography. Remember to supply relevant clinical information to pathology in accordance with local dataset requirements.

Management guidance varies, and dermatologists should be familiar with current recommendations and local policy. UK (BAD) guidance is currently being updated, with the US recommendations (JAAD) the most recent.

Staging summary:

'High or low risk' definitions are used by the AAD and BAD in order to guide clinicians on margins for standard surgical excision and to offer recommendations on which tumours should be considered for micrographic surgery.

Staging of cSCC has clinical relevance with respect to likelihood of local recurrence as well as metastasis (local or distant, including lymph nodes). The BWH and AJCC8 staging stratify cSCC into 4 categories to more accurately reflect behavioural heterogeneity.

The AAD suggests use of the AJCC8 criteria; and with an update pending, BAD guidance groups patients into high or low risk for recurrence or metastasis. There is evidence to suggest the BWH staging criteria offers more heterogenous prognostic stratification than AJCC8.[1] We also recommend reading the Mayo clinic publication in the JAAD (Jan 2018) proposing a stratification system for cSCC into low, medium and high risk with recommendations for follow-up[2].

British Association of Dermatologists (BAD) staging:

High risk features

Tumours on the lip, ear and non-exposed sites (perineum, sacrum, sole of foot)
Moderately or poorly differentiated tumours
Recurrent tumours. Incompletely excised tumours, tumours >2cm in diameter
Depth > 4mm or invading beyond dermis
Immunosuppressed patients (e.g. immunosuppressive medication or haematological malignancy such as CLL)
Perineural invasion (PNI), acantholytic, desmoplastic and spindle cell subtypes
SCC arising in chronic ulcers or inflammation, sites of thermal or radiation injury, or Bowen's

BWH staging

T1 – 0 risk factors
T2a – 1 risk factor
T2b – 2-3 risk factors
T3 – 4 risk factors or bone invasion
Risk factors: Tumour diameter 2cm or more, poorly differentiated histology, perineural invasion and invasion beyond fat (excluding bone, which automatically upgrades to T3)

AJCC 8 staging

T1 – Tumours < 2cm in greatest diameter
T2 – Tumours ≥ 2cm and < 4cm in greatest diameter
T3 – Tumours ≥ 4cm in greatest diameter *or* minor bone invasion *or* PNI, *or* deep invasion
T4 – Tumours with skull bone invasion/and/or skull base foramen involvement
PNI – involvement of a nerve deeper than the dermis, *or ≥ 0.1mm. Deep invasion = beyond fat or > 6mm*

Surgical Management

As with BCC, the aim of (non-Mohs) surgery is complete excision, and thus tumour cure, by removing the visible tumour with a pre-defined margin of normal tissue to submit for histological processing. The general principles outlined earlier also apply here.

Although no firm randomised controlled trial (RCT) evidence exists that assesses outcomes relating to surgical margins in cSCC, the BAD and AAD suggest a 4mm peripheral margin
for clinically 'low risk' tumours, and a 6mm margin (or Mohs micrographic surgery) for 'high risk' tumours. The non-Mohs margins are based on a 1992 study by Brodland and Zitelli [3].

Depth of excision is suggested to mid fat or deeper. There is increasing evidence supporting the use of Mohs surgery for SCC suggesting lower recurrence rates for treatment of low and high-risk SCC[4]. Of interest is that no RCT evidence exists comparing the effectiveness of Mohs vs excision with standard surgical margins, or indeed any other treatment modality.

The JAAD guidelines recommend the use of MMS for treating high risk SCC, although accepts drawbacks
include certain subtypes being more challenging to diagnose using
frozen sections.

MMS – Recommended for high risk cSCC

Standard excision -Recommended for high and low risk SCC

C&C may be considered for low risk primary SCC – no RCT trial data, highly operator dependent, cosmetic outcome variable

Non-surgical management – As for BCC, marginal clearance cannot be assessed and should be only considered in patients with low risk SCC, or for those who don't wish to have, or aren't suitable for surgery. Discussion of these modalities is beyond the scope of this chapter.

Follow up for cSCC

Should include a full clinical examination looking for new tumours (including melanoma), recurrence of previously excised tumours, and for the presence of any clinically detectable l ymphadenopathy.

AAD guidance suggests at least yearly follow up but does not specify a duration. BAD guidance suggests between 2- and 5-years duration for high risk tumours. We currently follow our AJCC8 T2-T4 patients for up to 5 years at 4-6-month intervals.

References

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The dermatological surgeon should use the evidence of the studies discussed above, along with published guidelines, to allow a better understanding of those factors which are likely to influence the success or otherwise of surgery for a particular tumour.

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Notes

SURGICAL TREATMENT OF PRIMARY CUTANEOUS MELANOMA

Surgery of primary cutaneous melanoma has two objectives. The first is to completely excise the primary lesion and the second is to remove any associated locally metastatic disease. Treatment is usually provided in two stages. Stage one is to completely excise the suspected melanoma with a 2 mm lateral margin of clinically normal skin and down to subcutaneous fat. This allows accurate histological diagnosis and microstaging. Incomplete excision and in particular incision biopsies introduce the possibility of sampling error and inaccuracies in diagnosis, and may compromise accurate measurement of histological thickness if the lesion is a melanoma. It is important to record both the lateral 2 mm margin and also size of the longitudinal margin, that is the distance from the border of the tumour to each end of the ellipse.

Treatment excisions are generally done following diagnosis and microstaging. The purpose of this wider and deeper margin of skin and subcutaneous fat is to remove any subclinical locally metastatic disease. The reason for this is historical and results from the observation that melanoma tended to recur within and around the primary excision site. It was reasoned that wider excision might avoid this and improve the chance of cure and from the early 20th century onwards a 2 inch or 5 cm radius of excision for all melanomas became established surgical practice.

This dogma was challenged as it became apparent that thin melanomas under 1 mm have a very high chance of cure. In 1988 the preliminary results of WHO Trial 10 were published[1] . This showed that for melanomas 1 mm or less in thickness a lateral excision margin of 1 cm and down to muscle fascia provided as good local control as 3 cm margins. However, the same was not true for patients with melanomas between 1-2 mm in thickness. In this group a 1 cm excision margin eventually resulted in 6 patients relapsing locally in and around the scar before they had any evidence of relapse at any other side. In the 3 cm margins group only one patient had local metastasis as the first site of relapse. This suggests that narrower margins may impair local control of melanoma and provided the first substantial evidence that the old dogma of wide local excision might actually be correct.

There has only been one other randomised control trial of surgical margins and this compared the effects of 2 cm with 4 cm margins in patients with melanomas 1 -4 mm in thickness[2] . This trial did not show any difference in outcome between the 2 cm and 4 cm groups but the numbers of patients in this trial with melanomas over 2 mm in thickness was too small for any firm conclusions to be drawn. However, this trial does suggest that 2 cm margins give adequate local control for patients with melanomas in the thickness band 1-2 mm.

It has not been established in melanoma that local metastasis confers an extra survival hazard. This is simply because a) no trial has specifically used this end point and b) neither of the published RCTs are large enough[1,2]. However, it has been established in breast cancer that more aggressive local treatment, i.e. surgery + radiotherapy, both reduces local metastatic risk and increases survival. The same may well be true of melanoma.

Consequently it is important to adhere to the currently recommended margins unless narrower margins are being used as part of a clinical trial, e.g. the MSG BAPS study which compares 1 cm with 3 cm margins in patients with melanomas thicker than 2 mm.

Recommended surgical margins are:-

1. For melanomas up to 1 mm Breslow thickness - 1 cm WLE
2. For melanomas more than 1 mm and up to 2 mm - 1cm to 2 cm WLE
3. For melanomas more than 2 mm - 2cm WLE

All melanoma therapeutic excisions should be down to but not including muscle fascia. This is because local metastases are likely to be in the lymphatics and the lymphatic system in the skin extends down to fascia. The clinical efficacy of more superficial excisions has never been tested - both the RCTs on melanoma excisions and all of the previously published data follow the established surgical practice of excising skin and full thickness fat. There appears to be no advantage in removing fascia too.

National guidelines exist which are updated regularly including the excellent resource from Cancer Council Australia—
https://wiki.cancer.org.au/australia/Guidelines:Melanoma
NICE update 2022, melanoma focus group 2020

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Surgical Management of Primary Cutaneous Melanoma

Introduction
Melanoma is responsible for most deaths related to skin cancer, making early detection and treatment crucial. Since the early 1990s, melanoma skin cancer incidence rates have more than doubled (134%) in the UK, with approximately 16,000 new cases of diagnosed each year. It's the 5th most common cancer (2016) with rates expected to rise by at least 7% over the next 15 years.

Key Resources (order of publication)

Garbe C, *et al.*

European consensus-based interdisciplinary guideline for melanoma

Eur J Cancer. 2020 Feb; 126:159-177

Swetter SM, *et al.*

Guidelines of care for the management of primary cutaneous melanoma

J Am Acad Dermatol. 2019 Jan;80(1):208-250.

Cutaneous melanoma. A national clinical guideline (SIGN 146)

Scottish Intercollegiate Guidelines Network (SIGN) January 2017

https://www.sign.ac.uk/assets/sign146.pdf

Melanoma: assessment and management

NICE guideline 29 July 2015

www.nice.org.uk/guidance/ng14

Marsden JR, *et al.*

Revised UK guidelines for the management of cutaneous melanoma 2010

Br J Dermatol, 163 (2010), pp. 238-256

Diagnosis
Suspect melanoma in any new or changing pigmented lesion, or any changing non-pigmented lesion that is not clinically identifiable. Remember – 'If you don't know what it is, you don't know what it isn't'. Use of a dermatoscope and recording of findings is considered mandatory in the NICE guidance. Consider macroscopic and dermoscopic photographs of any biopsied lesion, or indeed any non-biopsied lesion being followed up.
Diagnosis should be confirmed via excision biopsy (AAD recommends ellipse excision, punch excision or saucerization/deep shave) with at least a 1-3mm clinical margin in order to gain histological clearance.
At the author's institution, we excise with a 2mm margin around the lesion without removing standing cone deformities (SCDs). If wide local excision is required, it is taken around a true scar margin. If the lesion is benign, we reassure that smaller SCDs often settle over time, or offer scar revision. Large lesions may require an incisional biopsy from the most suspicious area. It is also important to record information on the pathology form in line with local/national guidance.

Staging
The AJCC 8 staging is summarised in the chart below. Evidence suggests that 3 histological variables are important in melanoma prognosis. Breslow thickness (measured from the granular layer of epidermis to deepest level of invasion to nearest 0.1mm), presence of ulceration, and mitotic rate. Mitotic rate was removed from AJCC8 in favour of stratifying T1 tumours with a reduced Breslow thickness of 0.8mm.

AJCC Melanoma of the Skin Staging 8th Edition

Definitions

Primary Tumor (T)

- **TX** Primary tumor cannot be assessed (for example, curettaged or severely regressed melanoma)
- **T0** No evidence of primary tumor
- **Tis** Melanoma in situ
- **T1** Melanomas 1.0 mm or less in thickness
- **T2** Melanomas 1.1 - 2.0 mm
- **T3** Melanomas 2.1 - 4.0 mm
- **T4** Melanomas more than 4.0 mm

NOTE: a and b subcategories of T are assigned based on ulceration and thickness as shown belowt:

T CLASSIFICATION	THICKNESS (mm)	ULCERATION STATUS
T1	≤1.0	a: Breslow < 0.8 mm w/o ulceration b: Breslow 0.8-1.0 mm w/o ulceration or ≤ 1.0 mm w/ ulceration.
T2	1.1-2.0	a: w/o ulceration b: w/ ulceration
T3	2.1-4.0	a: w/o ulceration b: w/ ulceration
T4	>4.0	a: w/o ulceration b: w/ ulceration

Regional Lymph Nodes (N)

- **NX** Patients in whom the regional nodes cannot be assessed (for example previously removed for another reason)
- **N0** No regional metastases detected
- **N1-3** Regional metastases based on the number of metastatic nodes, number of palpable metastatic nodes on clinical exam, and presence or absence of MSI[2]

NOTE: N1-3 and a-c subcategories assigned as shown below:

N CLASSIFICATION	# NODES	CLINICAL DETECTABILITY/MSI STATUS
N1	0-1 node	a: clinically occult[1], no MSI[2] b: clinically detected[1], no MSI[2] c: 0 nodes, MSI present[2]
N2	1-3 nodes	a: 2-3 nodes clinically occult[1], no MSI[2] b: 2-3 nodes clinically detected[1], no MSI[2] c: 1 node clinical or occult[1], MSI present[2]
N3	>1 nodes	a: >3 nodes, all clinically occult[1], no MSI[2] b: >3 nodes, ≥1 clinically detected[1] or matted, no MSI[2] c: >1 nodes clinical or occult[1], MSI present[2]

Distant Metastasis (M)

- **M0** No detectable evidence of distant metastases
- **M1a** Metastases to skin, sub cutaneous, or distant lymph nodes
- **M1b** Metastases to lung
- **M1c** Metastases to all other visceral sites
- **M1d** Metastases to brain

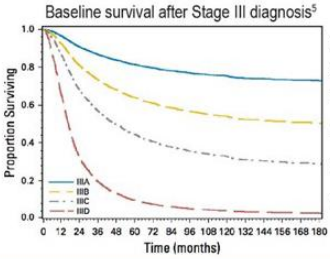
NOTE: Serum LDH is incorporated into the M category as shown below:

M CLASSIFICATION	SITE	Serum LDH
M1a-d	Skin/subcutaneous/nodule (a), lung (b) other visceral (c), brain (d)	Not assessed
M1a-d(0)	Skin/subcutaneous/nodule (a), lung (b) other visceral (c), brain (d)	Normal
M1a-d(1)	Skin/subcutaneous/nodule (a), lung (b) other visceral (c), brain (d)	Elevated

ANATOMIC STAGE/PROGNOSTIC GROUPS

	Clinical Staging[3]				Pathologic Staging[4]		
Stage 0	Tis	N0	M0	0	Tis	N0	M0
Stage IA	T1a	N0	M0	IA	T1a	N0	M0
Stage IB	T1b	..	..		T1b	..	..
	T2a	..	..	IB	T2a	..	..
Stage IIA	T2b	N0	M0	IIA	T2b	M0	M0
	T3a	..	..		T2a	..	..
Stage IIB	T3b	..	..	IIB	T3b	..	..
	T4a	..	..		T4a	..	..
Stage IIC	T4b	..	..	IIC	T4b	..	..
Stage III	Any T	≥N1	M0	IIIA	T1-2a	N1a	M0
	..	..	..		T1-2a	N2a	..
	..	..	..	IIIB	T0	N1b-c	M0
	..	..	..		T1-2a	N1b-c	..
	..	..	..		T1-2a	N2b	..
	..	..	..		T2b-3a	N1a-2b	..
	..	..	..	IIIC	T0	N2b-c	M0
	..	..	..		T0	N3b-c	..
	..	..	..		T1a-3a	N2c-3c	..
	..	..	..		T3b-4a	Any N	..
	..	..	..		T4b	N1a-2c	..
	..	..	..	IIID	T4b	N3a-c	M0
Stage IV	Any N	Any N	M1	IV	Any T	Any N	M1

Baseline survival after Stage III diagnosis[5]



Conditional, 5-year survival (%)[5]

Stage	Baseline	3y survivors
IIIA	81.4	83.1
IIIB	64.0	76.0
IIIC	44.5	66.7
IIID	9.8	40.6

Notes

[1]Nodes are designated as 'clinically detectable' if they can be palpated on physical exam and are confirmed melanoma by pathology following excision/biopsy.

[2]MSI comprise any satellite, locally recurrent, or in transit lesions.

[3]Clinical staging includes microstaging of the primary melanoma and clinical/radiologic evaluation for metastases. By convention it should be used after complete excision of the primary melanoma with clinical assessment for regional and distant metastases.

[4]Pathologic staging includes microstaging of the primary melanoma and pathologic information about the regional lymph nodes after partial or complete lymphadenectomy. Pathologic Stage 0 and I patients are the exceptions; they do not necessarily require pathologic evaluation of their lymph nodes. Physicians should "discuss and consider" SLNB for patients with T1b Stage IA disease; physicians should "discuss and offer" SLNB for patients with Stage IB disease.

[5]From Haydu et al., Journal of Clinical Oncology, 2017.

Produced following the 8th Ed. AJCC guidlines released January 1, 2017. Contact Dr. M. Gormally (mvgg07@gmail.com) for reprint.

Surgical management

First line treatment for invasive melanoma (after excisional biopsy) is wide local excision (WLE)- the aim being to prevent local recurrence and confirm histological margin clearance.

NICE suggests WLE margins dependant on staging from initial excisional biopsy.[1-7]

Melanoma in situ (MIS) - at least 0.5cm (or consider imiquimod in certain situations)

Stage 1 - at least 1cm

Stage 2 – at least 2cm

NICE suggests offering sentinel lymph node biopsy in melanoma >1mm Breslow thickness (up to stage IIc)

AAD guidance recommends the use of MMS for lentigo maligna on the face, ears or scalp.

References

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Diagnostic tips

You should be a member of the local (or specialist) skin cancer MDT if you are regularly managing/excising skin cancer (UK)

Audit your clinical diagnostic pick up rate based on biopsy results.

A dermatoscope increases diagnostic accuracy. There are several excellent texts and well-established courses available.

The location of lesions can be difficult to discern from descriptions in clinical notes or f rom hand drawn diagrams, and some tumours regress or become hard to discern post biopsy. Photography of a pre-biopsied lesion should be seriously considered – either use your medical photography unit or learn how to take your own (not with a mobile phone). Obtain photographic consent and store images safely in accordance with local/national policy.

If a biopsied lesion has become clinically indiscernible (low risk BCC or low risk SCC) consider follow up with serial photographs or ask the patient to use a skin monitoring app such as “myskinselfie” (other apps available).

Understand tumour growth patterns for BCC, SCC and melanoma. Go and see how paraffin sections are processed in your lab and appreciate the advantages and limitations of vertical sectioning vs horizontal sectioning. Spend time with a microscope familiarising yourself with variations in tumour pathology.

BCC can masquerade as SCC (and vice versa) – if you suspect SCC (keratinisation, pain, rapid growth) either list for urgent excision, or biopsy on the day to confirm.

Morphoeic BCC can be subtle. Consider scouting/mapping biopsies if the lesion appears to extend further than immediately obvious.

Explain the diagnosis to the patient (and relatives if present). Don’t use acronyms. Hand out appropriate information leaflets. Give contact details for if they have any questions or concerns.

Management tips

If operating on a pooled theatre list, you are unlikely to have met your patient before. Remember to build rapport; ensure your patient is aware of the diagnosis and that they know what procedure they have been listed for

Ensure you involve your patients in their treatment. Remember that most complaints are due to poor communication. Present treatment options with your patient’s best interests at the forefront of discussion. The below are based on AAD guidance.

Manage expectations; this requires explaining treatment options and complications. Consent appropriately, respecting local and national guidance. Show the patient how an anticipated defect might be reconstructed and draw this in the notes. Explain (for example) elliptical excision, how it increases scar length and why this is necessary to create a flat, cosmetically acceptable scar. Explain bruising, swelling, post-operative pain, scar thickening, incomplete excision, possible infection and bleeding in a manner that your patients understand.

Excision may not always be appropriate or possible. Some patients have significant comorbidities and/or frailty that may negate the need for surgery, and make other treatment modalities (or no treatment at all) a more favourable option.

Be aware of the difference between high risk and low risk (for recurrence and incomplete excision) BCC (and SCC)- this should guide choice of treatment modality.

Supply appropriate (usually locally agreed dataset) information on the histology form to the pathologist.

Be aware that a BCC (or SCC) reported as 'completely excised' with standard surgical margins can still recur – up to almost 6% for BCC. The recurrence rate of incompletely excised BCC is not insignificant – up to approximately 25% [17]

Standard excision to mid fat with 4mm margins is suitable for low risk, primary BCC. Recurrence rates are around 2-4% after 3-5 years [35,38-40].

If Mohs surgery is not available, consider delayed repair for potential high-risk tumours excised with standard margins until histology results are available.

Curettage and cautery (C&C) can be a useful option – however the scarring/cosmetic outcome in certain sites (and/or large areas) can be poor. Consider serial excisions for large superficial BCC, e.g. on the back.

When you list patients for surgery, consider how the defect from the excision might be reconstructed, and particularly how long it might take. If you aren't sure, get advice before placing the patient on a pooled theatre list. This may be relevant for lesions on the ear or central face (nose/lips/chin). This will keep your colleagues (and ultimately patients) happy.

Notes

SKIN GRAFTS

Introduction "Skin is the best dressing"

Grafts are a method of covering a skin defect. By comparison with other wound management techniques they may score relatively poorly for cosmesis but are technically easy to perform.

Cosmetic outcome		Technical competence required	
Worst	Split skin graft	Least	Allow to granulate
	Allow to granulate		Full thickness graft
	Full thickness graft		Direct closure
	Flap		Split skin graft
Best	Direct closure	Most	Flap

Indications

Where skin coverage is considered essential, there is a suitable vascularised base for the graft and other better techniques cannot be readily used.

TYPES OF GRAFT

Split skin graft

The cut is made through the skin taking the epidermis and a proportion of the dermis from the donor site, leaving the follicular epithelium from whence the donor site will be re-epithelialised. Skin can be taken using a manual knife (e.g. small grafts - Silver's knife, larger - Humbey) This manual techniques require practice and is difficult to perfect unless used regularly.

Mechanical devices (Dermatome - either electrically or gas pressure driven) are expensive but much easier to use and produce a predictably good piece of donor skin. The split skin graft can be meshed (manually or using a purpose designed mesher). This turns the skin into a fish-net stocking type of covering material that can be stretched out to cover a wider area. The gaps between the meshed skin epithelialise from the surrounding grafted skin. Meshing is useful on the lower limb, where the gaps act as an exit point for exudate from an oedematous or oozy surface, and when covering an uneven surface, e.g. ear, where the graft has to follow the irregular contour.

Split skin grafts are not widely used in dermatological surgery. Once an adequate split skin graft has been harvested the technique is simple. However, it does take practice to harvest the correct thickness and size of skin without producing delayed or non-healing problems at the donor site or producing a too thin graft as these can look terrible and are functionally often useless. Split skin grafting is a specialised technique and not appropriate to the introductory work shop.

Full thickness grafts

The skin from the donor site is completely excised. The donor site then has to be either closed directly, allowed to granulate or covered with a split skin graft! Full thickness grafts are fairly easy to do and with attention to detail can produce satisfactory cosmetic results.

Composite grafts
In dermatology these refer to the transfer of skin and cartilage. They are used when covering a defect on the ala rim of the nose with skin taken from the ear. The results are variable. This specialised technique is not applicable to the introductory workshop.

METHOD

Full thickness graft

Possible donor sites

- Behind ear
- In front of ear
- Upper eyelid
- Inner aspect upper arm
- Lower abdomen wall
- Supraclavicular fossa

1. Assess amount of skin required
2. Note the colour, adnexal structures, skin markings, thickness and texture of the recipient skin site
3. Look for matching skin somewhere else on body
4. Select donor site
5. Prepare donor and recipient skin sites - anaesthetise, clean and drape skin sites
6. Excise lesion
7. Careful haemostasis
8. Cut out template, using piece of sterile paper (suture packet, etc.) to indicate size and shape of graft. Allow for shrinkage of graft especially when grafting on the lower eyelid (25% bigger than the apparent graft size required)
9. Place template over donor site, mark round edge with Bonnies' blue or equivalent
10. Cut out graft down to fat, and put to one side (ie. in saline dampened, sterile gauze kept in a safe place)
11. De-fat graft, i.e. remove all fat from under surface (drape over finger end, fat side up and snip off the fat using curved scissors)
13. Check recipient site haemostasis
14. Suture graft. Carefully appose skin edges. Ensure skin edges are at the same height as the surrounding skin because part of the blood supply comes laterally and not just from the base of the graft.
15. Ensure base does not lift off using tie over dressing, basting sutures or bolster.
16. Repair donor defect or allow to granulate
17. Remove sutures if needed at 6-10 days depending on site

Note: There is no theoretical limitation to the size of a full thickness graft. Size depends entirely on how much donor skin can be harvested.

Donor base suitability for grafting

Recipient site	*Suitability for grafting*
Exposed bone	hopeless
Exposed cartilage	hopeless
Fat	OK
Perichondrium	good
Periosteum	good
Dermis	excellent
Granulation tissue	excellent

Disadvantages advantages

	Full thickness	**Split skin graft**	**Flap**
Technical difficulty	+	++	+++
Cosmetic result	++	+	+++
Ease of donor site healing	++	+	+++
Risk of failure	++	+	+++
Can be used to cover any defect	Not bare bone or cartilage	Not bare bone or cartilage	Cover any surface
?Shrinkage	5-25% especially if thin	10-25%	5-10%

These depend more critically on the experience and expertise of the operator than the intrinsic nature of the technique. The common sense advice is not to attempt anything unless you are sure that there is a good change of success or there is no apparent alternative. In general, flaps are more difficult to do correctly than grafts but are worth trying to do because they result in better cosmetic results. In some situations, e.g. where bare bone or cartilage has to be covered they are the only option if the wound is too big to be allowed to heal by second intention.

"A graft has no blood supply but must attain one; a flap has supply but must keep it"

Notes

NAIL SURGERY

Few doctors are proficient in surgery of the nail unit. Dermatologists should be familiar with the anatomy and functions of the nail unit and simple techniques of diagnostic and therapeutic biopsies of the nail plate, bed and matrix.

Instruments
Nail clippers, nail splitter, double skin hook and septum elevator (artery forceps will do), in addition to a skin surgery pack.

Anaesthetic
2% Lidocaine ring block and/or wing block (inject at points 3mm proximal to the proximal nail fold in the line of the lateral fold). Dilute (1:200,000) adrenalin in the anaesthetic is safe in small quantities in healthy people. Peripheral ischaemia, elderly toes, collagen vascular disease, may all complicate the situation and make it preferable to avoid adrenalin. Bupivacaine 5% or other long lasting anaesthetics can be useful in place of, or mixed with, the lidocaine.

Preparation
The digit can be soaked in warm water with added Hibiscrub preoperatively. This enables you to clean away subungual debris, reduce bacterial load and soften the nail. Apply a surgical glove to patient's hand, snip a minute hole in end of finger and roll back the rubber toward the MCP joint

Nail plate biopsy
This is used to get tissue where there is a thick dystrophic distal nail with or without underlying hyperkeratosis and when a histological specimen might help to identify fungus. Also used when distal pigment could be melanin or blood. Soak nail in water for 20 minutes. Anaesthetic often not required. With clippers or a blade remove chunk of nail. Another method is to do a punch biopsy through the nail.

Tourniquet
Where there is minimal bleeding due to anaesthetic, there may be no need for a tourniquet. If this is not the case, then the tourniquet can be of several designs but they need to share certain features. Namely, they need to minimise the trauma to longitudinal structures in the digit and to do that it will normally need to be broad (Eg 2cm), elasticated, soft and even in texture and held in place at a flexible level of tightness. Just tight enough to stop blood flow interfering with surgery. A further feature is that it should be obvious and all surgery protocols should ensure that the tourniquet time (time in place) is documented (aim for less that 20 minutes and the less the better) and that there is a routine for its removal at the conclusion of the procedure. Ideally by the surgeon themselves. For longer procedures, there is a case made for releasing the tourniquet for a brief period before reapplication.

Avulsion and Nail bed biopsy
Indications for this are tumours, severe dystrophy and unknown lesions. Determine where you think the epidermal disease is: for onycholysis, usually sample the nail bed. Where there is change in nail substance the disease is typically of the nail matrix. If it is not clear where the origin of the abnormality arises, both areas need to be included in the sample.

Dissect the attachment of the cuticle from the nail plate using fine scissors. Avulse the plate with the septum elevator or artery forceps (serrated side against the nail), by sliding it from the free edge under the nail. There is a "give" when it reaches the matrix. Grasp the nail with artery forceps and rotate it sideways to free the rest.

To visualise only the lateral half of the nail bed or matrix a partial nail avulsion can be used. Split the nail longitudinally with the nail splitters up to the proximal nail fold.
Complete the split with pointed scissors. Half the nail can then be avulsed as before. It is less painful post operatively than complete avulsions. Equally a lesion of the distal bed may be visualised by removing the distal half of the nail only.

With all this manipulation of the nail it is important that the area for biopsy is not damaged by the instruments pushing under the nail. Usually it is possible to lift the nail with cleaving the nail from adjacent tissue and then gently detaching it.

The nail can be avulsed in a variety of patterns and levels of completeness. In many instances it will be possible to replace it at the end of the biopsy after having ensured it is clean (in antiseptic during the procedure) and trimmed. This provides a useful protective template over the wound and where there is overlying nail fold, it helps prevent adhesion between the surfaces which might lead to pterygium scar tissue as it heals.

The biopsy
A range of sampled can be taken to suit the size, nature and orientation of the area to be sampled. Options include punch biopsy (3mm), shave, simple scoop with a curette for a friable mass, or thin ellipse. For the latter it is important to go to bone to enable wound closure. Closure is usually possible with a 5.0 or 6.0 rapidly absorbable suture. The nail bed can be undermined, but is likely to bleed as a consequence. The nail bed attachment to underlying periosteum is firm and required a scalpel tip for effective dissection.

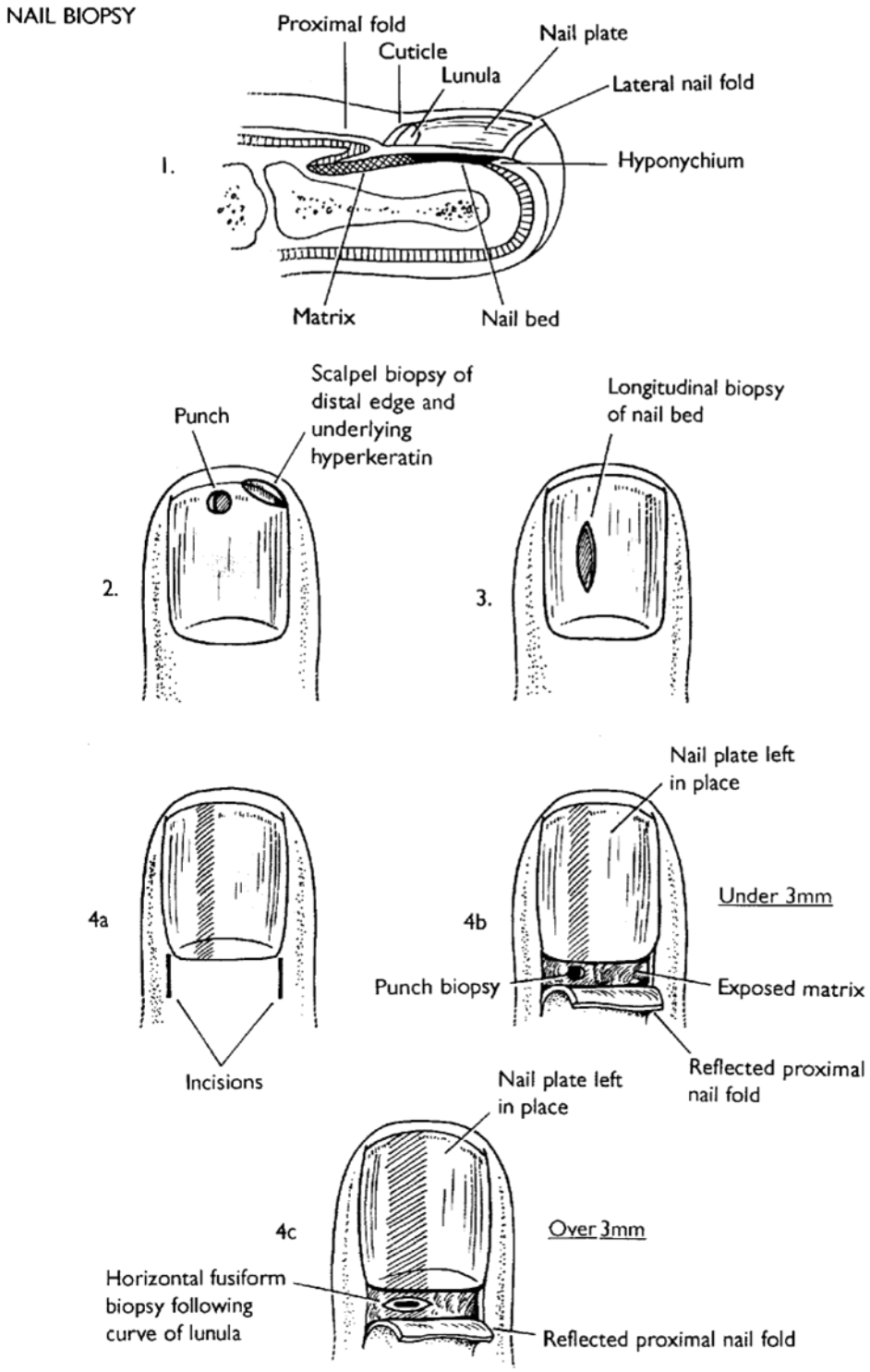
Where a sample is taken from the matrix, it is important to appreciate the risk of scarring or loss of nail plate production in line with the wound. Clinically this means a split or deficient nail. Such considerations are important in consenting and may not be fully apparent until 6-12 months after the procedure.

In order to minimise the risk of split, wounds are kept small and ideally in an axis that allows closure. A lateral longitudinal biopsy makes that possible using the mobile lateral soft tissues of the digit, whilst at the same time creating a nail of permanently narrower transverse width and the potential for slightly altered sensation and altered alignment of the nail. It is important to take the proximal lateral margin of the biopsy well clear of the proximal lateral boundary of the matrix horn. Failure to do this results in a small area of residual matrix generating a lateral nail spicule within the following 6 months. This is a nuisance and may lead to the need for corrective surgery to remove it.

In some instances a shave biopsy from the matrix is a useful option. The virtue being that the matrix dermis is left intact and the nail matrix epithelium is able to regenerate. The boundary of the matrix is defined with a preliminary superficial score in the shape of a square. A small amount of further anaesthetic or normal saline can be injected under the matrix to create a convex contour to the area for sample. It is then obtained with a tangential shave. With this form of biopsy, it is essential that the nail or similar barrier is returned in situ to protect the wound from contact with the ventral aspect of the overlying proximal nail fold. Failure to ensure this is likely to give rise to scarring and nail dystrophy long term. Normally, a sample of less that 4mm across and to mid dermis, will not create a scare if the post-operative management is optimal

The specimen

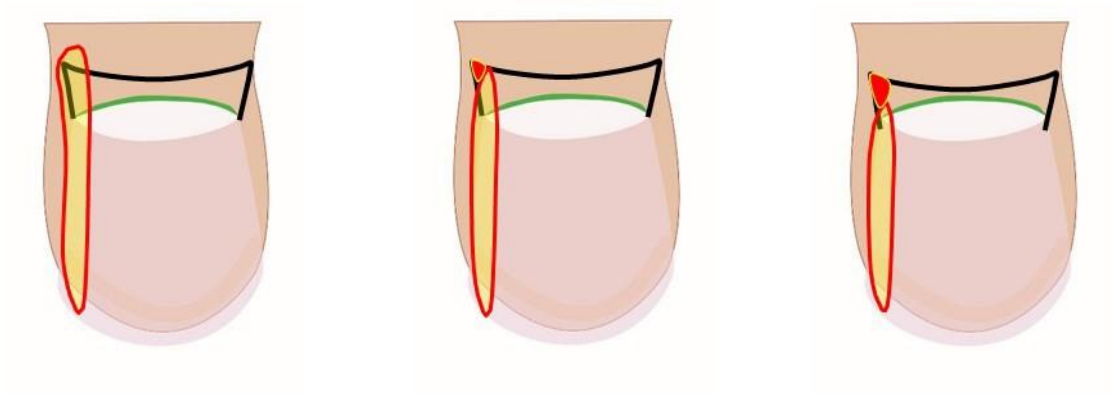
Most specimens can be placed directly in the normal formal saline pot. Where the specimen is a shave or comes from a precise and relevant place in the nail unit, it is useful to put the tissue on a piece of filter paper with a drawing of the nail unit on it. The paper and specimen are then placed in a histology processing cassette kept in the surgery room for this purpose and obtained beforehand from the laboratory. A thin piece of hand scrub sponge can help keep the specimen pushed against the paper such that when the cassette is clipped shut and put in the specimen pot, it does not float off.



Post-operative care

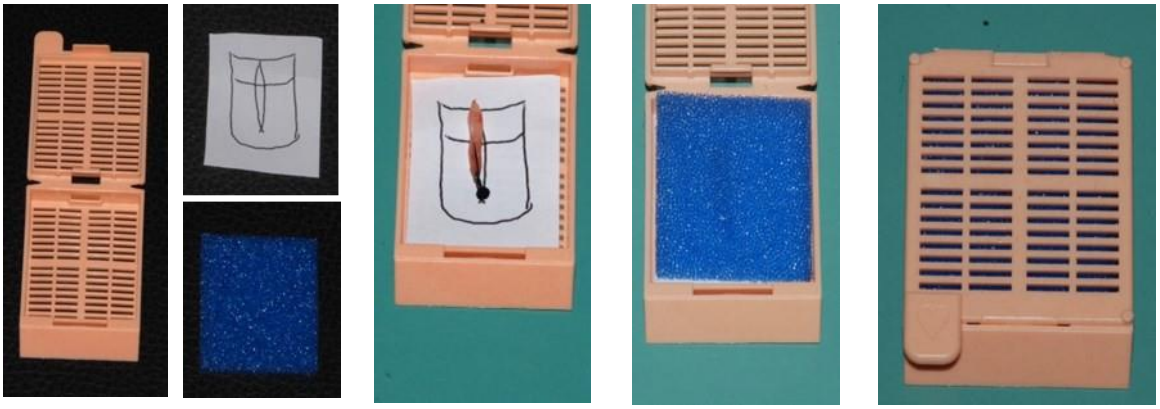
Biopsied can be sore and will throb if allowed to be dependent. Long acting anaesthetic is useful for the first 12 hours. The first and second night might warrant night time analgesics. In some instances dihydrocodeine is helpful for its additional sedative effect. The limb should be elevated for 1 - 2 days, but with periods of use if an upper limb.

Yellow soft paraffin or similar is useful and can be covered with a silicone dressing, and lightly bound with a further dressing and supplemented by a light bandage (not too tight). Systemic antibiotic prophylaxis is appropriate in children or when the nail was broken or crusted before surgery. Dressings might be changed 2-3 times in the first week, with the first one usually best done with some one confident in the process, which might mean nurse or doctor.



A B C

For a lateral longitudinal biopsy, the proximal margin needs to be sufficiently proximal and lateral (A) so as not to leave small remnants of matrix in situ (B&C) which give rise to subsequent nail spicules.

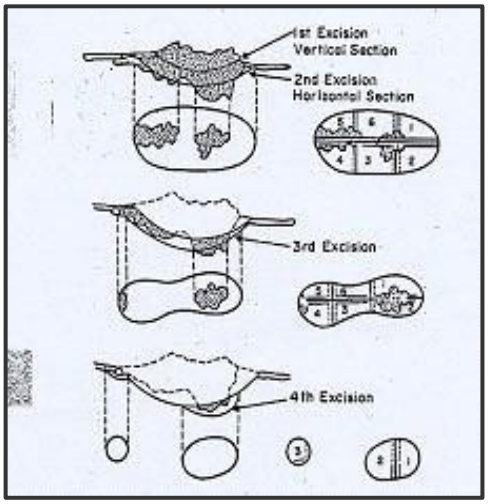


Consider presenting the specimen on oriented marked filter paper, held in place by sponge and in a cassette.

MOHS' MICROGRAPHIC SURGERY

The majority of skin cancers are relatively easy to remove completely by excision or curettage, but where maximum conservation of tissue is required, and with difficult tumours, (fig 1) Mohs' surgery is very valuable and results in the highest cure rates. The bulk of the tumour is removed by curette or knife and then a saucer shape piece of skin around is taken. The edges are marked with dyes corresponding to nicks made in the patient's skin. The specimen is then flattened, frozen and then cut in horizontal layers from the underside upwards in a cryotome. Because the lateral resection margin has been pressed down around the edge of the specimen it now lies in the same plane as the deep resection margin. The result is a series of slides that can be read like a map (Fig 2), enabling the operator to go back precisely to the place where tumour remains, and repeat the process until complete clearance (ie slides negative for tumour) is obtained. The resulting defect can then be repaired using conventional techniques. Even with problem and recurrent tumours cure rates of well over 95% can be obtained. The process can also be carried out using paraffin embedded tissue but it prolongs the treatment over several days.

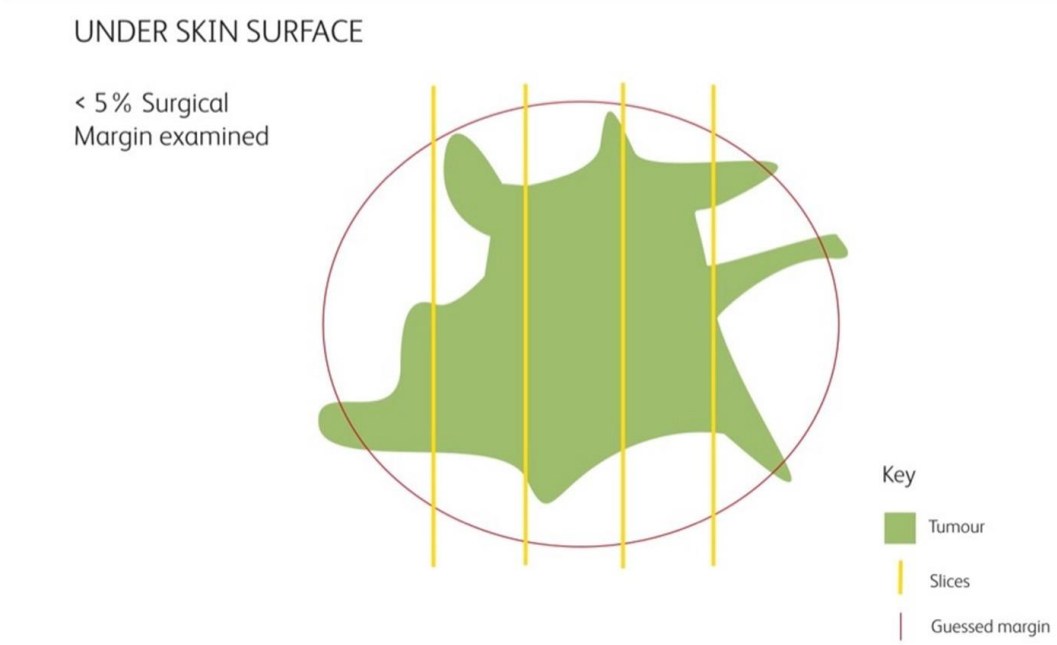
Indications for Mohs
Recurrent tumours
Ill-defined tumours
Incompletely excised tumours
Where maximum conservation of healthy tissue is important eg around the eye
Large tumours



"You can always cut out more, never less"

Fig 2
Schematic representation of a skin cancer (shaded areas). Vertical and horizontal projections are shown in three stages of excision. The areas of cancer are located by microscopic examination of the undersurface of each of the excised layers (illustrated by courtesy of Helm F., et al, 1964)

Standard histopathological vertical sections



Mohs micrographic surgery – A personal reflection – Dr Richard Motley

Much has been written about Mohs micrographic surgery: a simple 'Google' search by you or your patient will reveal more than a million 'hits' on the topic, so rather than give a précis of more comprehensive documents that you can access easily, I will give you my personal reflection on learning and undertaking Mohs surgery for 30 years.

As a Dermatology trainee I was fortunate to have gained considerable experience in cutaneous surgery, and while still a registrar was competent in a wide-range of procedures including skin grafts and flaps. For me, the frustration was those occasions on which the pathologist reported that a skin tumour had been incompletely excised after I had undertaken a surgical procedure. This threatened to undermine the value of my treatment and when I learnt that Mohs surgery was a way to avoid such incomplete excisions I jumped at the opportunity to learn this technique and spent time with Dr Antonio Picoto, Dermatologist and Mohs surgeon in Lisbon, Portugal.

Mohs surgery is named after its inventor Dr Frederick Mohs who, like many inventors was ridiculed in the early days of promoting his technique, not least because he called it 'Chemo Surgery'.

In fact, Mohs surgery is not type of surgery but a method of histological tissue examination and is ideally suited to ensuring that skin tumours growing in-continuity are completely excised.

I think the simplest way of understanding the Mohs surgery process is to explain it in the way I do to my patients:

"Imagine you normally have an immaculate lawn, but one day a weed grows in the centre of it. You recognise this weed may have extensive roots and unless completely removed it will continue to grow. You could dig under the weed and turnover the clod of earth and look to see if there are any visible roots on its surface. If there are, then you have not dug the hole deep enough, you should dig deeper and take more earth away until there are no visible residual roots".

Essentially this is the Mohs technique, and the only difference is that a three-dimensional piece of excised tissue has to be flattened into a two-dimensional single plane and converted into thin tissue sections for histological examination. The tissue is flattened and frozen and cut into microscopic sections by a skilled and experienced technician. This technical part of Mohs surgery is undoubtedly the most demanding part of the entire procedure.

Mohs surgery produces the highest cure rates for primary skin tumours, tumours with ill-defined margins and recurrent tumours. It is also tissue-sparing and allows many to tumours to be removed with less loss of normal skin than a conventional surgical excision.

With conventional surgery, a 4 mm margin of 'normal' skin should be taken around the border of a well-defined tumour that is less than 2 cm in diameter. If the border of the tumour cannot be visually identified it is impossible to know what margin of normal skin should be removed; larger tumours may have greater microscopic tumour extension and should be removed with wider margins. Conventional histological examination of excised tissue is designed to identify the nature of the tumour and not to confirm whether it has been completely removed. As such, a number of slices are taken across the excised tissue in a 'bread loaf' manner and prepared for histological examination. These slides give excellent views of the excised tumour but represent only a tiny fraction of the surgical margin.

Any conclusion about the adequacy of surgical excision is dependent upon the assumption that the tiny fraction that has been viewed is representative of the majority of the surgical margin (a feat not dissimilar to 'describing the contents of a room by looking through the keyhole').

In contrast, with Mohs surgery, after curettage or 'debulking' the tumour, a 'saucer' of tissue encompassing the curetted defect with a 1-2mm lateral margin is taken, and processed so the entire tissue undersurface is examined microscopically. In contrast to a conventional incision, the incision for Mohs surgery is bevelled at an angle of 30-45 degrees – to facilitate flattening the tissue into a single plane. Small pieces of tissue may be examined as one piece but most require division into 2 or 4 or more pieces and the tissue divisions are colour-coded and the tissue location and orientation precisely mapped to an anatomical diagram of the wound. In the event that tumour is incompletely excised the process is repeated to obtain a tumour-free wound at the end of the procedure. The wound is then repaired using conventional surgical techniques.

In my practice 60% of tumours are removed with one level of Mohs surgery, 30% require 2 levels and 10% require more than 2 levels. In all cases the tumours are excised with less loss of normal tissue than would be the case with conventional surgery.

The indications for Mohs surgery are ill-defined or recurrent tumours on the head and neck and tumours in those locations where smaller excision margins would be an advantage in terms of cosmetic or functional repair.

The Mohs surgeon usually undertakes all aspects of the Mohs procedure – tissue excision, microscopic examination and surgical wound repair – all using skills that should be familiar to the dermatologist.

In my opinion, every dermatologist should train to be able to conduct a Mohs surgery procedure -even if this is in a modified form using the support and assistance of pathologists and surgeons.

Every recurrent skin tumour started as a smaller tumour that was inadequately treated.

Mohs surgery prevents this.

Reference:

Motley RJ. Quality Control in Mohs Micrographic Surgery. Br J Dermatol 2015 Jul; 173(1): 11-2

To be completed by referring clinician

Mohs' Surgt.:ry Rdenal Funn

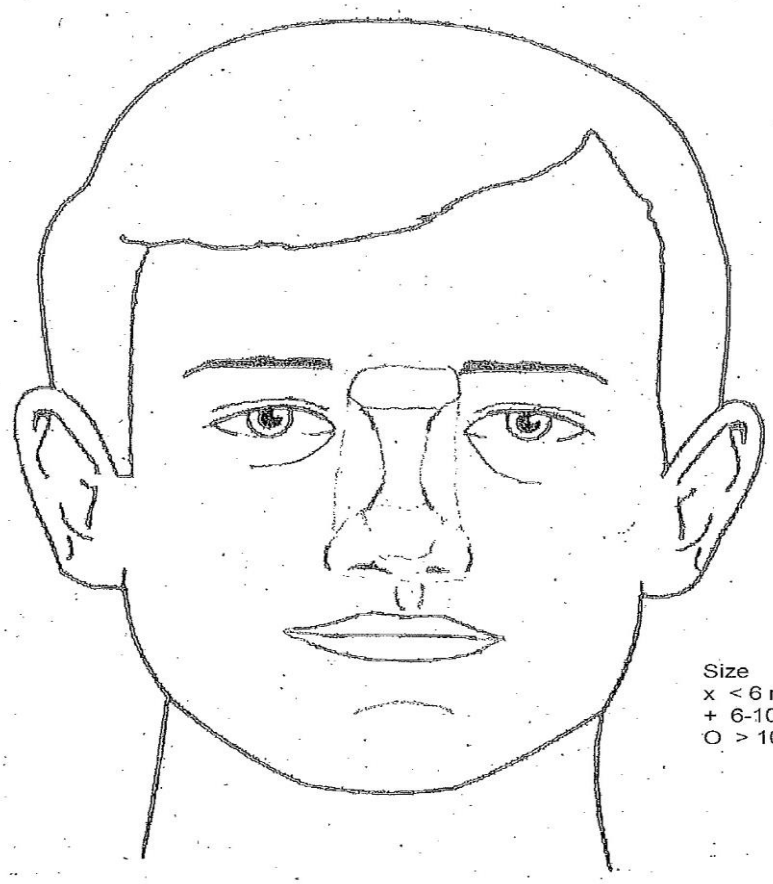
Patient JD	(sticky label)	Telephone Date of Referral Referred by Consultant
GP name GP address Clinical diagnosis Histological diagnosis Histopathology report attached		Site of lesion (Please tum over to also mark on diagram) Size of lesion- maximum dimensions (lengthand breadth in mm) Clinical photograph attached

lndication(s) for Mohs' - please tick box/boxes as appropriate

1	Recu1i-ent BCCon head and neck	
2	Deeply invasive BCC on head and neck	
3	Small BCC in a critical anatomic site	
4	Large BCCs at non-critical head and neck sites	
5	BCC on head and neck in an immunosuppressed patient	
6	BCC on bead and neck with a poorly defined clinical border	
7	Biopsy-proven histological high risk subtype BCC on head and neck	
8	Other rarer malignant skin tumours e.g. atypical fibroxanthoma, dermatofibrosarcoma protruberans, microcystic adncxal sarcoma	
9	Recently incompletely excised BCC on headand neck witb flap/graft repair	
10	SCC on head and neck skin	

NB. Cautious to Mohs
Frailty
Cognitive impairment

Specific situations
Warfarin INR <3.5 desirable
2 antiplatelet drugs- desirable lo stop one agent temporarily if possible
Antibiotic prophylaxis - for metal hemt valves I dose oral Flucloxacillin/Erylhromycin/Clindamycin I hour before procedure


Size
x < 6 mm
+ 6-10 mm
O > 10 mm

Notes

Strickler AG et al. Preventing and managing complications in dermatologic surgery: Procedural and postsurgical outcomes. J Am Acad Dermatol 2021;84: 895-903.

COMPLICATIONS OF SKIN SURGERY

Introduction

The nature and impact of a complication is related to what you, the patient, and your staff, expect, and what has been explained to them, and recorded in their records. Complications vary between completely predictable and inevitable consequences of necessary treatment, to totally avoidable 'never events'. Experience and diligence will help you reduce the avoidable and manage the unavoidable. Manage the expectations of your patients, their relatives, and your staff.

- Consider the implications of potential complications **for this patient**
- Shared decision making and informed consent
- **Gain rapport**
- Jargon is meaningless. What is going to happen?
- **Preparation and documentation**

Outcomes - assess and measure them

- Audit, follow-up, photos.
- Logbooks. Record your surgery and the outcomes.
- https://bsds.org.uk/mohs-surgery/national-bsds-logbooks/

Prevention – The 5 Ps:

- Proper Preparation Prevents Poor Performance

Preparing for complications pre-operatively: informed consent

- See also separate section on consent and medicolegal
- What are you going to do? How will it affect most patients?
- What are the known risks? (adverse events or undesirable outcomes)
- What is the likely impact of these risks to this patient?
- What is the worst case scenario for this patient? NB Montgomery case
- Are the benefits worth the risks?
- What are the alternatives?
- Can you do nothing?

How to avoid litigation

- See other section on wrong site surgery etc
- **Make the patient your first concern** (caution: ego, 'surgical libido'
- Prevention of complications (Human factors: good decisions, senior support, team-work)

Build rapport

- Ensure/inform: appropriate post-op recovery, rest, and home support

Good documentation

- Consent discussion (clinic and on the day)
- Pre-op written information
- Op notes clear and legible
- Intended peripheral & deep margins
- Structures encountered or steps taken to avoid
- Marker stitch position (e.g. 12 o'clock 'superior' to show cranial side, or 'proximal' on limbs)
- Verbal and written post-op instructions

Approach to patients who have had a complication - BLAST:

- B elieve - they have an issue/something went wrong
- L isten - to what happened/the problem
- A cknowledge - the issue they have with it
- S olution - if possible
- T hank - them for letting you know

Permanent visible scar

- Always something
- Impact depends on:
  - Life stage (age, support)
  - Conspicuity of scar to others
  - Ability to conceal (make-up, hair, clothing)
  - Other patient factors (prior experience, mental state etc)
- Conspicuity of scar depends on:
  - Shape
  - Thickness
  - Colour
  - Texture
  - Position
  - Distortion
  - Symptoms (pain, itch, tightness)
- Consider using validated scales to assess e.g. POSAS (see appendix)

Hypertrophic & keloid scars

- Overgrowth of collagen after it has healed, keloid goes beyond original scar whereas hypertrophic doesn't. Hypertrophic tends to go down, may peak at 6 months post-op.
- Respect relax skin tension lines, avoid tension.
- Keloid scars: more common on upper chest, shoulders, head (especially earlobe). Much more common in darker skin types. Check for a history. Very difficult to treat.
- Taping post operatively may reduce thickening and stretch e.g. micropore along scar replaced every few days for 3 months. Much more important in younger patients, the elderly are not very susceptible. *Rosengren H, Askew DA, Heal C, Buettner PG, Humphreys WO, Semmens LA. Does taping torso scars following dermatologic surgery improve scar appearance? DPC. 2013 Apr 30;3(2).*

Incomplete excision or recurrence

- Incomplete excision: persistence of tumour in patient
- Recurrence: re-growth after a period of apparent cure
  - Either: Sampling error has missed tumour at the margins
  - Or: tumour does not spread contiguously e.g. Merkel
- High risk facial areas: the 'H' zone
  Areas where typically harder to completely excise, spread more easily and more difficult to get good margins. Mohs surgery favoured to avoid this.

Bleeding
Bleeding during surgery is covered elsewhere in the manual (Haemostasis)

Bleeding after the patient goes home:
Most bleeding in dermatological surgery looks frightening but is not serious. Patients will often require additional help or reassurance though, especially if not warned and prepared pre-op. You must give them a clear written plan for what to do and who to call if they bleed after going home. It may lead to distress, upset relatives, infection, graft or flap failure and prolonged wound healing, poor scar, or functional problem. Serious adverse outcome are rare but there is a chance of falls etc if patients are not well supported at home to manage a bleed. However the longer term effects are usually minimal.

BSDS guidelines describe managing anticoagulants and other measures to reduce the risk pre-, peri- and post-operatively: https://bsds.org.uk/resources/bsds-bad-guidelines/

Implanted device interference
- See BSDS guidelines on the same link above
- **Pacemakers**:
  Extremely unlikely to interfere if bipolar electrosurgery used, or hot wire electrocautery
  Monitor only with pulse oximeter
- **Defibrillators**:
  A bigger risk
  Need switching off pre-op and back on ASAP post-op
- Check with specialist for any **unusual devices**

Infection
- Similar general impact to bleeding
- Published risk up to 12% in skin surgery: audit your unit and yourself.
- **May also lead to:**
  Spreading cellulitis
  Necrotising fasciitis
  Risks from antibiotic reactions (intolerance/sensitivity, rash, TEN, anaphylaxis)
  Sepsis & death (very rare)
- **Susceptibility**
  Immunocompromise: innate or comorbid, or iatrogenic
- **Standardised criteria**
  Dirty or infected e.g. frankly infected wound
  Contaminated e.g. inflamed tumour
  Clean contaminated e.g. ulcerated tumour
  Clean e.g. normal skin
- **Antisepsis**
  Pre-op patient preparation:
    Ordinary washing
    Decolonisation e.g. chlorhexidine body wash pre-op (variable evidence)
    Shaving the day before (or clip hair at surgery)
    Removal of make-up and jewellery
  Clothing, Scrubbing, Equipment (see relevant sections)

- **Prophylaxis**
  Antibiotic:
  Stat dose oral/IV, or oral course; +- Continue post-op
  Topical post-op (NB Cochrane review)
- Liu X, Kelleners-Smeets N, Sprengers M, Hira V, Mosterd K, Nelemans P. A Clinical Prediction Model for Surgical Site Infections in Dermatological Surgery. Acta Derm Venereol. 2018 Jul;98(7):683–8.

Damage to, or distortion of, important structures
- See also section on anatomy and 'danger areas'.
- Nerve or lacrimal injury
- **Forehead** – sensory loss into scalp
- **Temple** - reduced visual field (brow droop)
- **Jaw** – smiling problem (lip depressors), drooling
- **Medial canthus** - watery eye (epiphora)
- **Neck** – shoulder movement problems
- Pressure – **Nasal valve collapse** - Nasal breathing impairment
- Tension – **Ectropion** – Dry, watery or sore eye, increased sensitivity to light

Pain
Common and predictable usually minor complication after surgery
Generally managed by rest, good advice, simple analgesics such as paracetamol and comfortable, supportive dressings.
Chronic pain is a rarer complication which may relate to nerve damage and may require different drug therapy or revision surgery.

Dehiscence
- **Excess tension**
  Poor design or execution
  Poor suture decisions
- **Bleeding**
- **Infection**
  Outcome: General impact (as per bleeding and infection) i.e. delayed healing and poor final result

Necrosis
- Usually flap or graft, or primary closure under excess tension.
- Partial or complete (surface area). Superficial or full-thickness (depth)
- Causes:
  Infection
  Inadequate blood supply or oxygenation, or drainage:
  Excess tension (design, bleeding, infection)
  Poor flap design
  Poor wound bed
  Smoking (or poor nutrition, anaemia)
  Outcome:
  General impact (as per bleeding and infection)
  Additional procedures and visits (e.g. medical or surgical debridement)
  Delayed healing, Poor final result

Allergy
- Anaphylaxis (see local anaesthetic section) or irritant or allergic contact dermatitis to dressings or skin prep. Pay attention to history.

Fire risk
Avoid alcohol containing skin prep solutions unless home team well trained in their use and training is kept up-to-date. Alcoholic solutions may pool in concavities or soak into drapes or clothing and be ignited by electrosurgery.

Notes

"Visibility of the scar is not determined by the length but by the site of the incision"

SCAR REVISION

Scars of cosmetic or functional importance may form following cutaneous surgery.
Many factors interplay in the formation of scars.

Knowledge and thorough planning can reduce the chances of adverse scar-related outcomes.

Various scar revision techniques, both surgical and non-surgical are available for treating undesirable scarring.

Scars can be classified by various descriptive characteristics including—contour, shape, length, width, colour and function.

A scar's individual charactertistics and anatomical site will determine the appropriate revision technique or combination of techniques chosen.

Usually a delay of 6-9 months is desirable to allow for scar maturation and in some cases revision is then not needed.

Scar Revision Techniques
Simple excision (fusiform, punch, scar repositioning)
Z-plasty w-plasty, geometric broken line closure, multiple convergent transposing triangles
Flaps, grafts, dermal pocket grafting
Dermabrasion
Laser therapy—vascular, ablative
Intralesional steroids
Cryotherapy
Irradiation
Silicone gel / sheeting
Compression
Soft tissue augmentation
Observation
Cosmetic camouflage

Types of Scars
1. contour abnormality—elevated, hypertrophic, keloid, depressed
2. Abnormality of shape—pitted scars, trapdoor deformity, contracted scars, webbing
3. Length eg long linear scars
4. Width eg width
5. Free margin distortion—ectropion, eclabian, raised alar rim, alar notching
6. Colour—erythematous scar

POSAS Patient scale

The Patient and Observer Scar Assessment Scale v2.0 / EN

	1 = no, not at all … yes, very much = 10
HAS THE SCAR BEEN PAINFUL THE PAST FEW WEEKS?	1 2 3 4 5 6 7 8 9 10
HAS THE SCAR BEEN ITCHING THE PAST FEW WEEKS?	1 2 3 4 5 6 7 8 9 10

	1 = no, as normal skin … yes, very different = 10
IS THE SCAR COLOR DIFFERENT FROM THE COLOR OF YOUR NORMAL SKIN AT PRESENT?	1 2 3 4 5 6 7 8 9 10
IS THE STIFFNESS OF THE SCAR DIFFERENT FROM YOUR NORMAL SKIN AT PRESENT?	1 2 3 4 5 6 7 8 9 10
IS THE THICKNESS OF THE SCAR DIFFERENT FROM YOUR NORMAL SKIN AT PRESENT?	1 2 3 4 5 6 7 8 9 10
IS THE SCAR MORE IRREGULAR THAN YOUR NORMAL SKIN AT PRESENT?	1 2 3 4 5 6 7 8 9 10

	1 = as normal skin … very different = 10
WHAT IS YOUR OVERALL OPINION OF THE SCAR COMPARED TO NORMAL SKIN?	1 2 3 4 5 6 7 8 9 10

POSAS Observer scale

The Patient and Observer Scar Assessment Scale v2.0 / EN

PARAMETER	1 = normal skin … worst scar imaginable = 10	CATEGORY
VASCULARITY	1 2 3 4 5 6 7 8 9 10	PALE | PINK | RED | PURPLE | MIX
PIGMENTATION	1 2 3 4 5 6 7 8 9 10	HYPO | HYPER | MIX
THICKNESS	1 2 3 4 5 6 7 8 9 10	THICKER | THINNER
RELIEF	1 2 3 4 5 6 7 8 9 10	MORE | LESS | MIX
PLIABILITY	1 2 3 4 5 6 7 8 9 10	SUPPLE | STIFF | MIX
SURFACE AREA	1 2 3 4 5 6 7 8 9 10	EXPANSION | CONTRACTION | MIX
OVERALL OPINION	1 2 3 4 5 6 7 8 9 10	

Explanation

The observer scale of the POSAS consists of six items (vascularity, pigmentation, thickness, relief, pliability and surface area).
All items are scored on a scale ranging from 1 ('like normal skin') to 10 ('worst scar imaginable').
The sum of the six items results in a total score of the POSAS observer scale. Categories boxes are added for each item. Furthermore, an overall opinion is scored on a scale ranging from 1 to 10.
All parameters should preferably be compared to normal skin on a comparable anatomic location.

Explanatory notes on the items:

- **VASCULARITY** Presence of vessels in scar tissue assessed by the amount of redness, tested by the amount of blood return after blanching with a piece of Plexiglas
- **PIGMENTATION** Brownish coloration of the scar by pigment (melanin); apply Plexiglas to the skin with moderate pressure to eliminate the effect of vascularity
- **THICKNESS** Average distance between the subcutical-dermal border and the epidermal surface of the scar
- **RELIEF** The extent to which surface irregularities are present (preferably compared with adjacent normal skin)
- **PLIABILITY** Suppleness of the scar tested by wrinkling the scar between the thumb and index finger
- **SURFACE AREA** Surface area of the scar in relation to the original wound area

Notes

APPENDIX 1

ANTIBIOTIC PROPHYLAXIS FOR ENDOCARDITIS IN DERMATOLOGICAL SURGERY

The summary points of a joint statement from the Therapy Guidelines and Audit Sub-Committee (TGASC) of the British Association of Dermatologists and the British Society for Dermatological Surgery (BSDS) is included below. Full text and references can be found at www.bad.org.uk/healthcare/guidelines/surgery.asp

Summary Points

- Antibiotic prophylaxis is effective in reducing bacteraemia, but there are no prospective data to confirm that it prevents endocarditis.
- There have been only four reported cases of endocarditis associated with skin surgery.
- The incidence of bacteraemia during skin surgery is comparable to the 2.1% incidence of random bacteraemia detected in normal volunteers.
- The commonest isolate present on pre-operative surgical sites is coagulase negative staphylococcus which would require cover by vancomycin given intravenously.
- The TGASC and the BSDS, in agreement with the British Society for Antimicrobial Chemotherapy, believe that antibiotic prophylaxis for endocarditis is not required for routine dermatological surgery procedures even in the presence of a pre-existing heart lesion.

ANTIBIOTIC PROPHYLAXIS FOR WOUND INFECTION IN DERMATOLOGICAL SURGERY

The risk of wound infection in dermatological surgery depends on several variables –

- preoperative skin **(**clean, intact skin 1-4%**,** clean-contaminated skin 5-15%, contaminated skin >25%)
- sterile technique
- operative technique
- type of procedure eg. shave, curette, punch, simple excision, flap, graft
- length of procedure eg. Mohs' micrographic surgery
- other factors eg. diabetes, smoking,

Antibiotic prophylaxis (topical or oral) is not necessary for dermatological surgery of non-inflamed skin involving an uncontaminated wound. Inappropriate use may lead to bacterial resistance and sensitisation.

High risk groups include-

- clean-contaminated skin eg. eroded or ulcerated skin, respiratory or buccal mucosa,
- special sites eg. flexures especially groins, lower leg wounds, ears
- Mohs' Micrographic Surgery / protracted surgery
- frankly dirty or infected wounds (should treat therapeutically first unless emergency)

APPENDIX 2

STERILIZATION OF INSTRUMENTS

All instruments and materials for surgical purposes must be adequately sterilized before use. Pathological organisms including viruses and the spore forms of bacteria must be inactivated. Before a suitable sterilizing process can be used the instruments must be cleaned to remove all organic debris. Usually washing in a detergent and water mixture and scrubbing with a small brush eg. a nail brush is adequate. The following methods of sterilization are available.

Steam Autoclave is the method of choice. It is reliable and effective, killing bacteria, spores and viruses, including Hepatitis B and HIV. Larger machines (eg. Little sister) cycle at 115, 121 and 134°C taking around 15 minutes for the highest temperature. Smaller machines often have only one cycle and frequently take 30 to 40 minutes per cycle. The only disadvantage is the tendency to dull the cutting edges of sharp instruments.
Boiling water is not recommended as it does not kill spores or Hepatitis B.

Chemical Methods Usually based on glutaraldehyde which is toxic and may sensitize (see COSH regulations). These are unreliable for initial sterilization but may be used after Autoclaving instruments to maintain sterility if the instruments are not to be used immediately.

Dry Heat More effective than chemicals or boiling water but a relatively slow method. The machine maintains a temperature of 160°C for one hour which may char, burn or melt paper, cloth or plastic. The method is really only suitable for metallic instruments.

Gas Sterilization and Gamma Radiation These methods are highly effective but only applicable to a very large unit or industry.

A report by the Department of Health (Ref. HEI No. 196: A further evaluation of transportable steam sterilizers for unwrapped instruments and utensils. March 1990) tests small sterilizers, assessing them against British Standard 3970. Available from:- DHSS, NHS Procurement Directorate, Room 423, 14 Russell Square, London, WC1B 5EP. Tel: 071 636 6811 ext 3179.

No single model tested met all the requirements. However, the following have an acceptable performance :- Instaclave, Little Sister 2,Stericube, Sterimate 2000.

Disposable instruments The concern over prions is so great that it is now routine for certain operations e.g. tonsillectomy to be performed using disposable instruments. In addition there are now available packs of instruments so cheap that they are more economical than sterilising and repacking or old instruments

APPENDIX 3

BIOPSIES AT SPECIAL SITES

Dermatologists are often called upon to make diagnoses of diseases which affect mucous membranes, scalp, nails, etc. It is important to obtain diagnostically useful tissue and modification of the normal biopsy technique may be needed. Here we will look at special sites:-

Scalp and eyebrow
Genitalia
Lip and oral mucosa
Eyelid
Nails

Scalp

Depth is important. If the incision does not go down to the galea it may not contain hair follicles and in addition closure will be more difficult. Angling the incision in the same direction as the hairs emerge from the scalp should make it possible to visualise the entire hair shafts and follicles in the histology specimen. Haemostasis can be a problem, especially if an artery in the wound edge retracts and occasionally it is necessary to strangulate such arteries by undersewing through the epidermis, under the artery and up again through the epidermis, tying the knot on the surface. Vicryl rapide 2/0 or 3/0 is useful for closing scalp biopsies because even if the knots get tangled in the hair the whole thing tends to wash off about 10 days later.

Genitalia

On the penile shaft the scalpel often drags on thin, elastic skin. Holding a piece of skin in blunt forceps allows you to snip the skin just below where it is held between the forceps producing a good biopsy specimen. Vicryl rapide is a good suture, being soft and self absorbent. A common mistake, taking glans biopsies, is to end up with a small and traumatised biopsy. An easy method is to make 2 parallel incisions, 1 cm long and 2-3 mm apart, making no attempt to make the lines meet. With a pair of sharp iris scissors cut out the ribbon of tissue and put in a couple of vicryl rapide sutures. It always heals well. The same approach can be used on vulval skin.

Eyelid

Thin eyelid skin is suited to snip biopsies as described for the penile shaft.

Lip and Oral Mucosa

Try to avoid cutting across the vermilion. Otherwise, lip and oral mucosa heal very well. A Chalazion clamp will prevent bleeding.

APPENDIX 4

SAFE PRACTICE IN HIGH RISK INFECTION PATIENTS

Prevention of and Protection Against Blood Borne Virus Infections (BBVI) in Dermatological Surgery

A doctor has a duty of care to all patients for whom he has responsibility irrespective of race, religion, age, sex, sexual or political orientation of disease state. However, patients also have a responsibility to disclose to medical attendants any disease they may have that may affect the health of the treating physician or surgeon.

The risk of contracting a blood borne virus infection varies with the individual virus. The risk of infection following needle stick injury with HIV infected blood is small and estimated at approximately 3 per 1000 injuries while the risk for infection from Hepatitis B is estimated at approximately 1 in 5 injuries.

Some needle stick injuries carry a higher risk than others, e.g. those resulting in deep injury, those caused by hollow bore needles, those where the source patient is terminally ill with HIV infection and those where needles are visibly blood stained or have been in an artery or vein. The risk of acquiring HIV through mucous membrane exposure is less than 1 in 1000. Many studies have revealed no evidence of risk where blood is in contact with intact skin.

Body fluids that may be responsible for BBVI are:-

High Risk CSF, pleural, peritoneal, pericardial, amniotic and synovial fluids: breast milk, vaginal secretions, body tissue and semen

Low Risk urine, faeces, saliva, sputum, tears, sweat and vomit.

The blood borne viruses are:-

HIV (AIDS) HBV (hepatitis) HCV (hepatitis) HDV (hepatitis) HTLVI (adult cell leukaemia)

Prevention

Some procedures carry a greater risk of exposure to blood and body products than others within the range of dermatological surgery. High risk involve those in which the potential for uncontrolled bleeding or spattering of blood is greater, e.g. open surgery. A lower risk would be associated with capillary oozing, e.g. shave biopsy, curettage and cautery, cold point cautery, deroofing blisters, treating leg ulcers. Very low probability of personal contact during cryotherapy.

Specific protective measures required

High risk	Low risk	Very low risk
Gloves Water repellent gown Protective headwear Mask with visor Protective footwear	Gloves Protective eyewear	Gloves to be available, e.g. for treating an ulcerated lesion

General preventative measures:-

- Good basic hygiene with regular hand washing
- Cover any wound or skin lesion with waterproof dressing or wear gloves
- Protect mucous membranes of eyes, mouth, nose from blood splashes
- Transfer sharps by placing them on an instrument tray.
- Institute a safe procedure for handling and disposal of sharps, e.g. the operator should dispose of sharps and not leave a third person to tidy up
- Only resheath needles if resheathing apparatus is available
- Use appropriate instruments for putting on and taking off scalpel blades.
- Suturing needles should be stored in a safe place when not in use
- Potentially infected surfaces (eg a laboratory bench used for the preparation of micrographic specimens) and spillages of blood should be disinfected appropriately.
- Dispose of sharps in an appropriate puncture resistant container.

Note: Not all of the above preventative measures may be necessary all of the time. Departments should draw up there own code of practice for medical and nursing staff relevant to the tasks undertaken by that department in discussion with the Occupational Health Department and Microbiologists.

Immunisation

Effective immunisation is currently only available for HBV. All workers who regularly come into contact with blood or blood related products must be immunised against this virus.

Post Exposure Prophylaxis - Immediate Action

In the event of a sharps injury or other significant contamination, the following action should be taken without delay:-

- Wash off splashes on skin with soap and running water
- Encourage bleeding if the skin has been broken
- Wash out splashes in the eye using solution from an eye wash bottle or alternatively tap water. Contamination of the nose or mouth should be washed with copious amounts of tap water
- Record source of injury, e.g. name, type of fluid, type of injury. Report incident to the expert medical adviser for risk assessment* and decisions about prophylaxis with anti viral drugs
- An accident report form should be completed
- Blood should be taken from the infection source and the injured party to establish the risk of infection (consent is required)
- Counselling may be needed for the injured party and infected source

**This individual may be in infection control, occupational health, public health, or the accident department.*

In HIV infected persons the use of combinations of antiretroviral drugs suppresses viral replication. This has led to the introduction of prophylactic antiretroviral therapy following occupational exposure to HIV. Some of these drugs, especially the protease inhibitors carry significant and serious side effects.

References

A complete overview of the subject, with up to date references can be found at www.hpa.org.uk

5. SURGICAL PLUME

BACKGROUND

Over the last 30 years, there has been a growing concern that the smoke plume formed during surgical procedures using electrocautery or laser destruction of tissue could be a health hazard for operators, assistants and patients. There is recognition that the chemicals found in the plume are potentially damaging to health, and that the aerosolisation of viruses during procedures could permit disease transmission. These concerns have been highlighted during the COVID-19 pandemic when the realisation of possible spread of a virus with a significant mortality has led to the general adoption of personal protective equipment (PPE) to help protect the surgical team.[1]

Human papillomavirus (HPV) and Merkel cell polyomavirus (MCPV) are present in skin and mucosal lesions which are treated surgically by dermatologists. Surgery involves the use of cauterising devices which generate a surgical smoke plume consisting of vaporised and burnt tissue. HPV and MCPV are relatively resistant to heat due to their external capsid proteins[2,3] and viable infectious viral particles have been detected in surgical plumes[4] with t he viral DNA being detectable in the plume,[5] and on the face of surgeons after operations.[6]

HPV has been shown to be a necessary event in the development of all cervical cancers,[7] a proportion of other genital cancers, and also head and neck squamous cell carcinomas especially oropharyngeal, tonsillar and laryngopharyngeal cancers.[8] MCPV is a factor in development of Merkel cell carcinoma, a relatively rare skin cancer which is increasing in incidence in Europe and Australia.[9,10,11,12]

The risk of developing cancer in the uterine cervix is strongly associated with the persistence of high-risk HPV infection and HPV16 viral copy number associated with severity of disease,[13,14] and there are data that higher HPV viral copy numbers may also be associated with HNSCC, especially tonsillar SCCs.[15,16] This suggests that larger, infecting doses of high-risk HPV may increase risk of the persistence of HPV, and thus, risk of cancer at the site of infection. The time between exposure to the virus, and development of a pre-malignant or malignant condition at these sites, is often prolonged and may be years or decades. There are case reports of head and neck infection, including cancer in doctors exposed to high-risk surgical plumes,[17,18,19,20] for example in ENT surgery, gynaecology and more recently in dermatologists specialising in genital disease.

The recent data regarding risks to surgeons from infectious agents and toxic and carcinogenic chemicals in the plume has been reviewed,[21,22,23,24,25] and also assessed by CDC[26] and HSE.[27] The numbers of healthcare professionals recorded as having developed HPV-associated disease in the respiratory tract are relatively small.[28] However, this may be an under-reporting, and it should be remembered that in naturally-acquired genital HPV disease, the majority of individuals clear the infection naturally, a small proportion develop persistent infection, and only a minority progress to malignant disease.

Although the use of PPE for dermatologic surgeons has increased and improved over the years, the amount of surgery done in dermatology has increased, with some dermatologists now spending a large proportion of the week in the operating room. Risk of surgical plume to patients, assistants and surgeons can be reduced if the plume is
removed by means of a smoke extractor used during surgery. These are relatively low-cost portable devices that can be used when surgeons consider that there may be risk.

Smoke extractors to be available in all settings where dermatology surgery takes place so that surgeons can use these devices when they consider it appropriate.

Further occupational health research into the risks of virus in surgical plume is desirable.

There should be education for doctors and nurses undertaking surgical procedures so that they are aware of the types of lesions (e.g. genital and oral lesions, warts in transplant patients, Merkel cell carcinoma) and procedures (e.g. bipolar cautery rather than unipolar; lower power setting) most likely to generate surgical plumes containing potentially harmful virus particles.[29]

These measures should be in addition to the use of PPE of a level to prevent virus inhalation, as outlined in a previous BAD policy statement.[30,31]

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APPENDIX 6

Management of Pacemakers and Implantable Devices during dermatological surgery

https://www.bsds.org.uk/resources/bsds-policy-documents

Pacemakers:

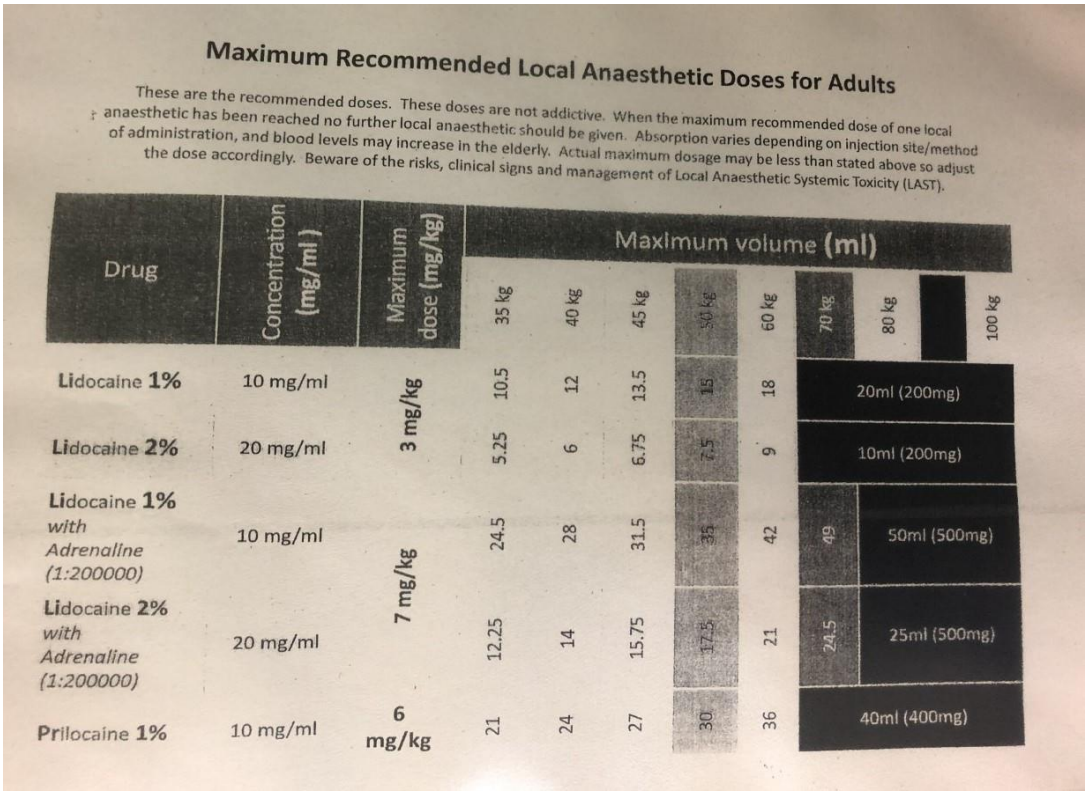
- Extremely unlikely if Bipolar used, or hot wire electrocautery
- Monitor only with pulse oximeter

Defibrillators:

- A bigger risk (although still negligible if precautions taken)
- Can be switched off pre-op and turned back on ASAP post-op
- Alternatively use of a magnet placed over the device when using bipolar electrocautery is used is a practical solution to temporarily disable the device and is acceptable to some cardiologists

Check with specialist for any unusual / older devices

Appendix 7

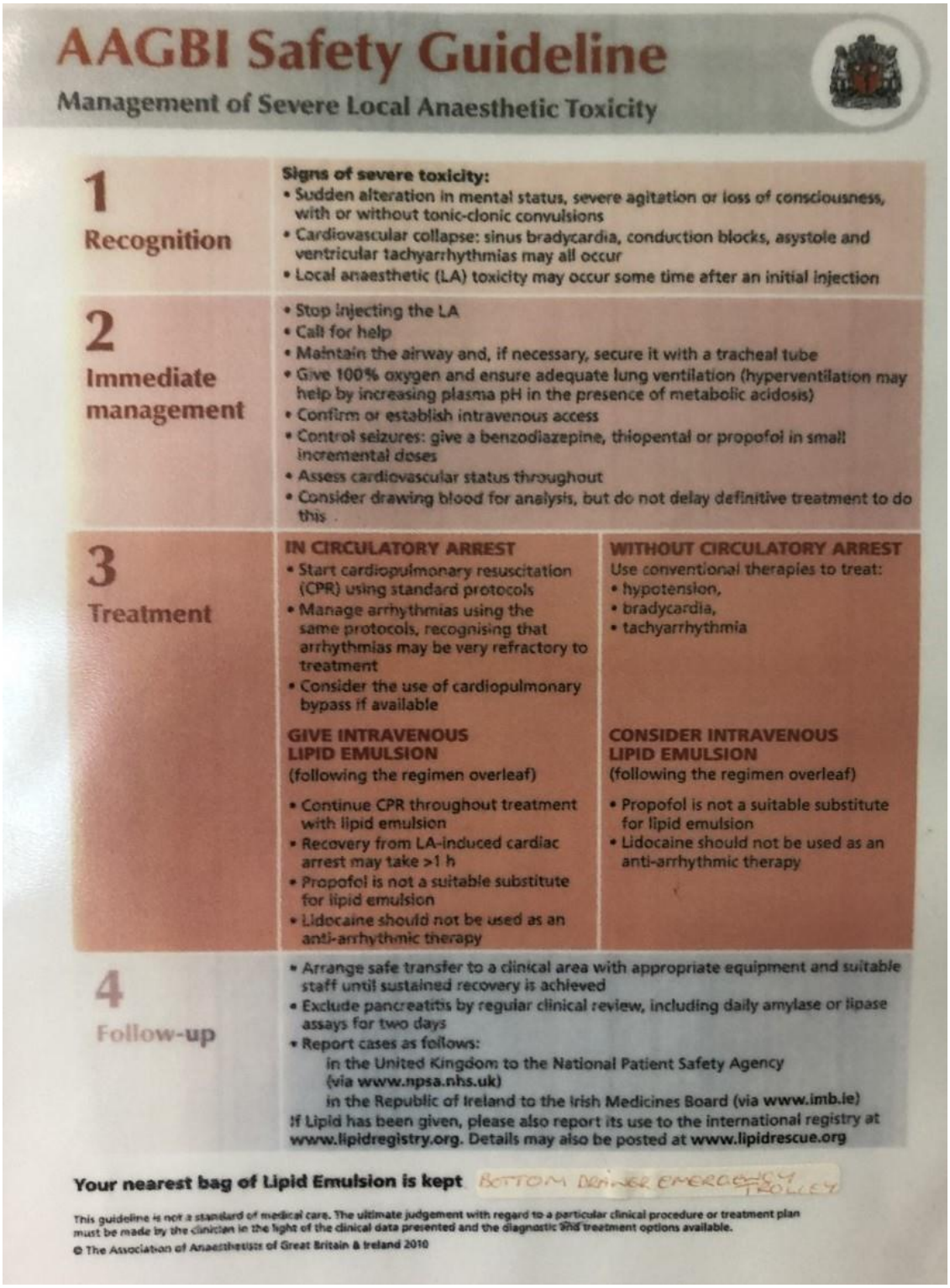


Maximum Recommended Local Anaesthetic Doses for Adults

These are the recommended doses. These doses are not addictive. When the maximum recommended dose of one local anaesthetic has been reached no further local anaesthetic should be given. Absorption varies depending on injection site/method of administration, and blood levels may increase in the elderly. Actual maximum dosage may be less than stated above so adjust the dose accordingly. Beware of the risks, clinical signs and management of Local Anaesthetic Systemic Toxicity (LAST).

Drug	Concentration (mg/ml)	Maximum dose (mg/kg)	Maximum volume (ml) 35 kg	40 kg	45 kg	50 kg	60 kg	70 kg	80 kg	100 kg
Lidocaine 1%	10 mg/ml	3 mg/kg	10.5	12	13.5	15	18	20ml (200mg)		
Lidocaine 2%	20 mg/ml		5.25	6	6.75	7.5	9	10ml (200mg)		
Lidocaine 1% *with Adrenaline (1:200000)*	10 mg/ml	7 mg/kg	24.5	28	31.5	35	42	49	50ml (500mg)	
Lidocaine 2% *with Adrenaline (1:200000)*	20 mg/ml		12.25	14	15.75	17.5	21	24.5	25ml (500mg)	
Prilocaine 1%	10 mg/ml	6 mg/kg	21	24	27	30	36	40ml (400mg)		

Appendix 8



AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
- Local anaesthetic (LA) toxicity may occur some time after an initial injection

2 Immediate management

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing plasma pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

WITHOUT CIRCULATORY ARREST
Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

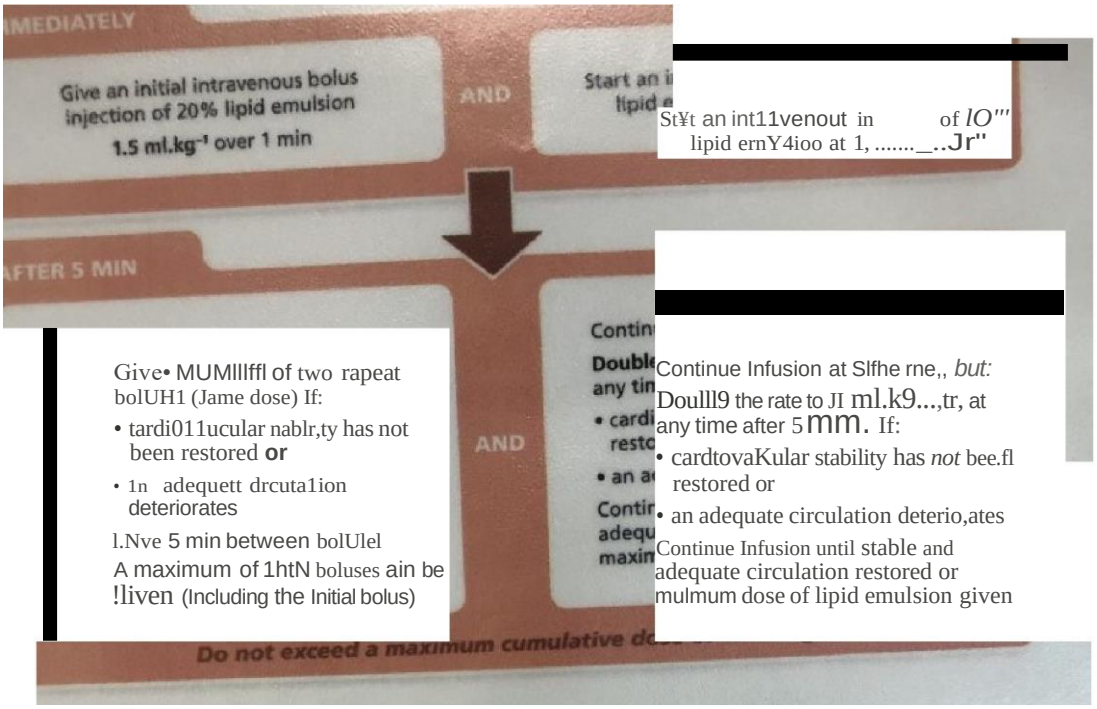
4 Follow-up

- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - in the United Kingdom to the National Patient Safety Agency (via www.npsa.nhs.uk)
  - in the Republic of Ireland to the Irish Medicines Board (via www.imb.ie)

If Lipid has been given, please also report its use to the international registry at www.lipidregistry.org. Details may also be posted at www.lipidrescue.org

Your nearest bag of Lipid Emulsion is kept BOTTOM DRAWER EMERGENCY TROLLEY

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.



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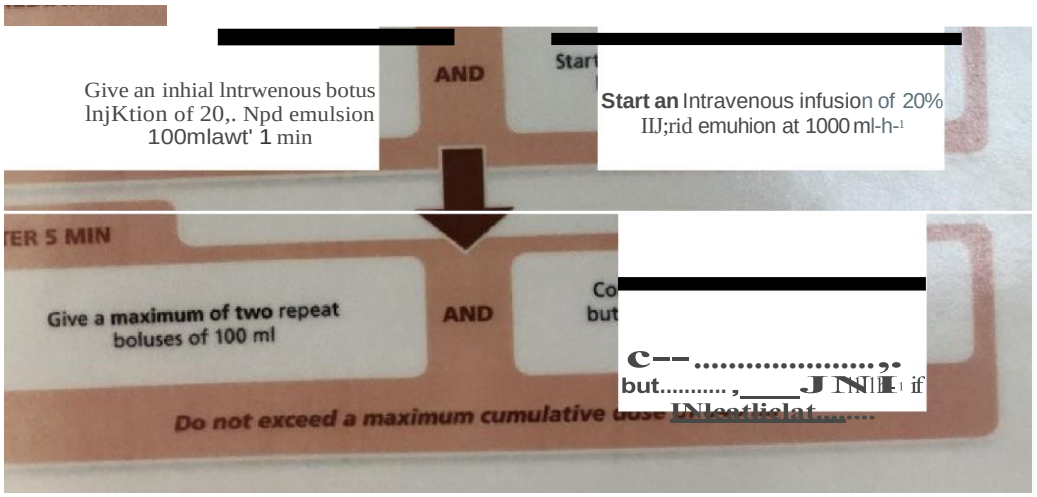

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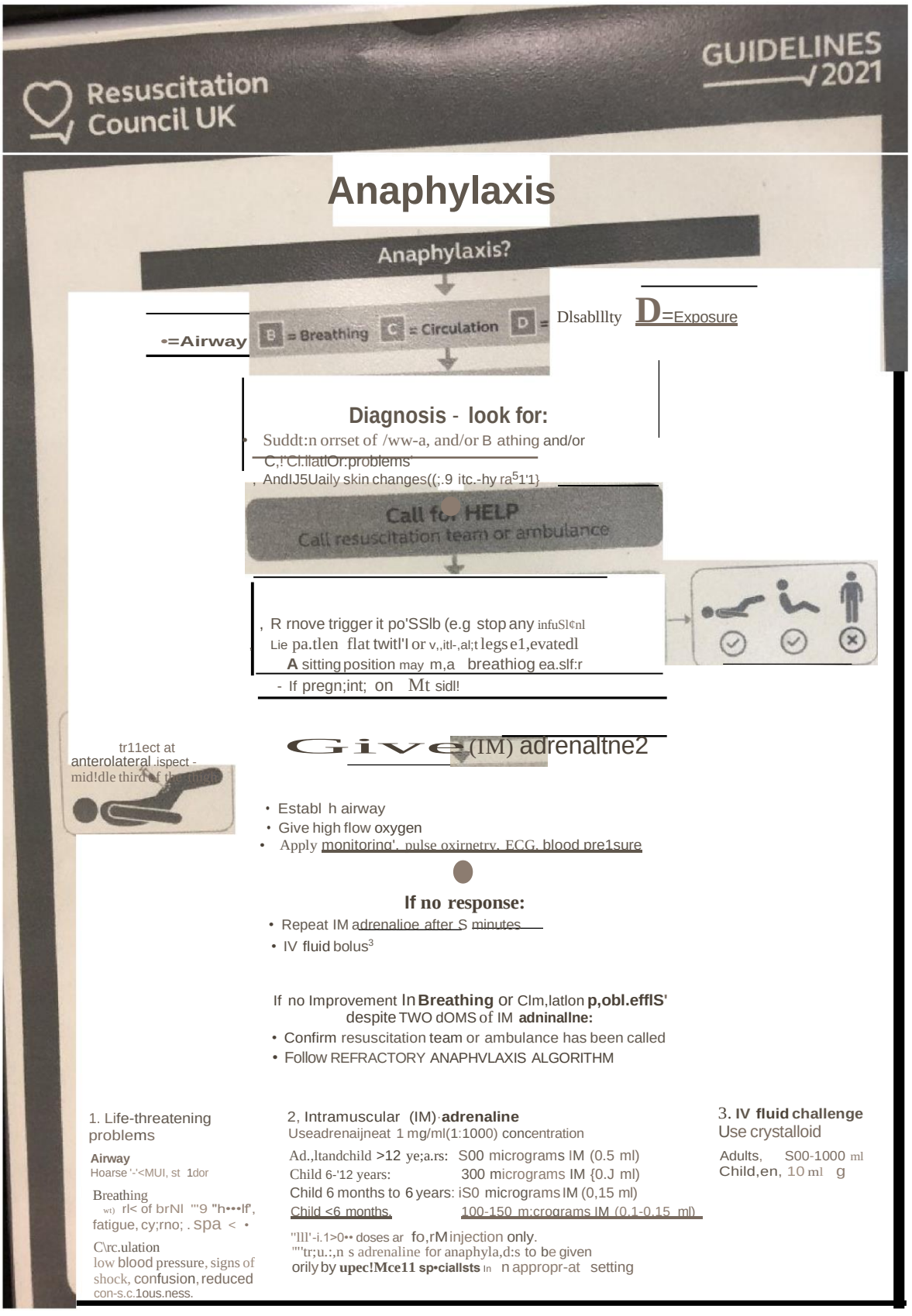
Appendix 9


Resuscitation Council UK
GUIDELINES 2021
Anaphylaxis
Anaphylaxis?
•=Airway
B = Breathing
C = Circulation
D =
Dlsablllty
D=Exposure
Diagnosis - look for:
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• Establ h airway
• Give high flow oxygen
• Apply monitoring', pulse oxirnetry, ECG, blood pre1sure
If no response:
• Repeat IM adrenalioe after S minutes
• IV fluid bolus3
If no Improvement In Breathing or Clm,latlon p,obl.effIS'
despite TWO dOMS of IM adninallne:
• Confirm resuscitation team or ambulance has been called
• Follow REFRACTORY ANAPHVLAXIS ALGORITHM
1. Life-threatening problems
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fatigue, cy;rno; . spa < •
C\rc.ulation
low blood pressure, signs of shock, confusion, reduced con-s.c.1ous.ness.
2, Intramuscular (IM) adrenaline
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Child 6-'12 years: 300 micrograms IM {0.J ml)
Child 6 months to 6 years: iS0 micrograms IM (0,15 ml)
Child <6 months, 100-150 m:crograms IM (0.1-0.15 ml)
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orily by upec!Mce11 sp•ciallsts In n appropr-at setting
3. IV fluid challenge
Use crystalloid
Adults, S00-1000 ml
Child,en, 10 ml g

BRITISH SOCIETY FOR DERMATOLOGICAL SURGERY

WORKSHOP MANUAL

NEWCASTLE

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Part 2. Practical Section

"Faster surgery does not represent better surgery"

USING THE SCALPEL

The Pencil Grip This is useful for short, fine incisions, but because of the angle to the skin there is diminished cutting edge contact, which decreases depth and direction control in long incisions.

The Fingertip Grip This gives less depth variation and greater direction control with long incisions; however, there is diminished fine control.

Incision Methods

Press Cutting Press vertically downwards on stationary knife until it cuts through the tissue. This gives good control in length and direction, eg. draining an abscess, beginning an excision biopsy. However there is poor depth control.

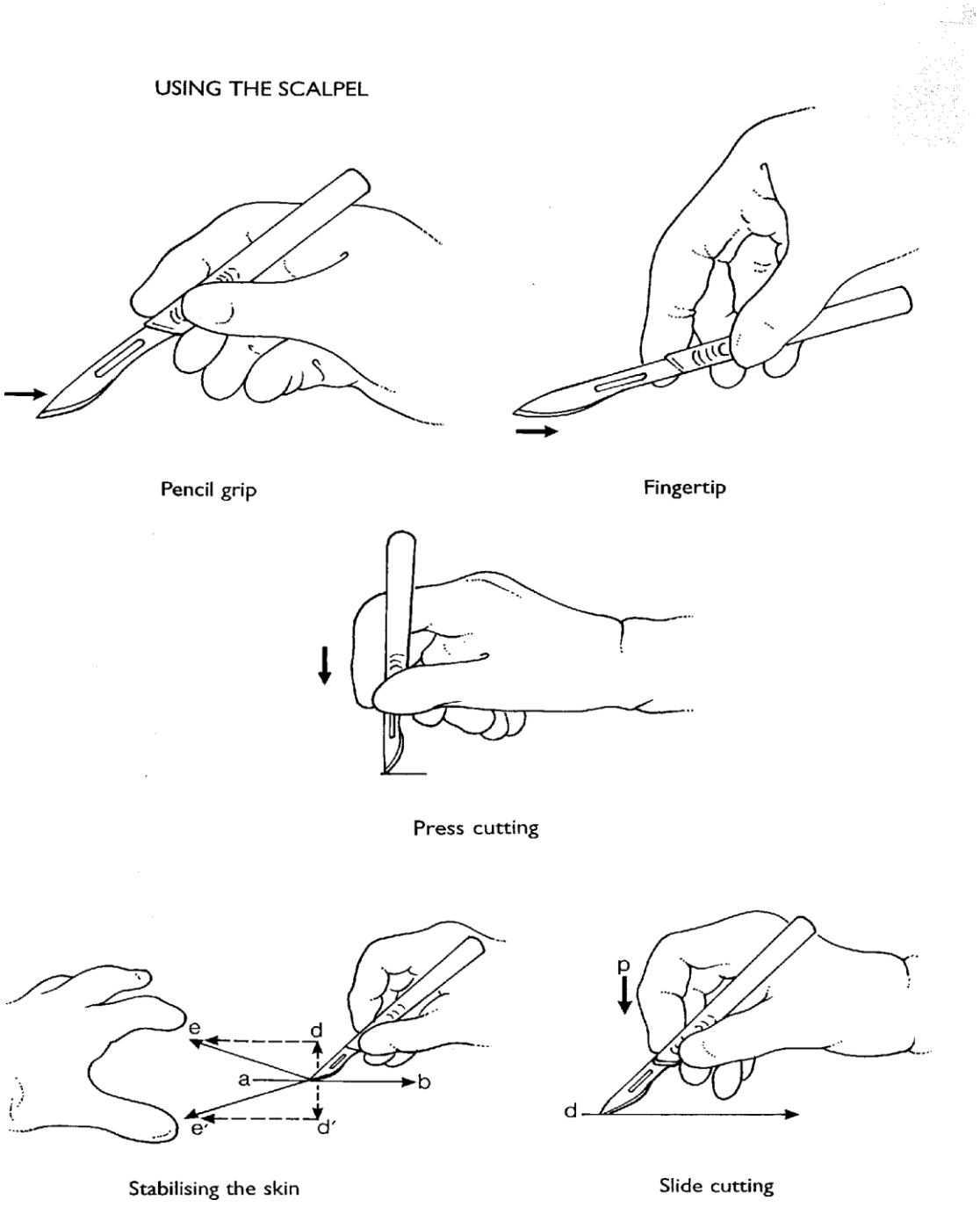
Slide Cutting Blade motion at right angles to scalpel pressure. There is accuracy of depth control and precise direction and length control. However, the beginning and end of the cut tends to be shallow.

Stabilising the Skin A stretched undistorted surface prevents jagged cuts.

"I hear and I forget. I see and I remember. I do and I understand."

Confucius

"Slice, don't scratch, poke or push"



A clinician wielding a scalpel is in a position of power and this can be dangerous for the beginner.. One must be wary of overconfidence and the formation of bad habits. It is important to work through the basics and grasp the fundamentals of good practice. Don't get carried away. Take it slow. Train with humility.

Elliptical excision of skin

Examine lesion carefully under good light. Use magnification if necessary, and clean the lesion with an alcohol swab.

- Mark clinical edge of lesion with marking pen.
- Determine the correct direction for the excision using relaxed skin tension lines.
- Mark the shape of the ellipse with a length to width ratio 3:1 or greater. Ensure the clearance is adequate; measure the clearance and record it in the patient's notes.
- Obtain anaesthesia and wait for the adrenaline effect.
- Stabilise the skin with the fingers and thumb.
- When starting the wound, hold the scalpel upright, so that the point is vertical as it enters the skin at one of the apices of the ellipse, and cut through the skin almost to the other apex and then repeat on the other side of the wound and finally reverse the scalpel to cut through the points at the opposite apex.
- When cutting, cut boldly along the marked line, in a single movement avoid making numerous small cuts, which will cause a jagged margin.
- Ensure scalpel is vertical to skin at start and finish. Avoid under cutting.
- Dissect the specimen with scissors, using a skin hook where possible to lift the specimen out of the skin. This will avoid crushing the specimen with forceps. Cut the base parallel with the skin. The shape of the specimen, and also the defect should be U-shaped and not V-shaped (see diagram).

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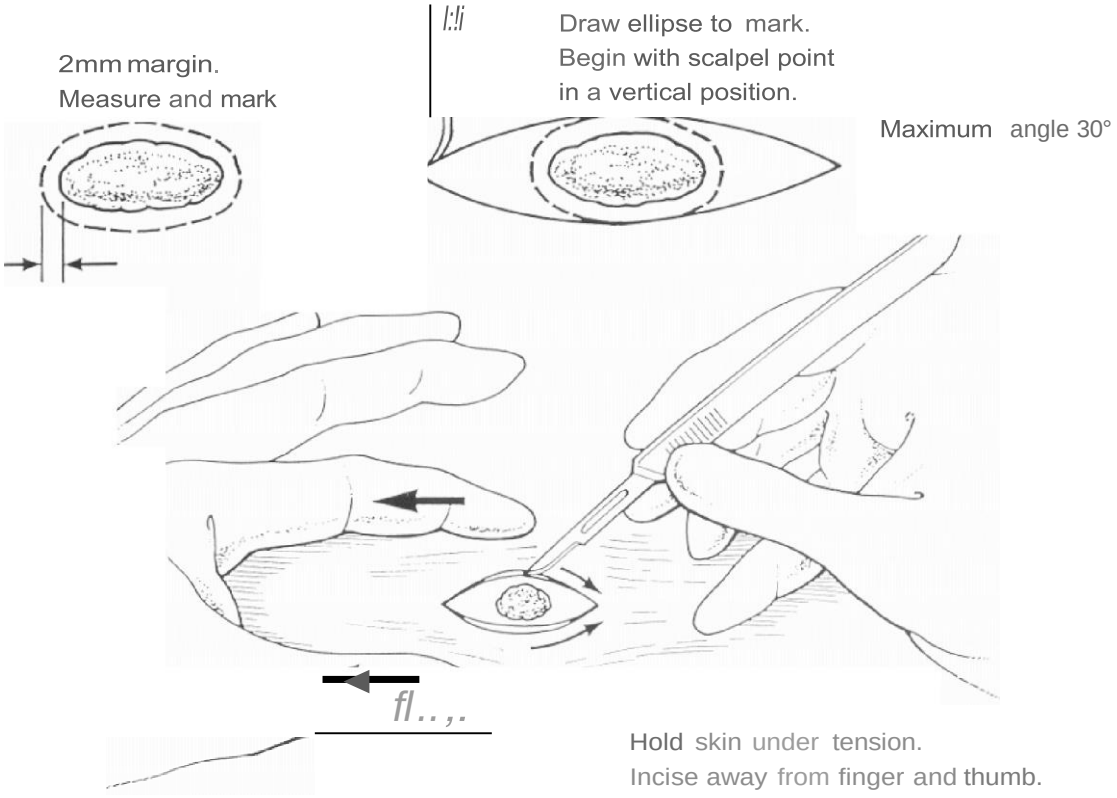

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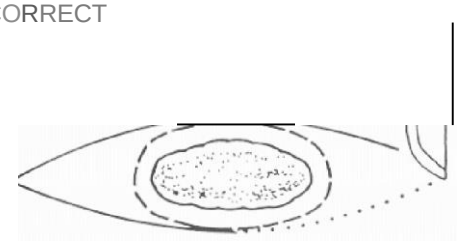
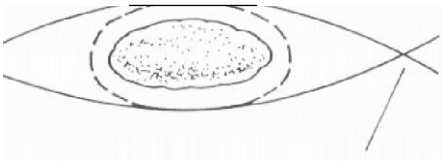
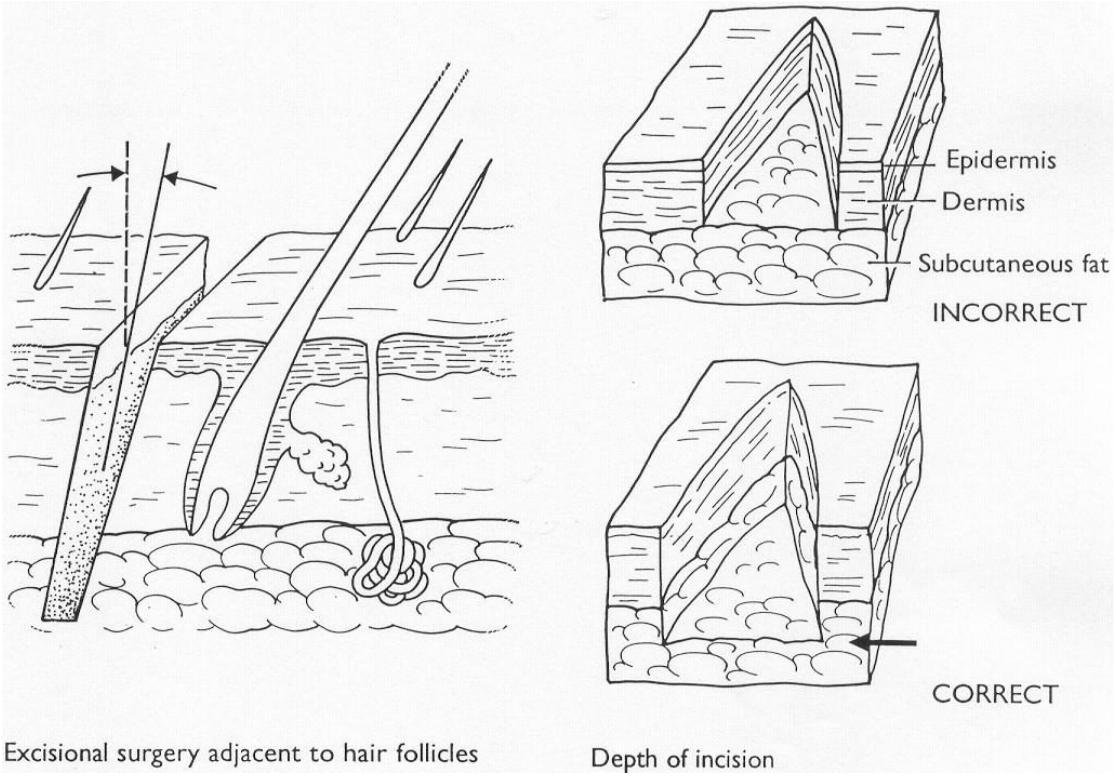


Before reaching the end of the ellipse, reverse the scalpel and cut the end point vertically

INCORRECT

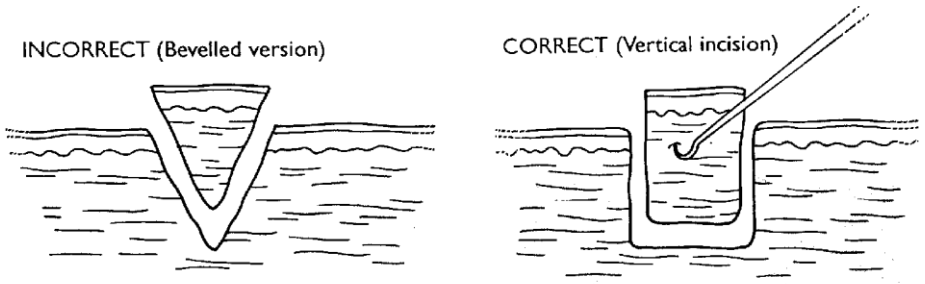


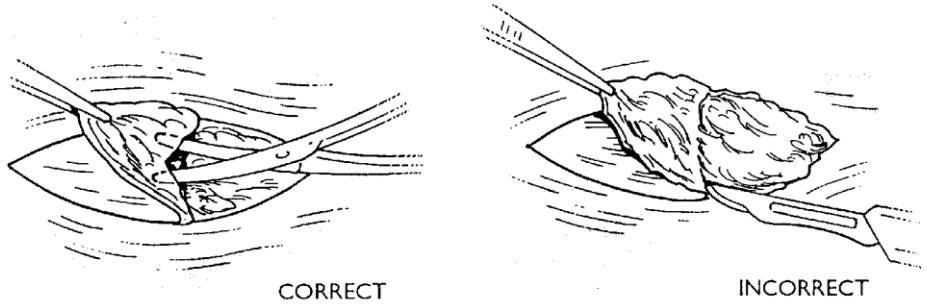
AVOID fishtails



Excisional surgery adjacent to hair follicles

Depth of incision





Removing the specimen using blunt dissection
and or scissors. Scalpel often leads to jagged edge. (not if done carefully)

UNDERMINING **"Appose it, don't necrose it"**

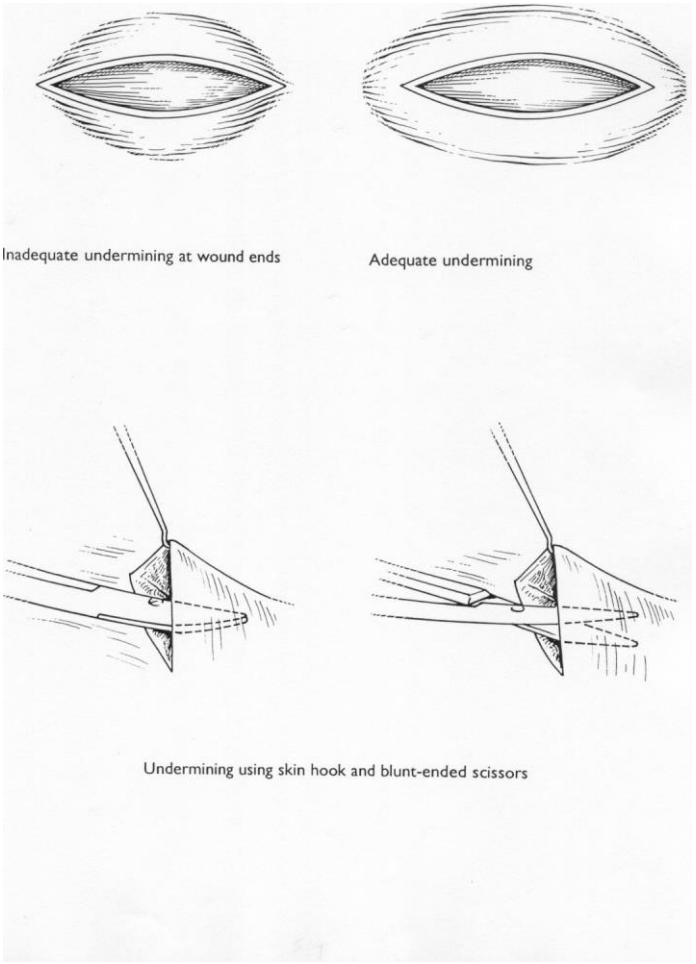
Undermining of the wound edges, after removal of the specimen, confers several benefits.

- helps eversion of wound edges
- reduces tension (the surgeon's enemy) on the wound
- eases closure

Blunt tipped curved scissors are highly satisfactory and are used by cutting and spreading. Hold the wound edge with a skin hook. The amount of undermining varies according to wound site, site, skin laxity. But it must allow closure with minimal tension and with wound eversion. It is important to undermine all the way round including the two ends.

Depth of Undermining This varies according to site.

- Scalp - best in the avascular space below the galea to avoid cutting follicles
- Face - upper subcutaneous fat
- Torso - any level of fat. Deeper fat for larger excisions
- Hands - just below dermis



Undermining 100% of periphery including lateral to tips reduces tethering and protrusions beside tips and so leads to a better cosmetic outcome

SUTURES AND SUTURING TECHNIQUES

"We are what we repeatedly do. Excellence, then, is not an act, but a habit"

The ideal suture would be easy to handle, provoke little tissue reaction, discourage bacterial growth, have a high breaking strength, with little allergic potential and would be absorbed after serving it's function. No one suture material is perfect and it is important to understand the various types.

SIZE refers to the diameter of the suture strand and is usually expressed by an appropriate number of zeros, in millimetres or as a metric number.

USP/BP mm Metric No
3/0 0.2 2 The zeros system does not uniformly correspond

4/0 0.15 1.5

5/0 0.1 1

6/0 0.07 0.7

Suture material is made into either monofilament (single strand), or multifilament form, which in turn can be twisted or braided, and coated.

Monofilament e.g. PDS (absorbable) Ethilon (non-absorbable)
Advantages - slide through tissue easily, less tissue reaction, memory, cheaper.
Disadvantages - stiffer, knots may slip, more likely to cut out.

Twisted and Braided e.g. Vicryl (absorbable) Nurolon (non-absorbable)
Advantages - easy to handle and knot, good for tying off vessels
Disadvantages - more reaction, infection variable absorption

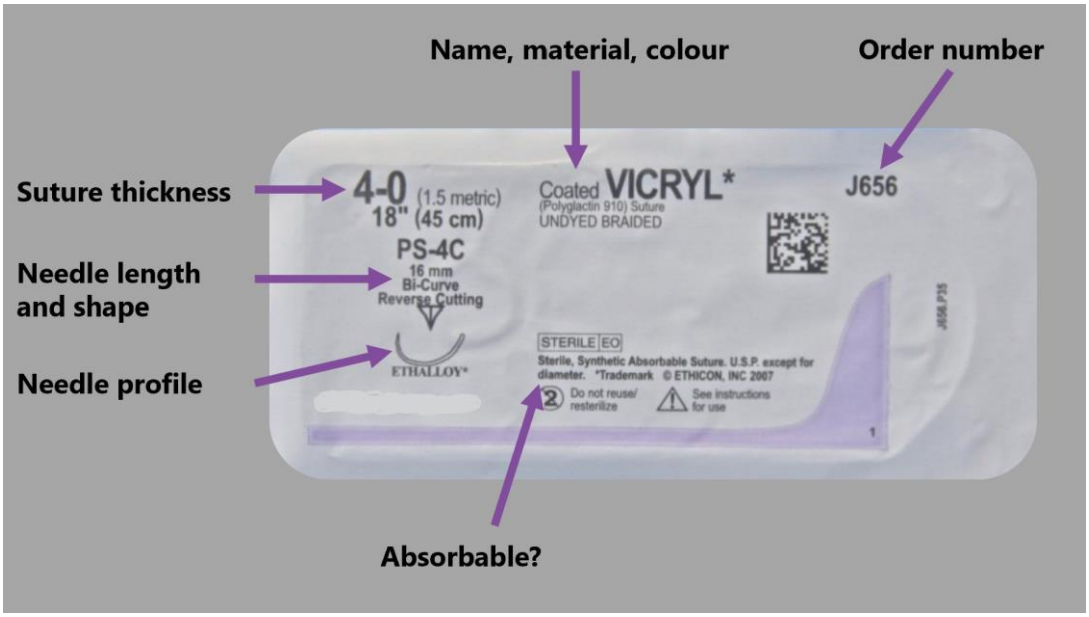
ABSORBABLE

Synthetics
Vicryl (Polyglactin 910) Degraded by hydrolysis Coated, braided, good handling, 50% Strength at 2-3 weeks. May "spit out".

Dexon (Polyglycolic Acid) Uncoated, braided, fair handling 50% strength at 2-3 weeks.

P.D.S. (Polydioxanone) Monofilament. Poor handling, 50% strength at 6 weeks.

Monocryl (Poliglecaprone 25) Monofilament. Fair handling. Non reactive. 50% strength at 10 days



USP size	Metric size	mm
10-0	0.2	0.02 - 0.029
8-0	0.4	0.04 - 0.049
6-0	0.7	0.07 - 0.099
4-0	1.5	0.15 - 0.199
2-0	3	0.30 - 0.339
0 or 1-0	3.5	0.35 - 0.399
2	5	0.50 - 0.599

Monofilament

Braided

The properties of most sutures available are summarised in the following tables which are found in an excellent review article: Regula C and Yag-Howard C. Suture Products and Techniques: What to Use, Where, and Why. Dermatological Surgery 2015. 41:10S:OCTOBER SUPPLEMENT

Absorbable sutures

Suture	Configuration	Tensile strength	Strength retention profile (d=day)	Complete Absorption	Tissue reactivity	Handling	Knot strength	Comments
Fast-absorbing Polyglactin 910 (Vicryl Rapide)	Multifilament	Good	50% at 5 d	42 d	Low to intermed	Good	Good	
Polyglactin 910 (Vicryl)*	Multi / Mono filament	Quite high	50% at 21 d	56–70 d	Low to intermed	Good	Good	Easy to handle
Poliglecaprone 25 (Monocryl)*	Monofilament	Quite high	50%–60% at 7 d; 20%–30% at 14 d	91–119 d	Very low	Very good	Good	High knot security
Polydioxanone (PDS)*	Monofilament	High	4-0: 35% at 42 d; 3-0: 60% at 42 d	183–238 d	Low	Poor	Poor	
Polyglyconate (Maxon)	Monofilament	Very High	59% at 28 d	180 d	Very low	Very good	Very good	
Polyglycolic acid (Dexon)	Multifilament braided	Intermediate	20% at 21 d	60-90 d	Low to intermediate	Good	Good	High rate of knot extrusion
Polyester (Velosorb)	Multifilament braided	Quite high	45% at 5 d	50-60 d	Low to intermediate	Good	Good	

Non—absorbable sutures

Suture	Configuration	Tensile strength	Memory	Handling	Tissue reactivity	Knot strength	Comments
Silk	Multifilament braided	Low	Low	Excellent	High	Excellent	Good for mucosa
Nylon (ethilon, monosof, dermalon)	Monofilament	High	High	Poor	Low	Poor	Inexpensive
Polypropylene (prolene)	Monofilament	Moderate	High	Poor	Low	Poor	
Nylon (surgilon)	Multifilament braided	High	Moderate	Good	Low	Fair	Inexpensive
Polybutester (novafil)	Monofilament	High	Low	Good	Low	Good	
Polyester (mersilene, Ethibond Excel)	Multifilament braided	Very High	Moderate	Very good	Moderate		

Advantages - predictable absorption and strength. Very little tissue reaction. Long lasting strength.
Disadvantages - May "spit out" (especially Vicryl). Present in tissue 3-6 months. Poor handling of P.D.S.

NON-ABSORBABLE

Nylon
a) Monofilament, e.g. Ethilon, Dermalon

Advantages - high tensile strength, low tissue reaction and infection rate; fewer stitch marks. Excellent for skin surgery. Easy suture removal. Some elasticity. Cheap.
Disadvantages - poor handling and knot security if special knots not used.

b) Braided, e.g. Nurolon, Surgilon

Advantages - easier handling than monofilament
Disadvantages - higher infection rate than monofilament. Expensive.

Polypropylene
Monofilament, e.g. Prolene, Surgilene, Dermalene
Advantages - very smooth surface. Plasticity therefore very little cutting out. Low infection rate. Can be left in position for several weeks.
Disadvantage - poor handling and knot security. More expensive than monofilament nylon.

Polyester
Braided, e.g. Mersilene, Dacron, Ethibond
Advantages - soft and strong. Useful for mouths, mucosae, folds.
Disadvantage - expensive, little advantage over silk.

Polybutester
Monofilament, e.g. Novafil
Advantages - slippery and plastic, ties easily, low tissue reaction.
Disadvantages - poor knot security, expensive.

Silk (Braided)
Advantages - soft, easy to tie. Useful for lips, mouth, body folds etc. Less likely to tear.
Disadvantages - marked tissue reaction, stitch marks, high rate of infection, painful suture removal.. Must be removed by 4 days to avoid scarring. Now largely superseded by synthetics e.g. vicryl rapide.

"Twice and thrice over, as they say, good is it to repeat and review what is good"
Plato

Suturing and suture technique

Most skin surgery needs can be met from this range:

ABSORBABLE
Vicryl[1] (braided) - useful if defect under some tension
Dexon[2] (braided) should be available in 3/0, 4/0, 5/0
Monocryl[1] (monofilament) - good for facial defects
PDS[1] (monofilament) - strongest so good for defects on torso and limbs
'Vicryl Rapide'[1] (braided)
PGA RESORBA[3] (braided)
GLYCOLON[3] (monofilament)
CAPROLON[3] (long acting monofilament—50% tensile strength at 56 days)

NON-ABSORBABLE
Ethilon[1] (monofilament) should be available in 3/0, 4/0, 5/0, 6/0
Prolene[1] (monofilament) for different sites
Novafil[2] (monofilament)
MOPYLEN[3] (monofilament polypropylene)
NYLON[3] (monofilament polyamide)

1. Ethilon product Tel 01314535555 for catalogue
2. Sherwood, Davis & Geck product 01329224114 for catalogue
3. RESORBA sutures, Advanced Medical Solutions Ltd T 08444 125 754, customersupport@admedsol.com, admedsol.com

NB: Silk has largely been superseded and catgut is no longer available

When choosing the suture pack remember:
Needle

- 'P' and 'PRIME' have excellent point
- 3/8 circle is ideal for skin
- length variable:16mm for fine work(6/0),19-26mm for heavier work (3/0)
- Cutting or reverse cutting needle for skin

Thread

- Undyed for skin
- 45cm length usually adequate

In General

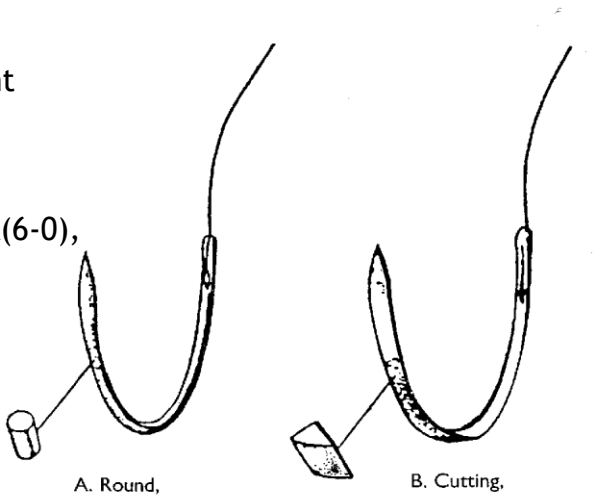
- Face - use 5/0 absorbable, 5/0 or 6/0 non-absorbable
- Body - use 3/0 absorbable, 3/0 or 4/0 non-absorbable
- Running subcuticular use 3/0 monofilament non absorbable or absorbable
- Mucosa - use 5/0 Vicryl Rapide (do not need removal)
- Silk must be removed in 4 days

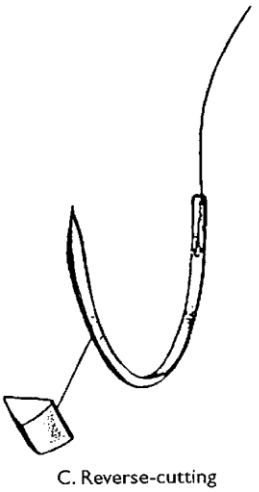
to avoid scarring
(obsolete in derm surgery now)

Types of needle point

Needle type

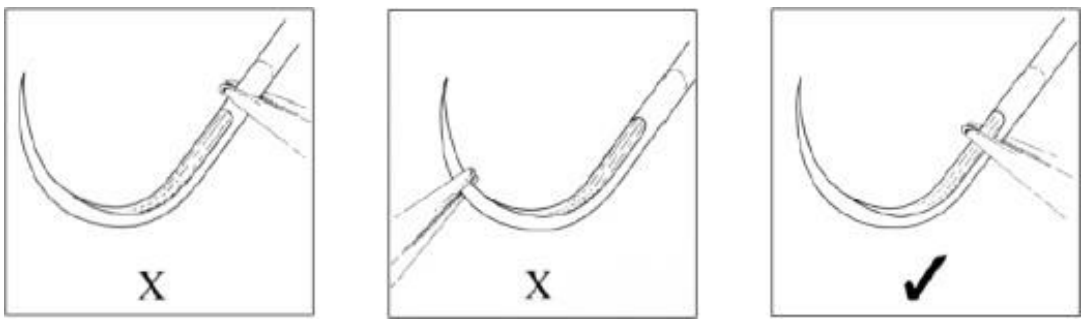
- ‘P’ and ‘PRIME’ have excellent point
- 3/8 circle is ideal for skin , although bi-curve (compound curve),
- 1/2 , 5/8 are sometimes used.
- Length : 16mm or less for fine work(6-0), 19 + mm for heavier work (3-0)
- Cutting or reverse cutting needle for skin—most use reverse cutting as the pressure on the skin when tied is against a flat surface, rather than pointed (see below).





Thou shalt not -

1. Hold needle at the tip or shank
2. Apply force to needle that does not follow its curve
3. Use too small a needle for too large a job
4. Twist your needle within tissue. Should placement need altering, remove and re-insert needle
5. Use the needle to bridge an entire wound. Insert separately into each side of defect
6. Allow needle to act as fishing hook



What sutures to use?

Area	Face	Eyelid	Scalp	Body - high tension	Body - low tension	Mucosa
Skin external	5-0 -7-0 non - absorbable or 6-0 , 7-0 absorbable (vicryl rapide)	6-0 - 7-0 non - absorbable or absorbable (vicryl rapide)	2-0 - 4-0 Non-absorbable Leave in for 2-3 weeks rarely	4-0 - 6-0 Non-absorbable or 6-0 absorbable (vicryl rapide)	4-0 - 6-0 Non-absorbable or 6-0 absorbable (vicryl rapide)	5-0 - 6-0 absorbable (vicryl rapide) No need to remove
Subcuticular (Absorbable)	4-0 - 5-0	5-0	Try not to use in hair-bearing sites 3-0 - 4-0	2-0 - 4-0	3-0 - 5-0	4-0 - 5-0

USING NEEDLE HOLDERS

Thumb - Ring Finger Grip

Accurate needle release without pulling on tissues.
Precise, rapid, re-gripping of needle for next stitch. Easy regripping of needle. Control not so good as palm grip.

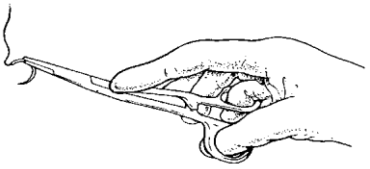
Palm Grip

This gives accurate control. The ratchet is released by the ball of the thumb. The disadvantage is that the grip must be adjusted before placing another stitch.

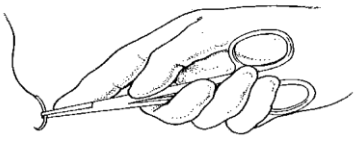
Holding the Needle

This should normally be mid curve. The needle is designed to be held here. Nearer the swage allows greater needle length to be inserted but there is a risk of bending. Nearer the point for tough tissue.

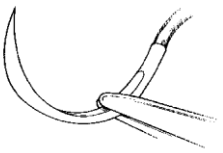
Hold the needle with the points of the needle holder as shown in the diagram.



Thumb-ring finger grip



Palm grip



Needle held mid-curve

SUTURE REMOVAL

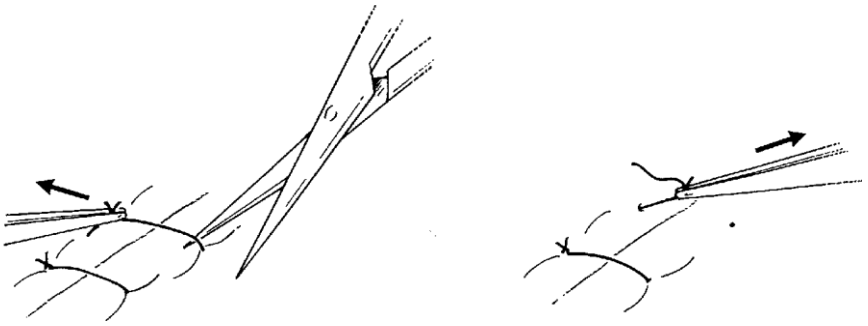
In thin skin, such as the eyelids, sutures may be removed in 1-2 days. On the back, or if under some tension, up to 14 days may be reasonable, but there is a higher incidence of infection. Suture marks are uncommon if sutures are removed in under 7 days, but almost universal at 14 days.

Removal Technique

The surface should be gently cleaned. Cut the stitch with IRIS SCISSORS - NOT with stitch cutting blade which tends to pull the wound apart. Once cut, pull the suture across the wound.

Suture removal

Wrong Correct



WOUND CLOSURE

Each aspect of wound closure is important and attention to detail will give superior cosmetic and functional results both in the short and long term.

Instruments
Use a fine skin hook or non toothed forceps on wound edges.

Sutures
The size, curve and point on the needle should be chosen to suit the job. The thickness and absorbability of the thread are also important.

Layers
There should be minimal tension on the most superficial stitches. According to site one or several layers of sutures may be needed to close a wound. On the thigh for example 2 layers of continuous fat sutures followed by buried dermal and a non-absorbable skin layer may be needed.

SUTURING

All wounds, except the smallest, should be sutured in layers. Deep absorbable sutures bring the skin edges into apposition and then superficial sutures of monofilament material are placed with just sufficient tension to hold the skin edges in apposition and prevent unnecessary movement. These skin sutures can be removed after only a few days as the deep sutures remain in situ to maintain the strength necessary for wound healing.

To prevent the knots from the buried sutures being ejected through the skin, the knots are tied at the lower part of the suture so that they will lie in the deepest part of the wound. The needle is inserted at the base of one side of the wound and brought up near the skin, crosses the wound to the opposite side at approximately the same level, reinserted and run down to the base of the wound again. This brings both ends, the needle end and the other free end, to come out at the bottom of the wound. The knot is tied and the suture cut very short. In a very deep wound, several layers may be necessary to close the defect. Once the skin edges are lying together, the monofilament nylon is inserted as an interrupted or running suture.

It is recommended that interrupted sutures are used initially. Nylon materials are more slippery than braided materials or silk and hence care is needed in tying the knots. Extra turns need to be put in, particularly into the first throws where it is recommended that two, or occasionally three, turns are used, with one turn of the opposite way for the second layer, and one turn again the opposite way to that in the third layer; in other words in the same way as the first throw for the top layer.

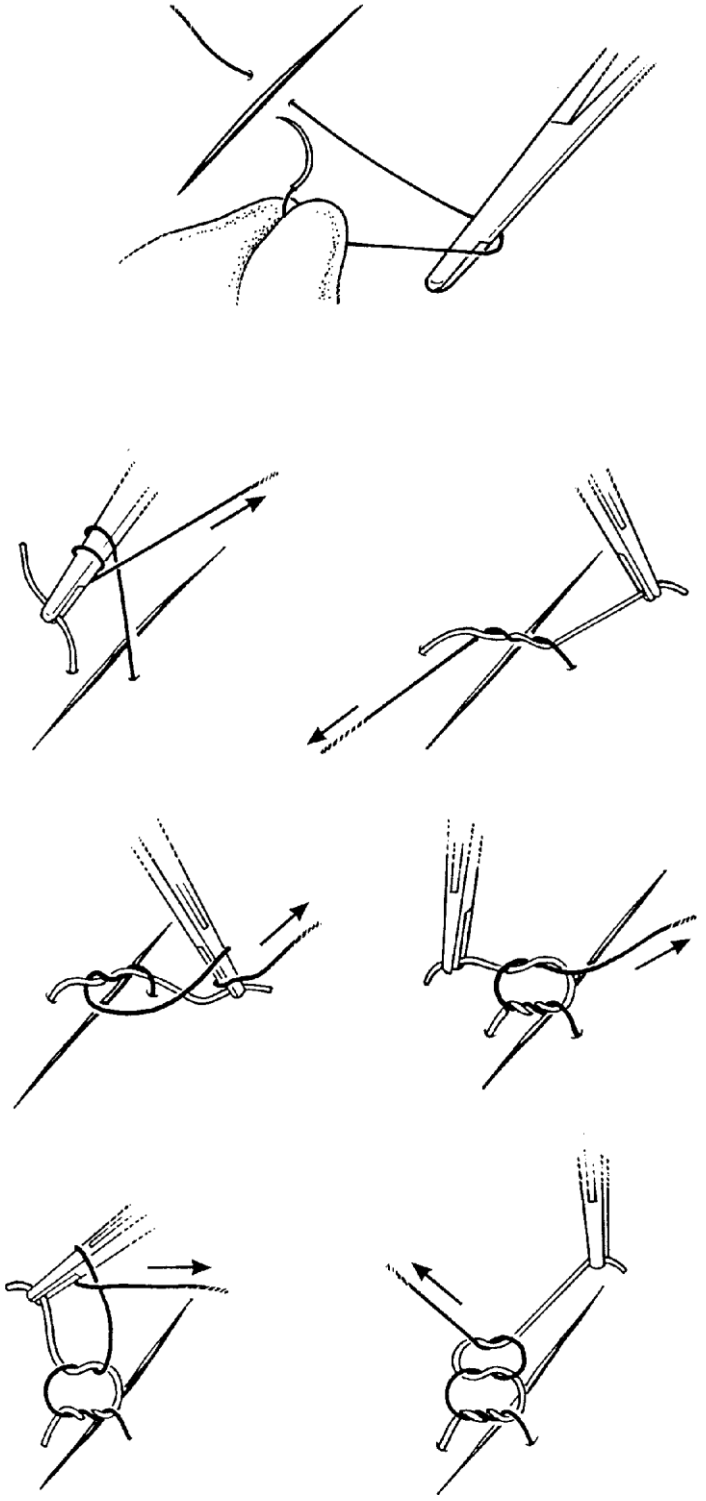
"*The beginning is the most important part of the work*"

One cannot underestimate the importance of creating optimum passage of the needle through the skin and forming surgical knots correctly. There are several commonly used suturing techniques in dermatological surgery and many other less -used techniques. Each dermatological surgeon has his favourite techniques and preferred choice of needle and suture material. One should develop good technique with precision and accuracy before speed. Speed comes in time as the technique becomes effortless and subconscious. Be aware of the movements of both hands when making throws. Be gentle with the skin edges when using the forceps and consider using the skin hook when suturing. Master the key suturing techniques and be aware of niche suturing techniques which can be utilised in specific situations.

"There are 3 kinds of surgeons: good fast surgeons, bad fast surgeons and bad slow surgeons"

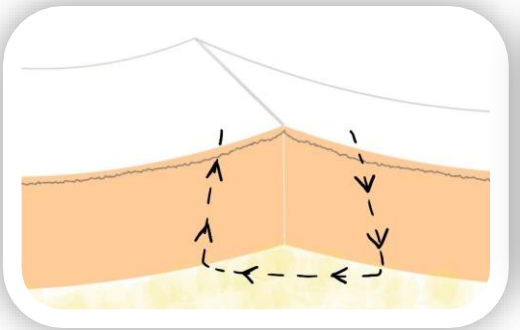
There is much dogma and anecdotal-based practice in dermatological surgery. Individual surgeons have their own preferences. Principles should be questioned, scrutinised, tested and modified. A principle should not be accepted based upon who said it or how it sounds. It is imperative for a competent surgeon to understand the difference between good, sound principles and principles that sound good.

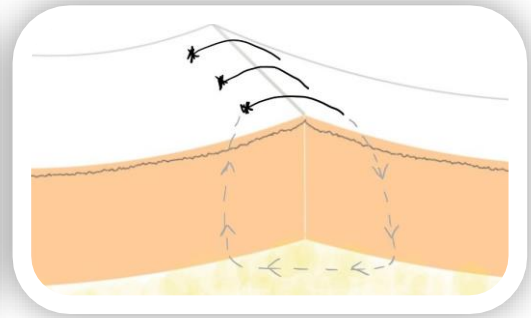
USING INSTRUMENTS TO TIE THE SQUARE KNOT



Simple sutures with square knots

Skin Surface
The wound edge should be everted and the angle of the needle adjusted to ensure that the angle of entry is 90° to the skin surface. The thickness of the bite will then be equal at the top and bottom of the wound. A skin hook also helps to ensure that the angle of exit is also 90° . Tie with a square knot. This can have 2 or 3 turns with up to 3 throws on the first turn.

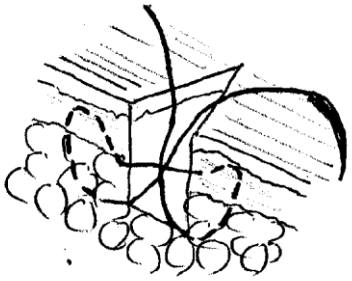


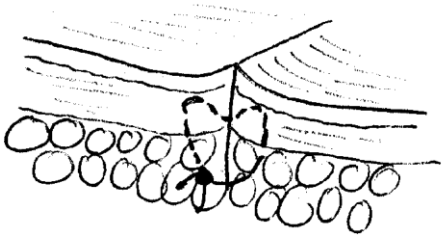


Dermal Buried Suture (with inverted knot)
Most wounds should have some buried sutures in vicryl or PDS. They close the dead space and take the tension off wound edges. The knot must be formed at the deep aspect to avoid sticking up through the wound.
Tie with a square knot (Fig 1).

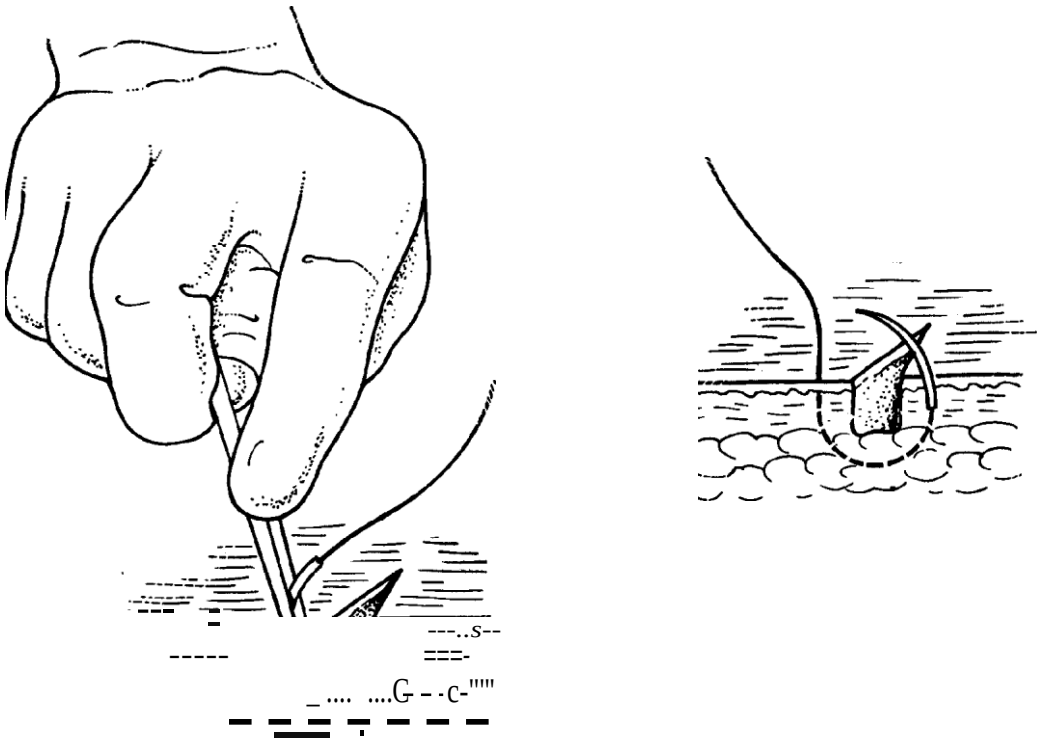
The far near far type of buried stitch results in better eversion of the wound edges. A bite is taken horizontally on one side of the wound followed by an equal sized bite on the other edge so that the needle emerges exactly opposite the initial point of entry.

SUPEREVERTING BURIED INTRADERMAL SUTURE (“butterfly” suture)

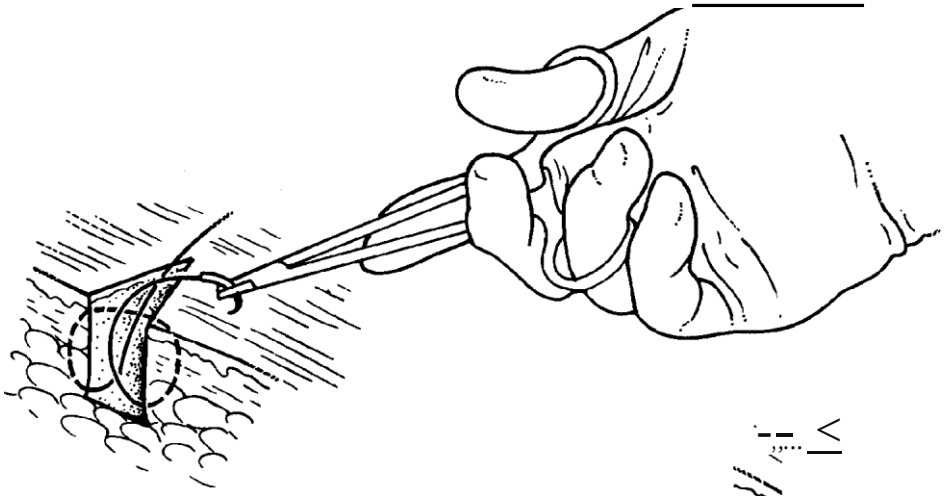




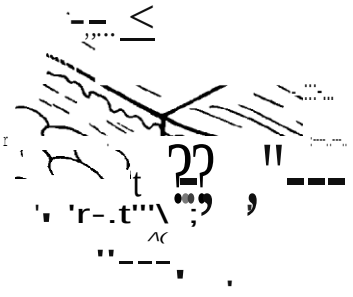
STANDARD SUTURING TECHNIQUE



Use only when skin edges lie in apposition- with no tension.
Sutures must be left in longer.



Suture totally
in dermis



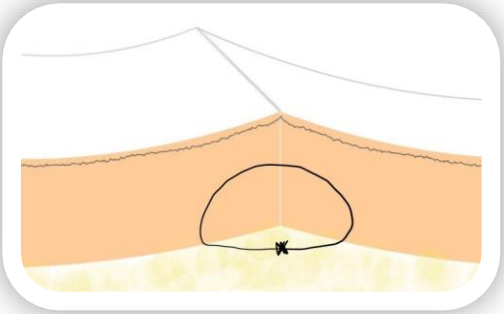
Knot at lowest point

Inverted knot buried suture

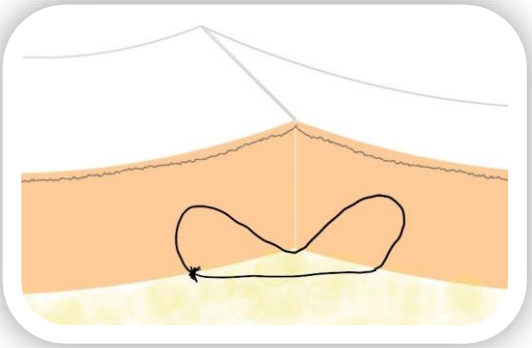
Dermal Buried Suture

Most wounds should have some buried sutures. They close the dead space and take the tension off wound edges. The knot must be formed at the deep aspect to avoid sticking up through the wound. Tie with a square knot.

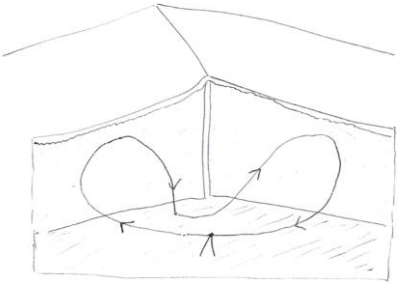
The simple buried suture as shown in Figure 1, shows the path of the needle through the vertical cut edges of the wound.
This type of suture results in minimal eversion and inferior cosmetic result.



The super-everting buried suture as shown opposite, shows the path of the needle avoiding the vertical cut edges of the wound.
This type of suture results in better eversion and improved cosmetic result compared to the simple buried suture



The set-back buried suture (shown below in Figure 3) involves taking a bite of dermis 'set- back' from the skin edges, but importantly the exit of the needle is also set back from the skin edges as well, then an equal and opposite bite is taken on the other side. This type of suture will hyper-evert the wound edges and result in reduced dead space and more superior cosmetic outcome as the scar heals.



Suturing methods

3 Point Suture aka. tip stitch

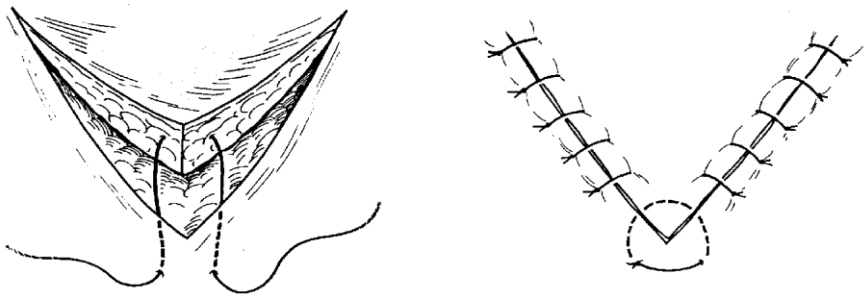
This is especially useful when suturing the point of a flap. The suture only passes through the dermis of the tip and avoids strangling the tissue. The needle enters the skin normally but exits at mid dermis level before passing through the mid dermis of the tip and then through the mid dermis of the other side of the wound and out through the skin.

Haemostatic Suture

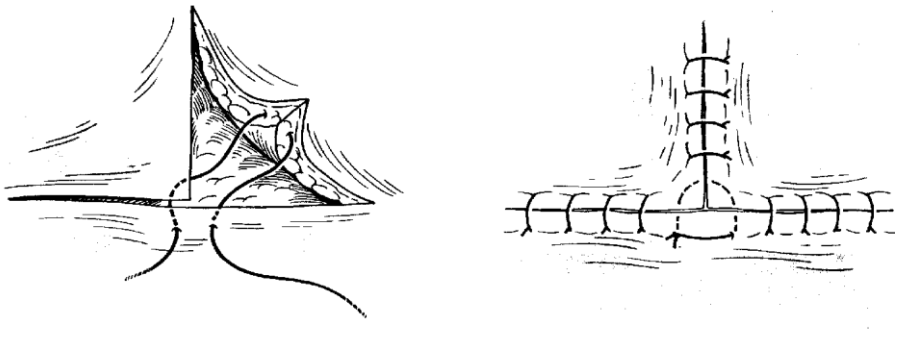
Awkward bleeding vessels may need to be sutured. A circumferential stitch can be worked around the artery. However, it is sufficient to insert a cross stitch which enters and leaves the tissue on one side, is carried across the vessel and enters and leaves the tissue on the other side.

Vertical Mattress Suture

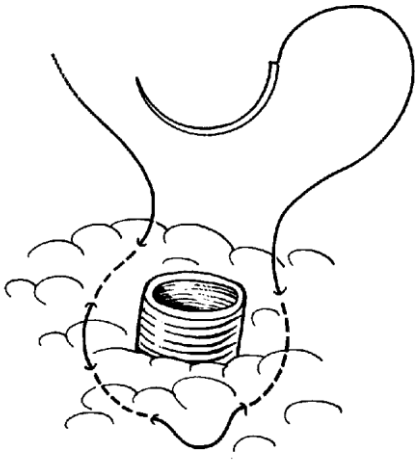
(Far-far-near-near) This is used for closing deep spaces and gives very nice eversion of the wound edge. However well placed buried dermal sutures should produce similar results. Sometimes the situation does not readily permit these dermal sutures and the vertical method comes into its own. Each stitch leaves 4 puncture marks so should be removed early where possible.



Three-point suture used to suture a triangular flap in place

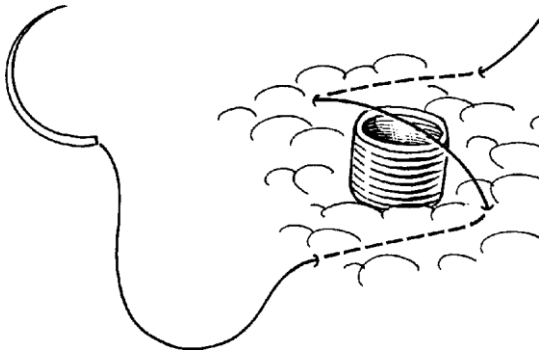


Three-point suture used to suture a double-triangular flap in place



Purse-string

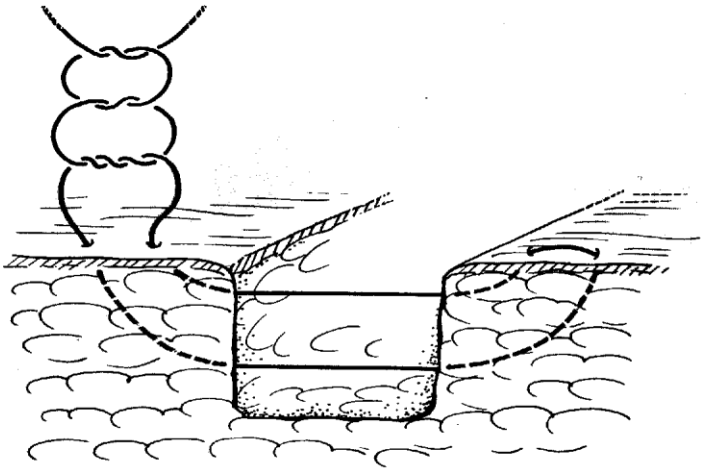
Direct ligation

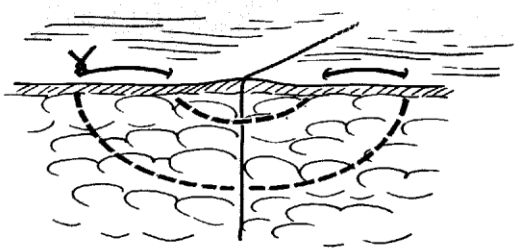


2 **-stitch**

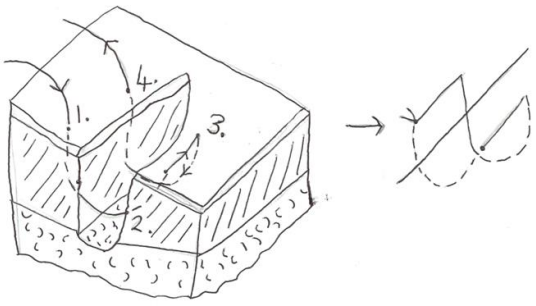
reduces tension and everts edges
- Far, Far, Near, Near
- Closes dead space
- Good retention suture
- High tension wounds

VERTICAL MATTRESS SUTURE



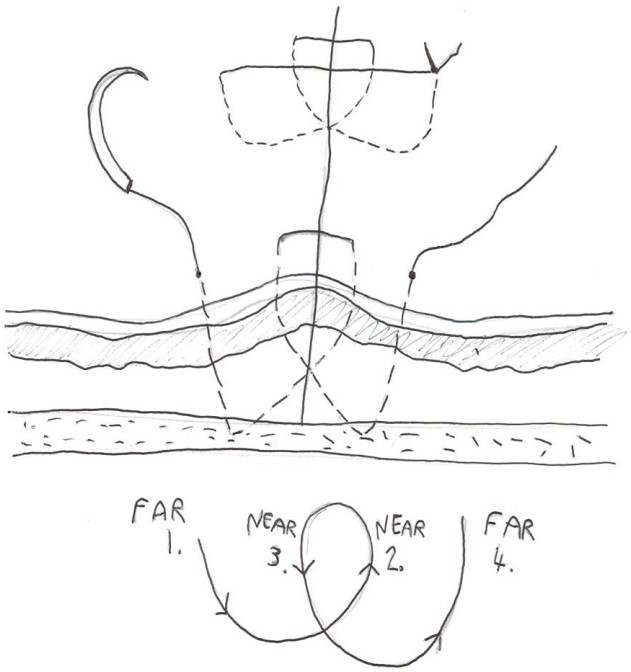


The Horizontal Mattress suture—
reduces tension and everts edges
- Across, Along, Across, Tie — Closes dead space
- Good retention suture — High tension wounds
- May strangulate more than vertical mattress suture
- Care in wounds with poor blood supply

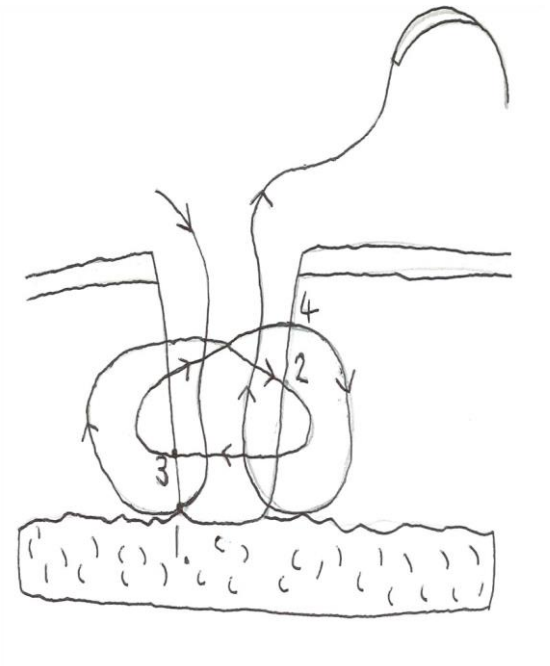


Alternatively, this suture can be looped - named after Sommerlad who used it in cleft palate surgery - the loop inceases apposition of edges, decreases tension and is easier to remove

The cutaneous pulley suture — “far, near, near, far” — good as a tension-holding suture e.g. on scalp and trunk. High resistance, minimal slippage.



The buried pulley—is simply 2 buried sutures placed one after the other i.e. continuous—approximately 3 mm apart. Like its cutaneous counterpart, this suture is excellent at holding tension. An added benefit is the locking mechanism with the second loop securing the first loop which can be especially useful if working without an assistant.



Running subcuticular sutures

- Used to suture straight wounds
- The skin edges should already be in apposition with no tension. This is achieved with deep sutures.
- Allows stitch to be left in for 2 weeks without stitch marks.
- Especially useful on breast and flexures, trunk and limbs
- Use 3/0 or 4/0 mono filament
- Curved or straight cutting needle

Technique

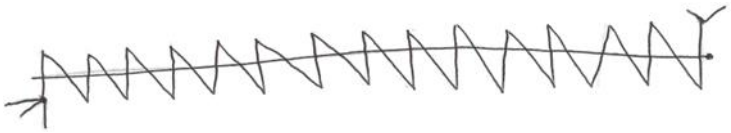
- The needle enters beyond one end of the wound and emerges between the wound edge.
- Wound edge is everted and the needle takes a small bite of dermis close to the dermis/fat junction. Each subsequent bite should be the same size and at the same depth.
- Cross over to take a bite on the other side backing up a little so that the opposing sutures are staggered.
- Continue to the end and emerge beyond the wound.
- In a long wound it is best to bring the suture out onto the surface half way along, cross over and into the other side before continuing with the subcuticular part. This loop can be cut at the time of suture removal so that there are 2 short pieces to pull out.
- The ends can be tied on themselves, tied around a button, etc.
- Cover the wound with a clean dressing, hydrocolloid, etc.
- Remove at 7-10 days by cutting one end very close to the skin end before pulling through from the other end. If absorbable monofilament suture is used (e.g. PDS) the suture can be left. The ends are snipped flush with the skin at 10 –14 days. The suture is useful for closure of deep wounds on the trunk and limbs as the suture retains its strength for several weeks.

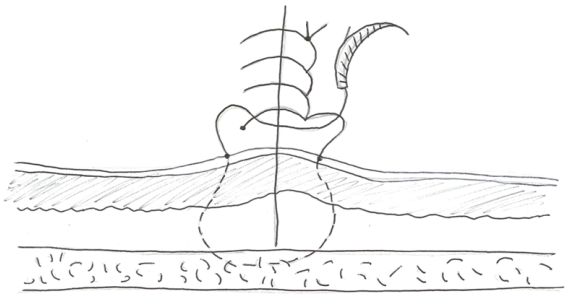
BEWARE

- taking large bites
- varying the depth
- repairing a long wound without a loop in the middle - it may be impossible to remove

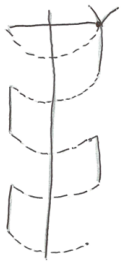
Simple continuous running unlocked suture -

Square knot at start and end
- Maintain gentle traction on thread
- Consider a tie half way across wound
- Pros:
- Faster than interrupted
- Cons:
- Not as secure
- If suture breaks –dehiscence
- Care in wounds under tension

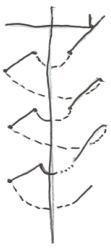




Continuous running locked suture

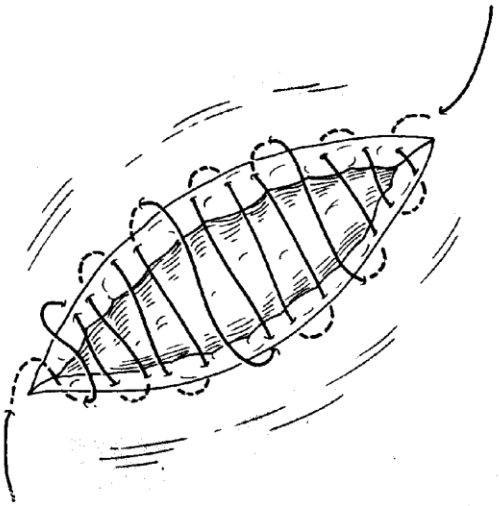


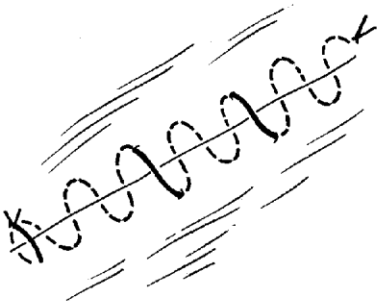
Continuous running horizontal mattress suture



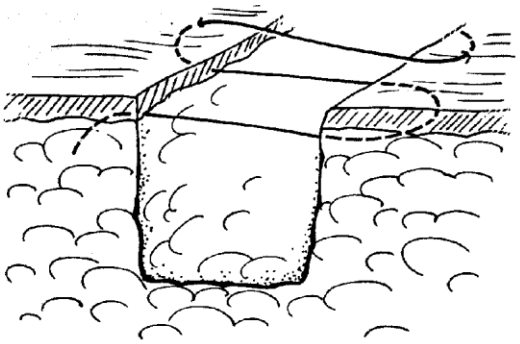
Continuous running hybrid mattress suture

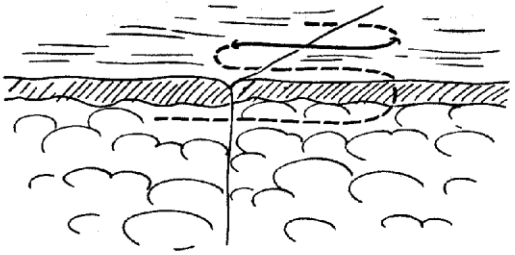
RUNNING SUBCUTICULAR SUTURE





Use 3/0 or 4/0 Prolene





There are several variations in this technique - including choice of suture material (dissolvable suture is often preferred eg 4/0 monocryl or vicryl) and method of tie off eg use of the Aberdeen knot and / or a knot cinched onto the skin surface beyond the apex of the defect which is then trimmed 2 weeks later.

Uneven wounds

An ideal wound would lie precisely in a natural wrinkle line and would follow the contour of the adjacent skin. In fact a compromise has to be made because the removal of a piece of skin and underlying fat inevitably leads to some distortion when the edges are drawn together. The problems are

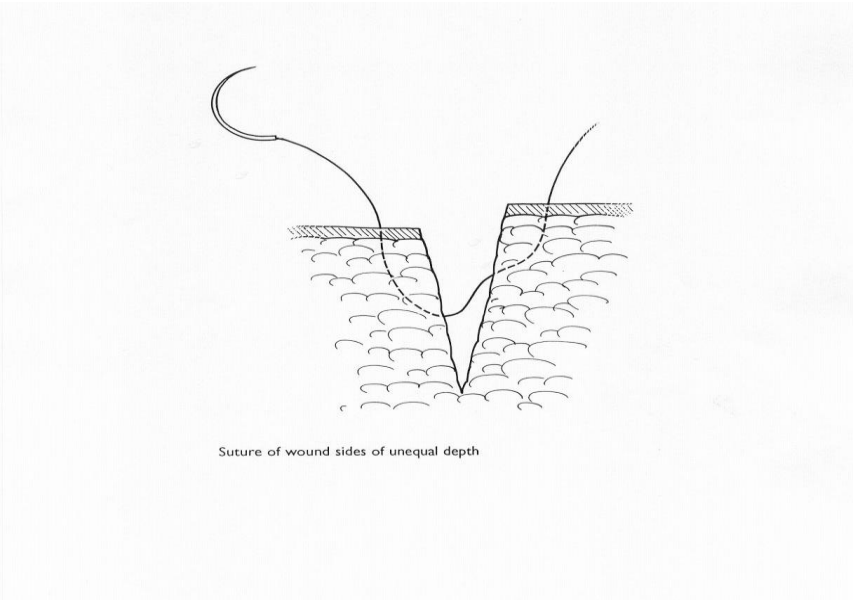
- unequal length of wound edges
- different skin thickness of wound edges
- failure of the sutured wound to follow the curvature of the area, eg. on a forearm

Unequal Length (Halving Method) Some excisions result in a wound with sides of different lengths. If suturing is begun at one end and progresses to the other it will leave a dog ear at the end (see dog ear repairs). It is often possible to 'lose' a small inequality by using the halving method. First place a suture half way along the wound, and then half way between the first sutures and the wound end, etc. This is called the rule of halves and gives a curved wound.

If you cut out a triangle from the longer side before suturing the result is a straight line.

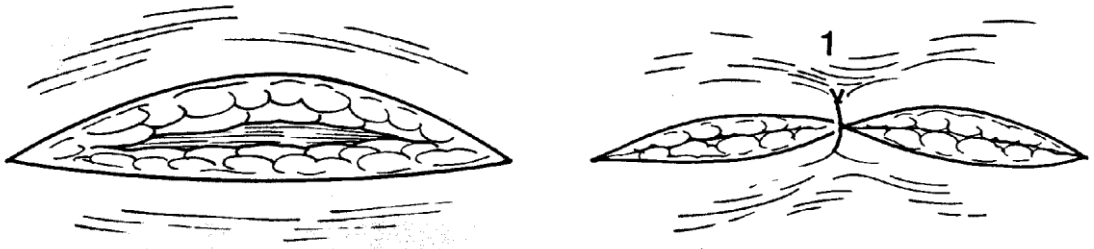
NB: The longer side is often higher than the shorter side and a combination of closure by halves and high on the high (longer) side and lower on the low (shorter) side.

Uneven Heights Skin thickness varies considerably according to anatomical site. After removing a skin lesion it is not uncommon to find that the two edges to be sutured are different heights. This may be more marked if one edge is under tension. The uneveness can be corrected by taking a more superficial bite on the edge which is higher and a deeper bite on the lower edge. You can create uneven edges on the pigs trotter by placing an uneven subcutaneous suture.
To correct a step-off deformity, a more superficial bite is taken on the high side ("high on the high") and a deeper bite is taken on the low side ("low on the low").

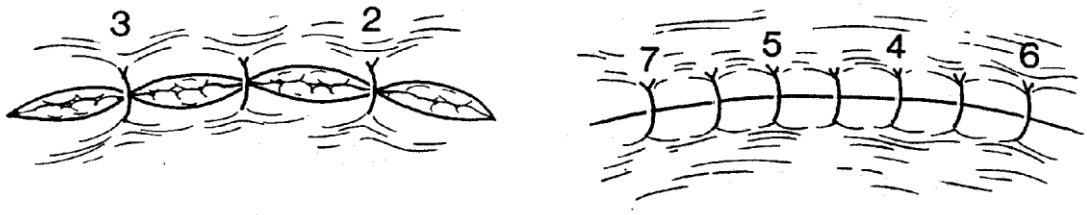


Suture of wound sides of unequal depth

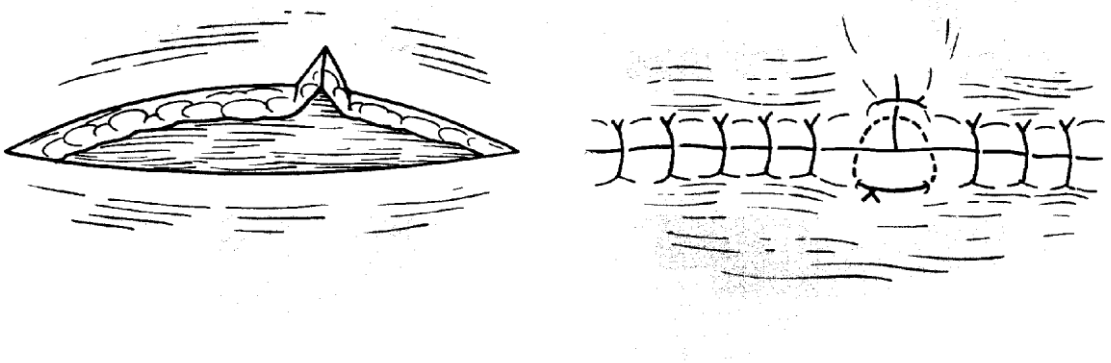
CLOSURE OF WOUNDS WITH SIDES OF UNEQUAL LENGTH



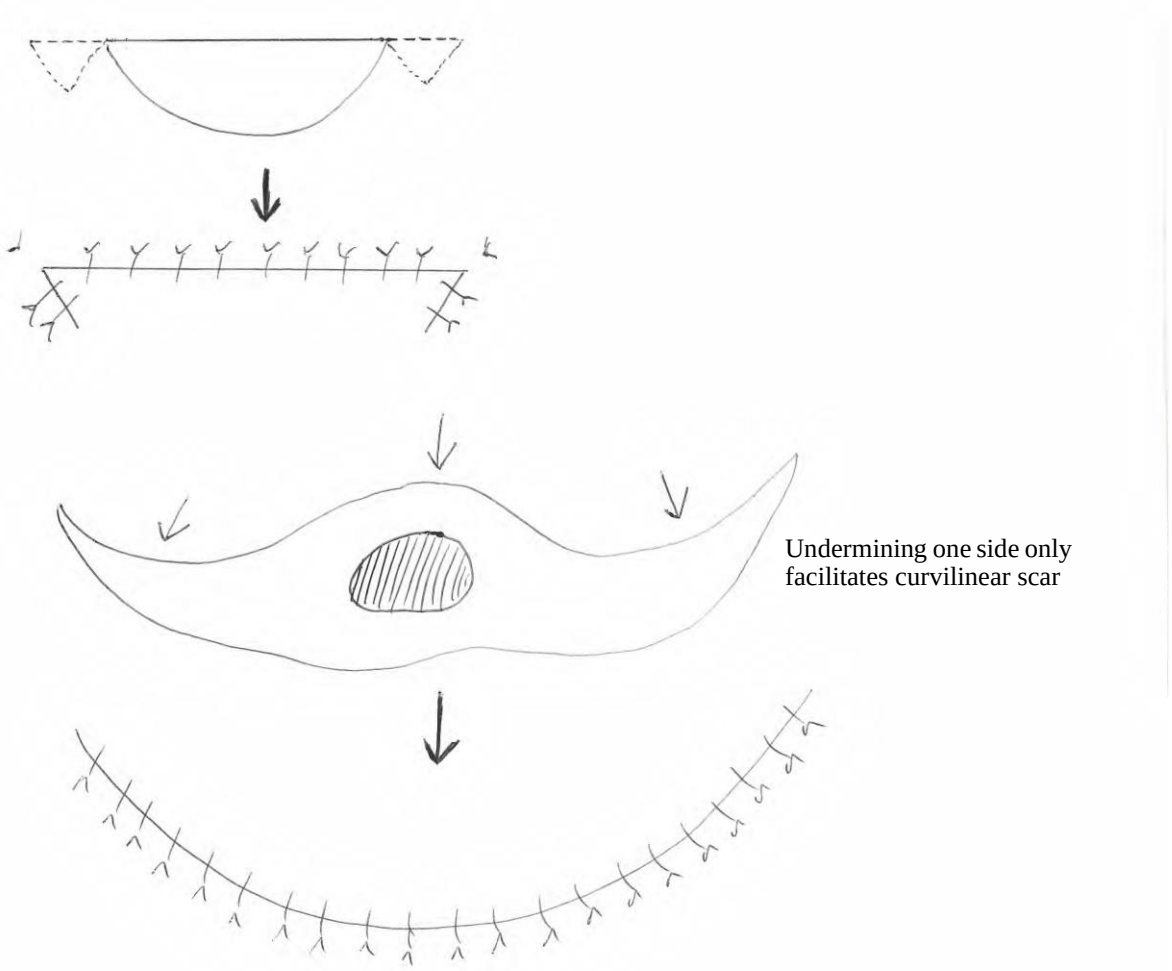
Crescentic defect—take wider suture bites on the longer convex side to equalise tension and give a linear scar



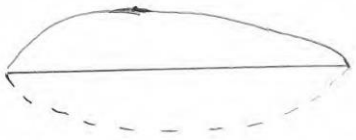
Halving method of suture placement



Correction of wound edges of unequal length by removing a triangle of skin from the longer side

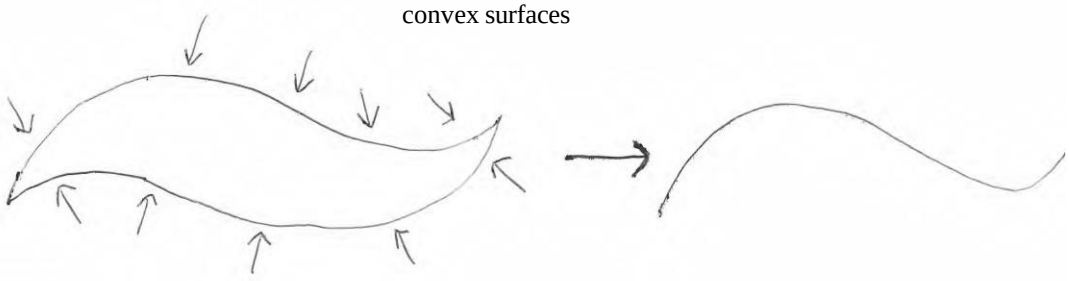


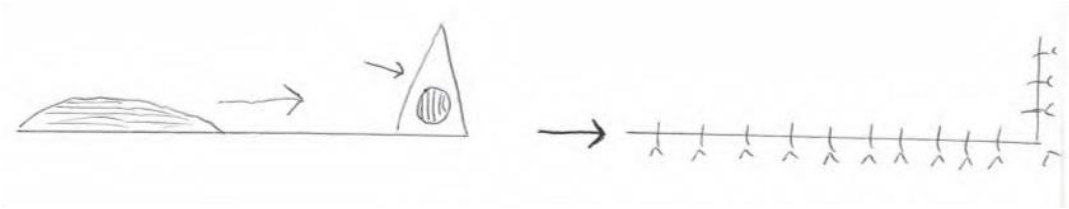
Undermining one side only facilitates curvilinear scar



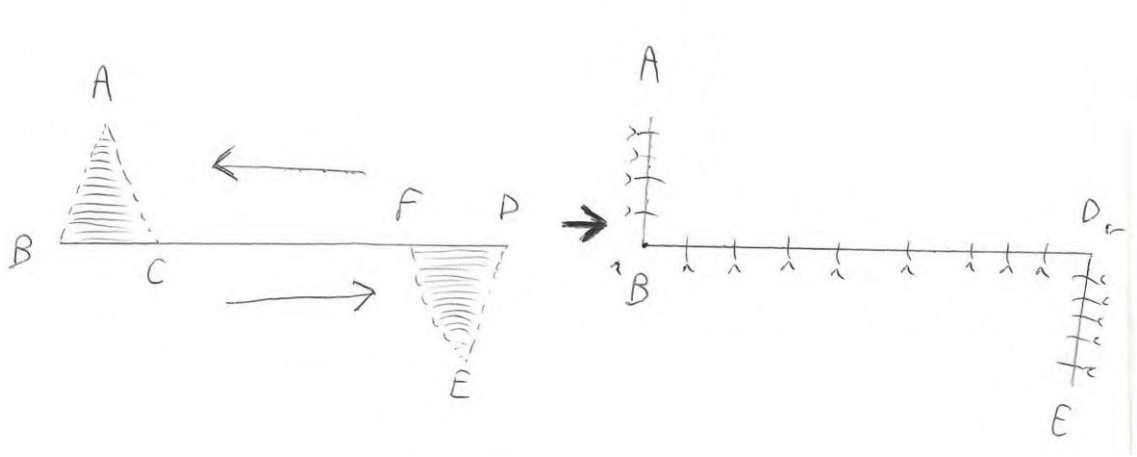
Lengthening the shorter side of a crescentic defect forms an ellipse with equal sides

Lazy-S closure - may lead to a superior scar on convex surfaces

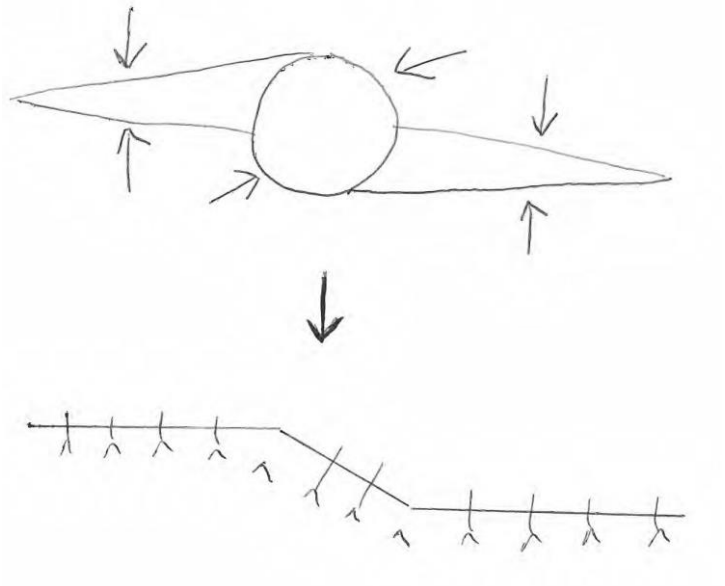




Crescentic advancement flap - removing a crescent of skin from the shorter side (same side as the defect) elongates this side to be the same / similar length to the opposite longer side (without defect) and so facilitates closure without a standing cone excision being needed on the longer side



Burrow's switch advancement flap - the triangles of an ellipse are displaced east and west



Bi-winged flap—
similar to "lazy-S"
Redirects tension centrally to be more horizontal then vertical

Dog ear repairs

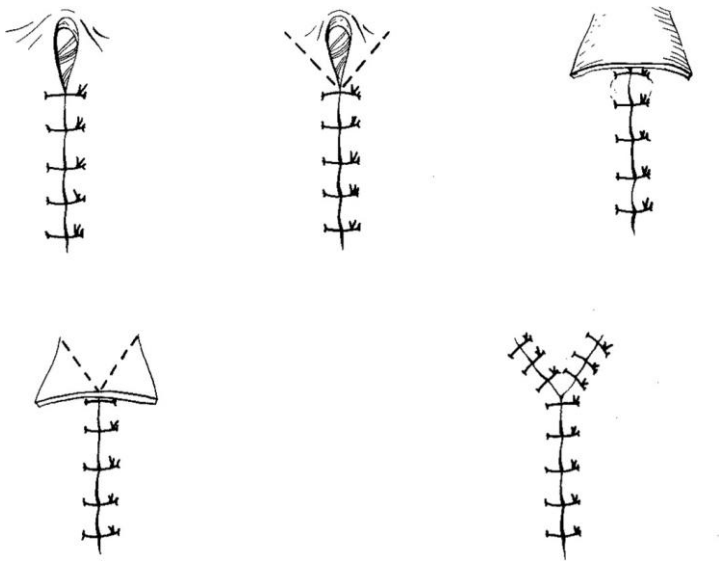
Dog ears are redundant tissue at the end of an excision line. They are common in the following situations:-

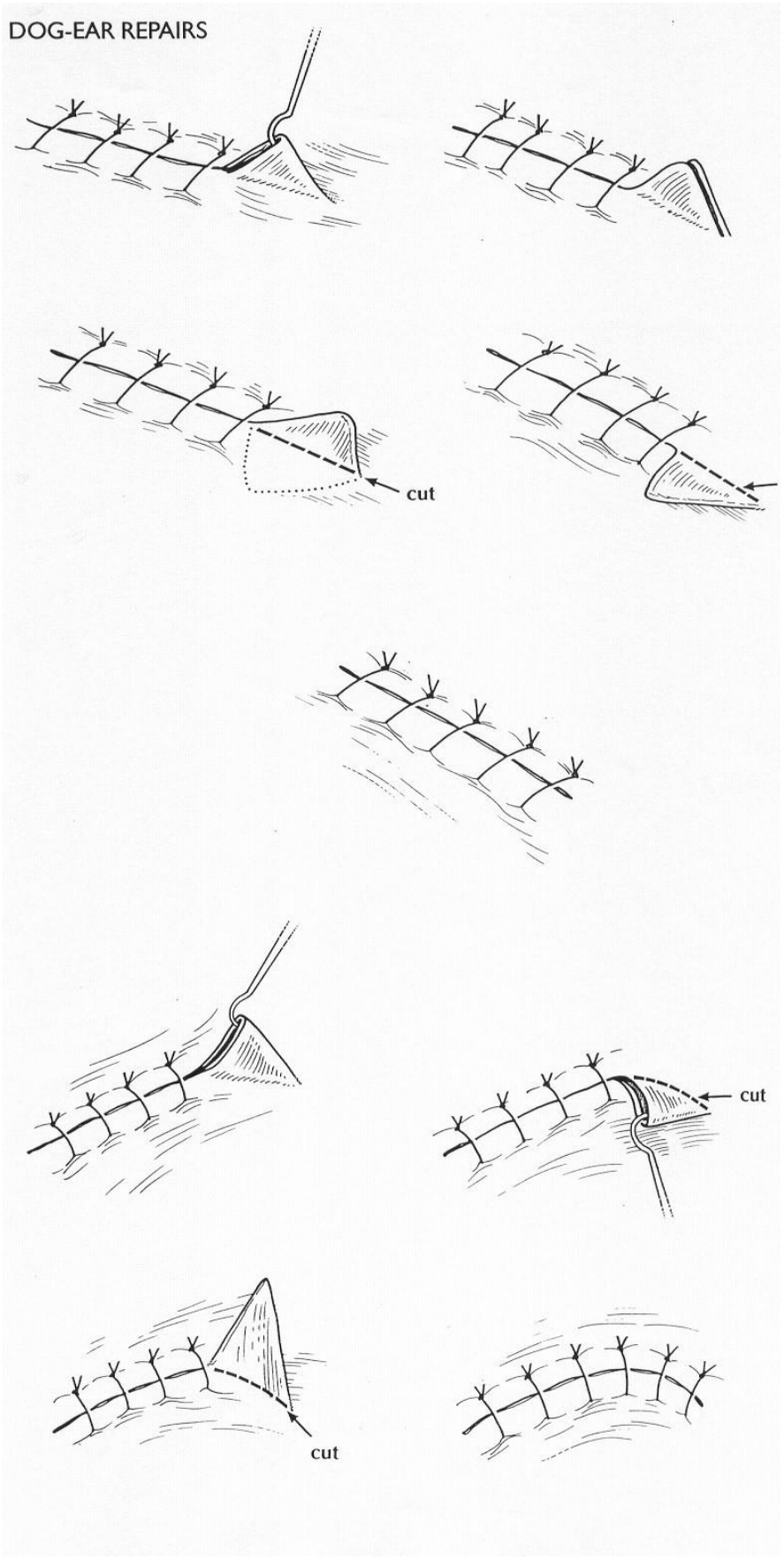
- sides of excision are unequal lengths
- broad ellipse or circular defect
- altered skin elasticity
- convex surface, eg. forearm

Dog ears can often be avoided but you should not worry if one forms - they are easy to deal with. Experience shows that some dog ears can be left and will settle spontaneously; this is often the case on the forehead. If the formation of a dog ear is inevitable sutures should be placed so that the dog ear is created in the least conspicuous part of the wound or placed so that it may be excised in a wrinkle.

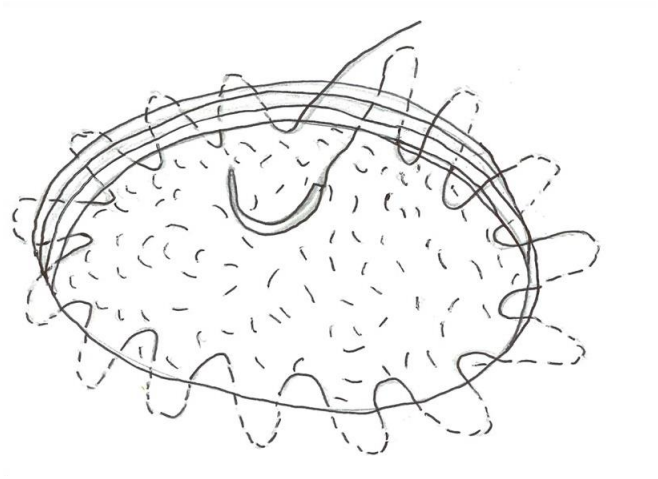
Technique The dog ear may be excised as a straight line continuation of the wound or in a curve. The redundant tissue is tented with a skin hook and either

- divided along the roof into 2 triangles which are then excised
- pulled to one side and the base divided on one side and then the other
- excised as an ellipse around the base
- corrected with an M-plasty




DOG-EAR REPAIRS
cut
cut
cut

Buried dermal round block advancement suturing technique to close fully or partially a circular defect like a purse string aka the “purse string” suture.
No standing cones excised.



Conversion of a circular defect into a triangle by excision of 3 Burrow’s triangles then closure of each triangle resulting in tripod-shaped scar aka “Mercedes Benz” flap

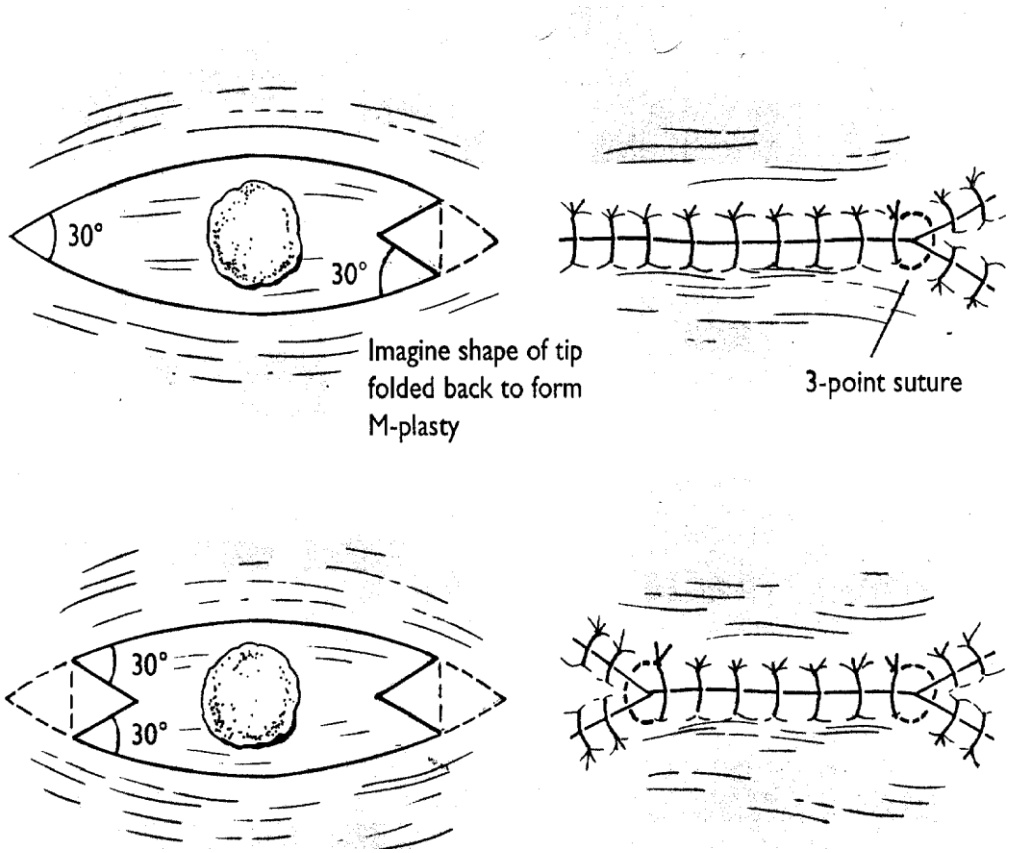
Simple plastic repairs

M-plasty

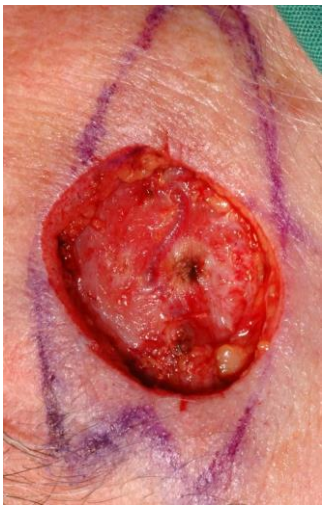
An M-plasty is an excision that decreases the length of an ellipse. It is useful when space is limited at the end of an excision line by an important structure eg a free margin (see diagram). It may also be a useful way of repairing dog ears.

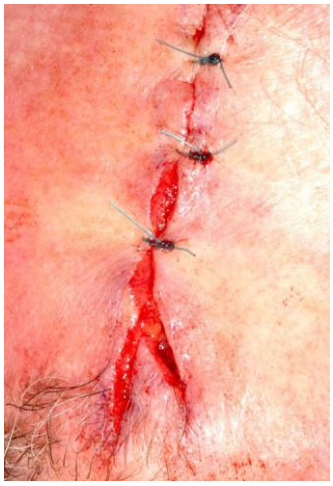
TECHNIQUE

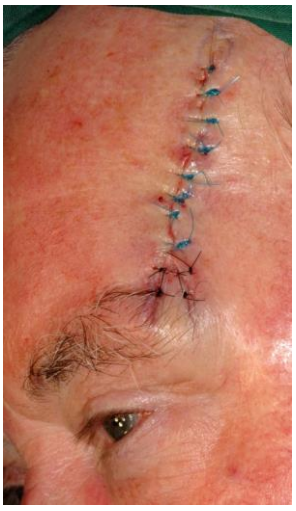
1. Mark out an ellipse where practicable. Imagine folding in the tip of one or both ends.
2. Cut along marked lines.
3. Close wound with deep buried sutures.
4. Suture skin with interrupted sutures, first along straight part then V section using a 3 point suture.



THE M-PLASTY

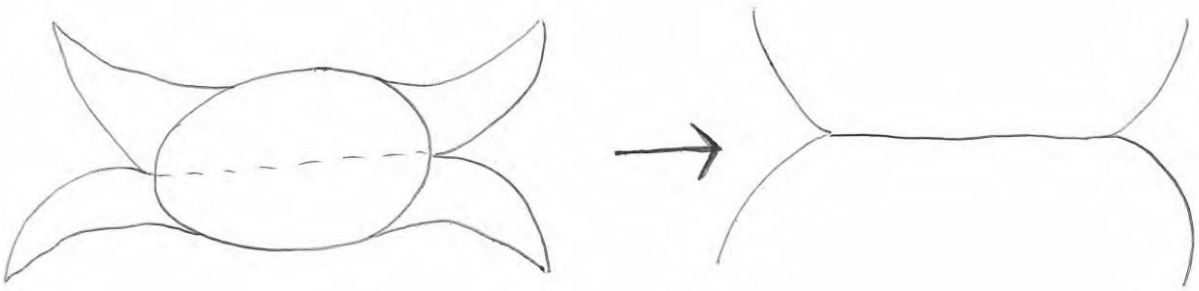




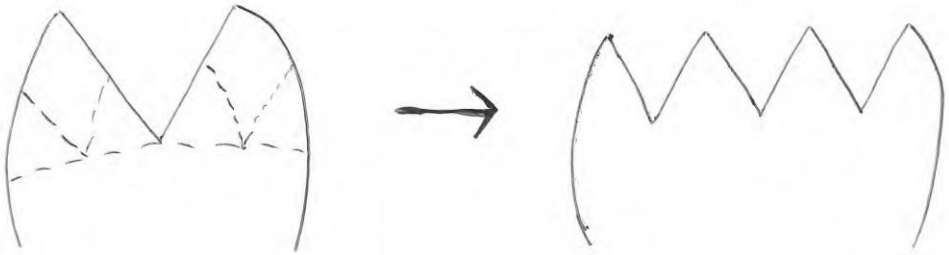


M-plasty at the left suprabrow reduces the length of scar at lower margin

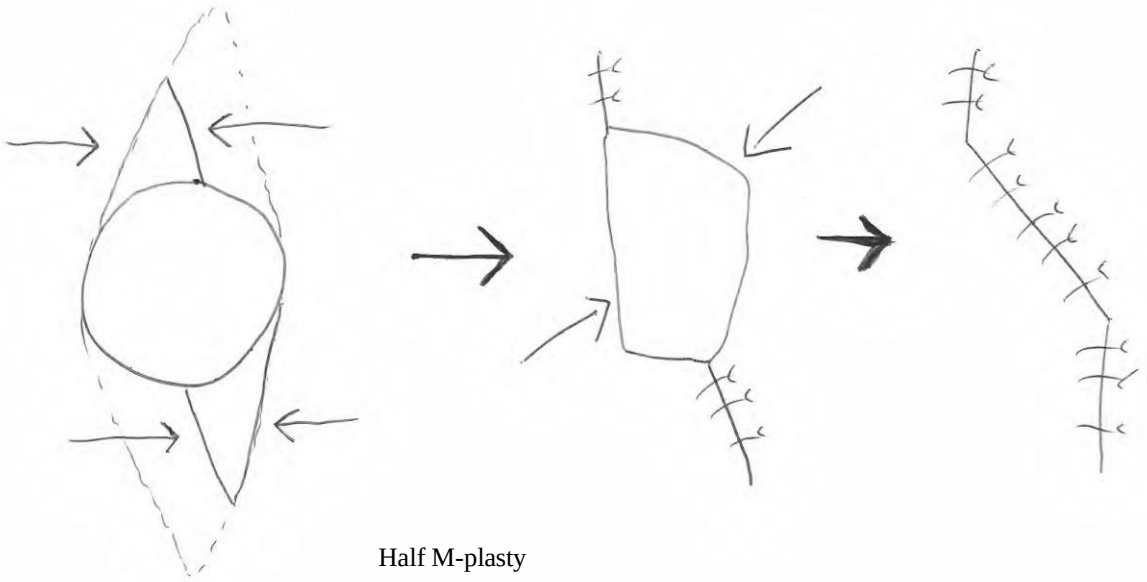
Modifications of the M-plasty



Curvilinear M-plasty (crown excision



Nested M-plasty



Half M-plasty

The Principles of Local Skin Flap Reconstructive Surgery

Rewarding to remove a challenging tumour and perform an artful reconstruction
Local skin flap repairs on the face are more than just an exercise in geometry
Many factors determine the likelihood of a successful outcome
Aim to restore normal function and optimal aesthesis
Take patient's opinion into account and general patient factors
Beware "FLAPOPHILIA"
"FLAPOPHOBIA" can also be a problem – taking the safe option too often

EXPERIENCE counts for a lot...
"Am I the right person to perform this surgery?" "What are the possible complications?"
"Will I be able to reconstruct the defect? If not, then should I create the defect?" Consider a delayed closure. Take appropriate surgical margins. Would Mohs surgery be best?
HONESTY OPTIMISES ULTIMATE SURGICAL OUTCOMES
IF IN DOUBT DON'T

Aims of Reconstruction-
Preserve functional and aesrhetic outcome as much as possible
Preserve free margins
Restore skin contour
Minimise suture line tension
Conform suture lines to cosmetic borders
Align closure with relaxed skin tension lines

Place your incisions where you wish the scars to be

Consider the defect
Consider the patient
Discuss the options

Nomenclature of skin flaps –
shape
method of movement
blood supply
eponymous

Imagination sparks innovation
Perfect your craftsmanship

Thorough knowledge of the relevant surgical anatomy increases confidence -
Surface anatomy
Structural anatomy
Vascular anatomy
Sensory/Motor Nerve anatomy

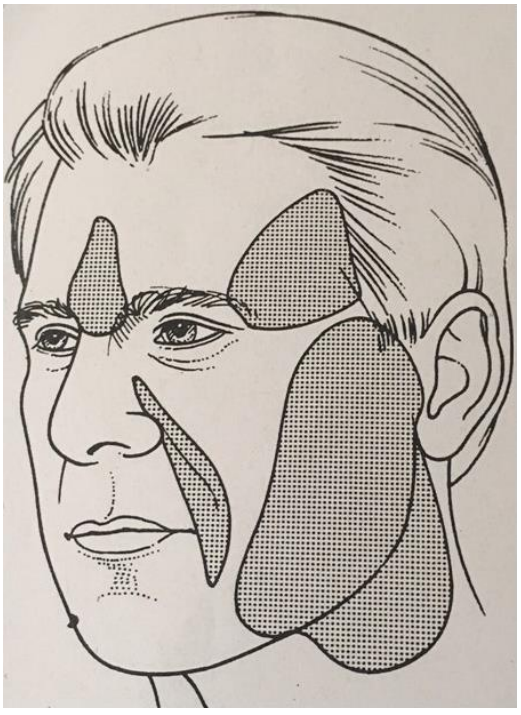
Cutaneous surgical defect assessment -

Size of defect
Site of defect
Shape of defect
Depth of defect
What tissue layers need to be replaced?

Each surgical defect is unique. Surround skin and individual patient factors also vary significantly.
Beware a cook-book approach to reconstruction

Assessment of Tissue "Reservoirs"

An area of skin/tissue laxity that can be accessed, mobilised and utilised to facilitate and enable closure of the surgical defect with a local cutaneous flap
Local or Regional
Which flap?
What issue movement would be best to utilise? – flap dynamics
Free margins
Scar placement – favourable incision lines
Personal favourites
"A good match"—skin colour/ texture/ sebaceous quality/ porosity/ hair density/ actinic damage



Free Margins -

Direct disruption/indirect distortion
Local or Regional
Anatomical - eyelid margin / alar rim / cutaneous-vermilion lip junctions / lips
"Hidden" - melolabial folds / malar convexity / eyebrow

Tissue Movement - anatomical considerations

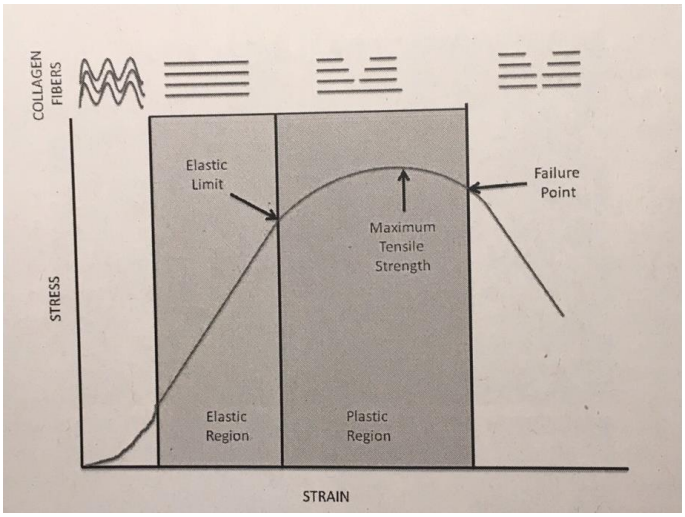
Close the defect along its shortest axis (*usually*)
The flap design should take into account the relevant local distribution of the fascia/ vasculature
and nerves
Fascial structures may be utilised for mechanical benefit -
To act as a "safety boundary"
To facilitate tension reduction AND
To help secure heavy local flaps

Tissue movement- vascular supply patterns

Random pattern
Axial
Anastomotic
Angiosomal - a three-dimensional tissue block composed of skin, fat, muscle and fascia that is supported by dedicated "feeding" artery

Tissue movement- mechanical considerations

Tension Reduction
Tension Redistribution
Dog-ear manipulation
Ultimate aim is to create a "tension-free surgical environment"

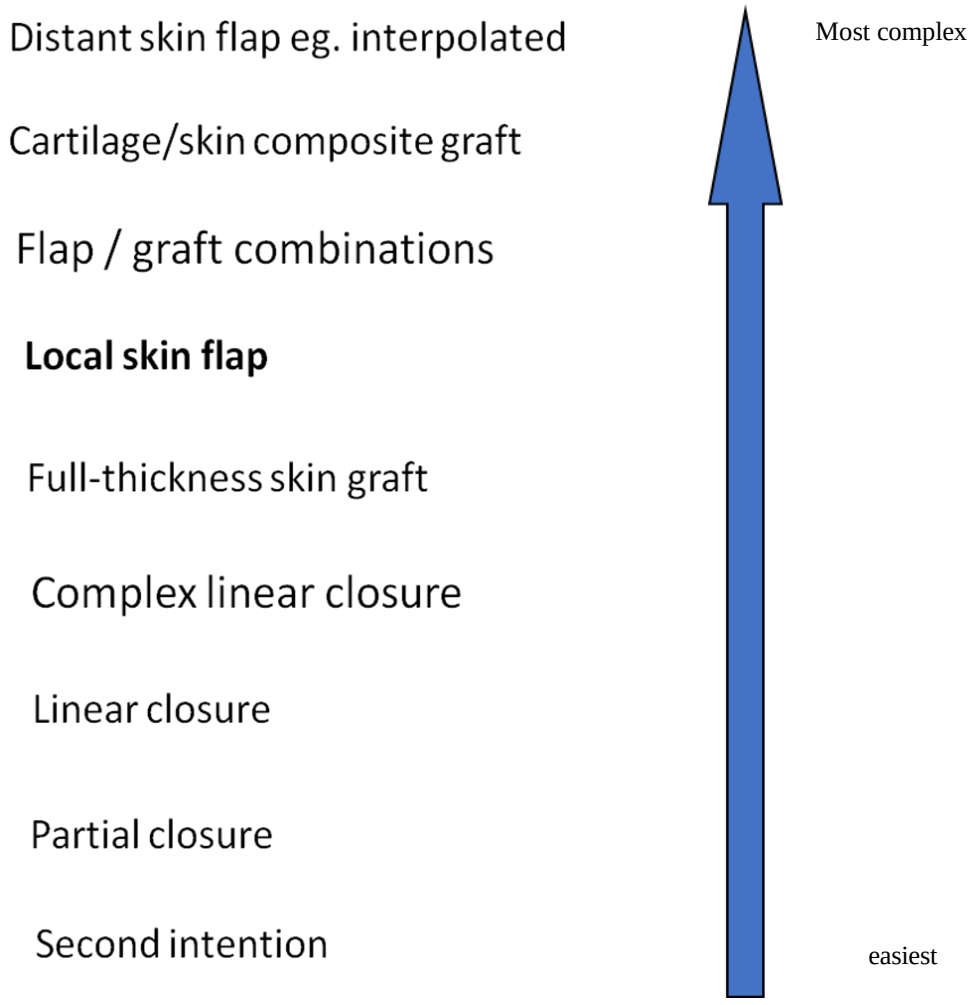


Tension Reduction

Undermining
- Blunt/sharp
- Visualised or not
- May increase postoperative bruising/haematoma and result in scar erythema
- "EFFECTIVE RATHER THAN EXTENSIVE"

Fascial manipulation
- Plication
- Imbrication
- "scoring/excision"
- pexing sutures

The reconstructive ladder



Sizing the Flap

Multiple considerations
Defect size & site, patient age & skin laxity, "skin reservoir capacity"
Flap "too big"
"Pin-cushioning", asymmetric distortion, nasal valve compromise, venous congestion

Flap "too small"
Free margin distortion through necessary secondary tissue movement
Ischaemic pressure (defect diameter:vascular pedicle length ratio)
Concavity distortion

Finessing the Flap

Contouring the flap
Trimming the flap
Use of adipomuscular hinge flaps to recreate volume
Cosmetic junctions for scar placement
Geometric incision scar lines
"Quilting" sutures to recreate sulcal depressions (alar creases, helical sulci)

Local flap combinations

Segmental reconstruction principle
Divide defect into subunits

Partial direct closure / partial local skin flap
Combining different synergistic flaps
Summative positive benefits whilst minimising adverse events
May be similar/different types of flap
Combining flap with a skin graft
Combining a flap with an area of granulation healing

Local Skin Flaps — overview and general principles
"If the operation is difficult, you are not doing it properly"

Many rules have been suggested including the following -
First, ensure you have done all you can to excise the skin cancer adequately - if in doubt then wait for the histopathology before repairing ie a delayed closure.
Minimise / avoid any functional morbidity.
Optimise aesthetic outcome
Should a local skin flap be considered?
If yes, design within a cosmetic unit or subunit and follow relaxed skin tension lines
If more than one reconstructive option is possible and likely to give comparable outcomes, then choose the simplest option aka the KISS principle (Keep It Simple Stupid)
Focus on understanding the 3 main types of local skin flaps
Think about the blood supply of the flap
Minimise tension by wide undermining - skin is stretchy but your flap should flop into place. Know your key holding stitch
Use your imagination to see the end-result before you start
The only way to get better is to challenge yourself—Be patient

As with any surgical specialty, dermatological surgery relies very much on experience. There are many quotes about experience including the following—
"*Experience...*
is the teacher of all things; can't be taught; is simply the name we give our mistakes; is what causes a person to make new mistakes instead of old ones; makes you grow"

Local skin flaps are challenging and one should start slowly gradually building confidence and learning from outcomes.
It is essential to get the basics right from the start as "*it takes 3 goes to earn something and 7 to unlearn something*".
Managing patients' expectations is important and generally it is better to "under-promise and over-deliver"

Millard's 33 Commandments of Plastic Surgery

PREOPERATIONAL PRINCIPLES

1. Correct the Order of Priorities
2. Aptitude Should Determine Specialization
3. Mobilize Auxiliary Capabilities
4. Acknowledge Your Limitations so as do no harm
5. Extend Your Abilities to Do the Most Good
6. Seek Insight into the Patient's True Desires
7. Have a Goal and a Dream
8. Know the Ideal Beautiful Normal
9. Be Familiar with the Literature
10. Keep an Accurate Record
11. Attend to Physical Condition & Comfort of Position
12. Do Not Underestimate the Enemy

EXECUTIONAL PRINCIPLES

13. Diagnose Before Treating
14. Return what is Normal to Normal Position & Retain it There
15. Tissue Losses Should be Replaced in Kind
16. Reconstruct by Units
17. Make a Plan, a Pattern, & a Second Plan (Lifeboat)
18. Invoke a Scot's Economy
19. Use Robin Hood's Tissue Apportionment
20. Consider the Secondary Donor Area
21. Learn to Control Tension
22. Perfect Your Craftsmanship
23. When In Doubt, Don't

INNOVATIONAL PRINCIPLES

24. Follow-up with a Critical Eye
25. Avoid the Rut of Routine
26. Imagination Sparks Innovation
27. Think While Down and Turn a Setback into a Victory
28. Research Basic Truths by Laboratory Experimentation

CONTRIBUTIONAL PRINCIPLES

29. Gain Access to Other Specialties' Problems
30. Teaching our Specialty is Its Best Legacy
31. Participate in Reconstructive Missions

INSPIRATIONAL PRINCIPLES

32. Go for Broke (always go for the very best, no matter what)
33. Think principles Until They Become Instinctively Automatic in Your Modus operandi

S Saraf. The Internet Journal of Plastic Surgery. 2006 Volume 4 Number 1.

"*The ancients stole all our best ideas*"

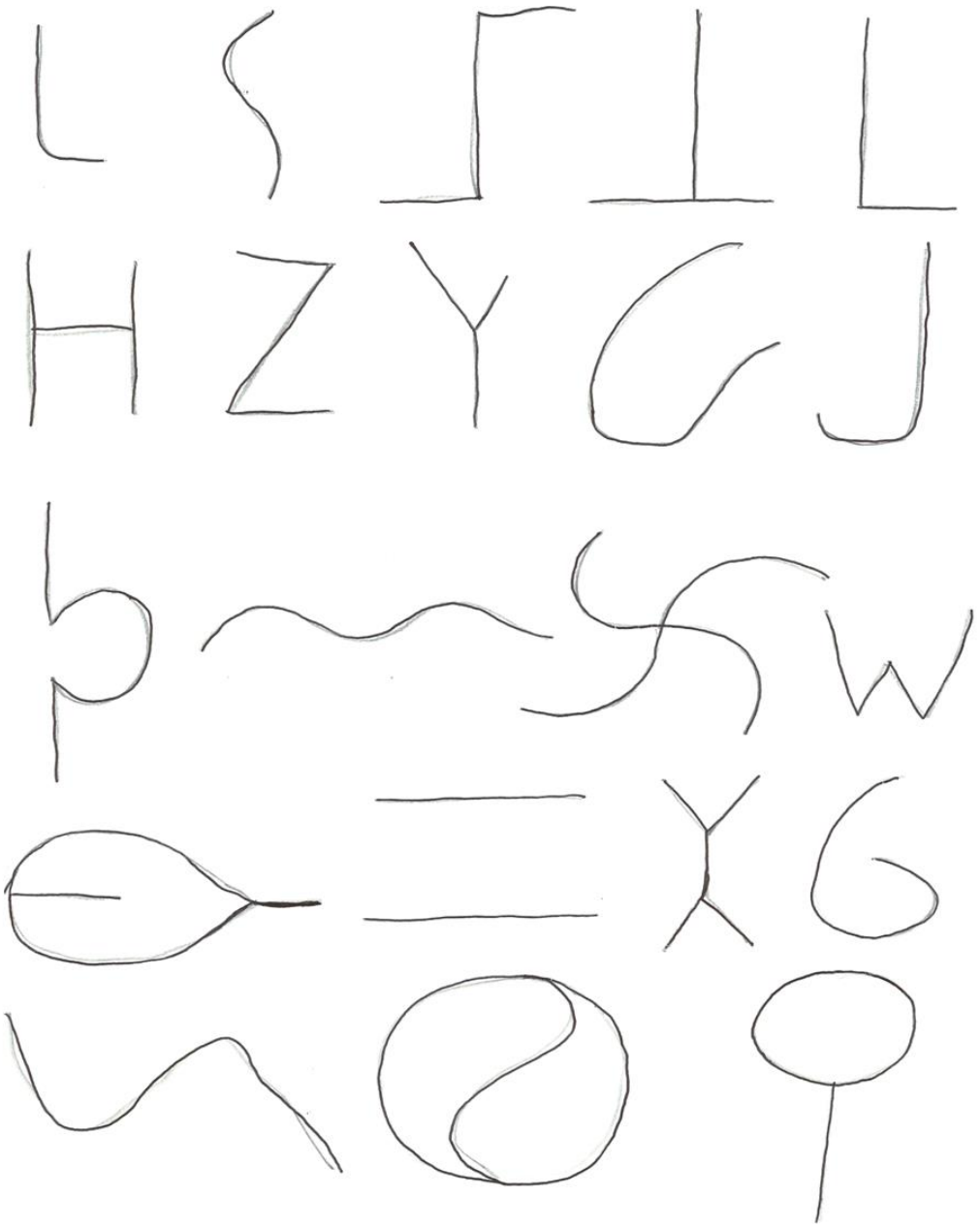
An A to Z of eponymous flaps in dermatological surgery.

Abbe's lip switch flap, 1898
Becker's rhomboid-to-W flap, 1979
Chan's modified island pedicle flap, 1988
Dufourmentel's modification of the rhombic flap, 1962
Esser's classic bilobe flap, 1918
Field's subcutaneous bipedicled island flap, 1980
Gillies' bishop's miter flap , 1920
Holt and Motley's modified rhombic transposition flap, 1991
Iwao's subcutaneous pedicled nasolabial flap to reconstruct the ala nasi, 2005
Johnson's staged retroauricular to auricular interpolation flap, 1997
Kovach's flipped island pedicle flap, 2008
Limberg's classic rhomboid transposition flap, 1967
Mustarde's cheek advancement/rotation flap for infraorbital defects, 1970
Nicalodoni's pedicled second toe to thumb transfer, 1900
Oribasius – pioneer of local skin flap principles, circa 350 AD
Peng's dorsal nasal pinch flap, 1987
Quaba's modified rhombic flap (a square peg into a round hole), 1987
Rieger's flap for repair of the nasal tip, 1967
Spear's nasolabial turn-over flap with a twist for lateral alar defects, 1987
Tenzel's flap for lower eyelid reconstruction, 1978
U-flap of chin as described by Mouly, 1963
Von Burrow's bilateral horizontal cheek advancement flap, 1853
Webster's 30 degree modified rhombic transposition flap, 1978
X-plasty (bilateral dog-ear rotation flap) repair described by Fox, 1965
Yoo's revision of the crescentic cheek advancement flap, 2003
Zitelli's modification of the bilobed flap, 1989

Local skin flaps may be described by the shape made when the flap is created.
Beware - some shapes are more forgiving than others.
Examples include -

Bucket handle, Bridge, Buddy, Chimera, Comet, Dog ear rotation, East-West, Flip-flop, Hockey stick, Horn, Hatchet, J-plasty, Jigsaw, Keystone, Kite, Lazy-S, Lenticular, Mercedes-Benz, Note, Omega, Pickaxe, Propellor, Pin wheel, Revolving door, Reading man, Spiral, Shark, Shutter closure, Spider, Seagull, Sine wave, Snail, Stepladder, Pacman, Visor, Winged man, W-plasty, Ying-Yang, Z-plasty

"Fortune favours the brave"
"No guts no glory"



A selection of local skin flaps named according to their final shape

ADVANCEMENT FLAPS

In a simple advancement flap, the movement is entirely in one direction and the flap advances over the defect. The limbs of the flap are cut to a length to breadth ratio not exceeding 3:1 on the face, or 2:1 or 1:1 ratio on the trunk.

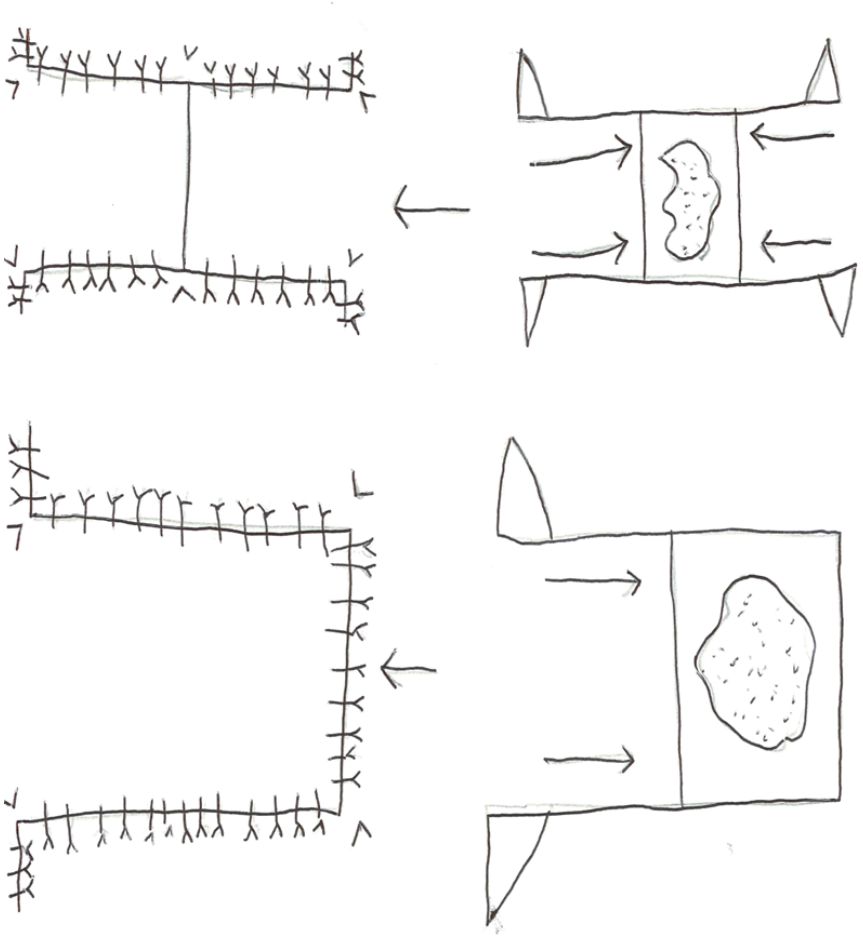
The flap consists of skin and fat and is fully undermined along with the area around the pedicle. It is advanced over the defect in a trial movement. Often a pucker (dog-ear) is seen at the base of the pedicle. These can be cut out (Burow's triangles). Often the size of these triangles will be of different sizes on either side of the flap depending on local tissue laxity.

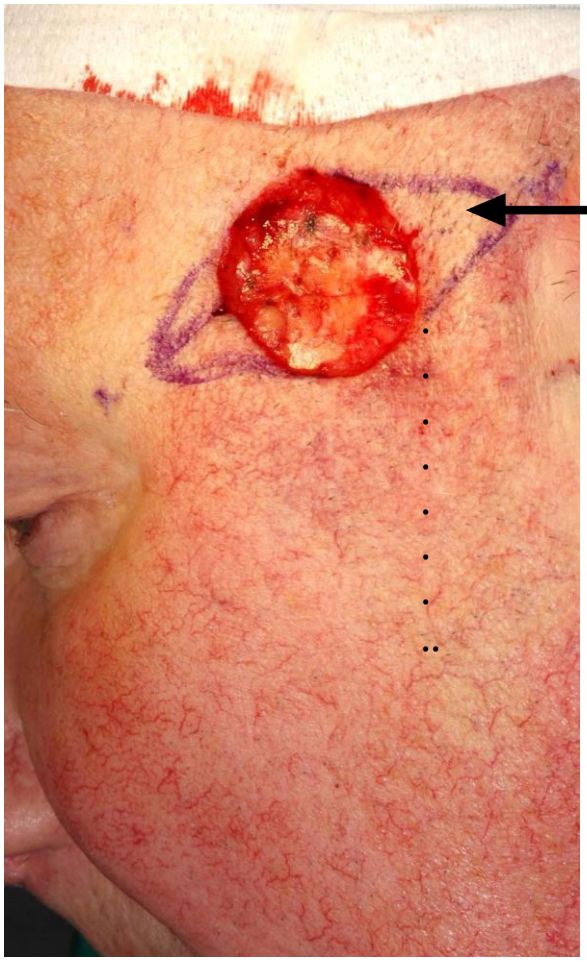
Key stitches with subcutaneous absorbable sutures secure the leading edge of the flap to the opposite side of the defect. Larger defects may require bilateral advancement. The flaps do not have to be of the same length. They may not join at the centre of the defect because of variability of the elasticity and movability of the skin.

These flaps are useful on the forehead.

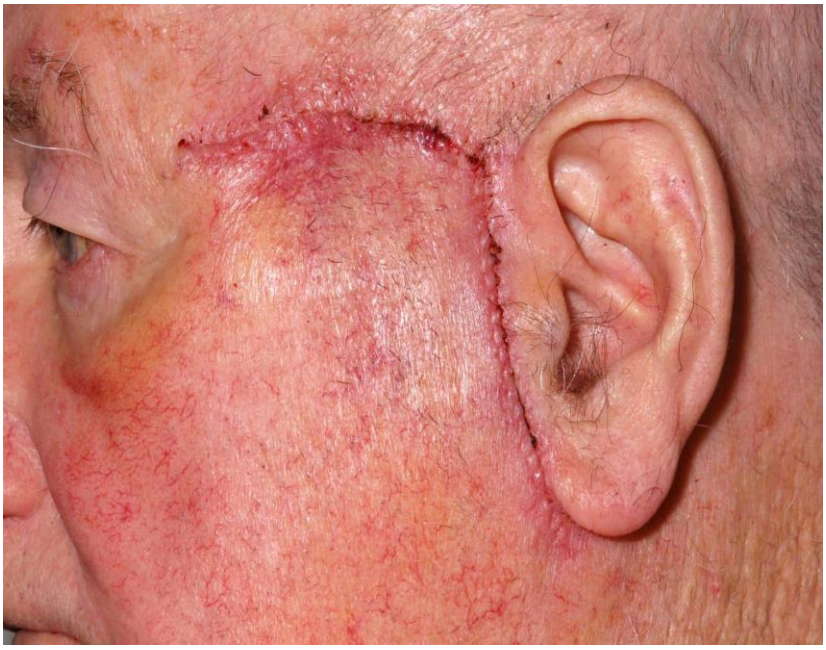
Variations of the simple advancement flap are the A - T and the O - T and the Burow's wedge design (see diagrams).

Single advancement flap (O to U) and Double advancement flap (O to H)

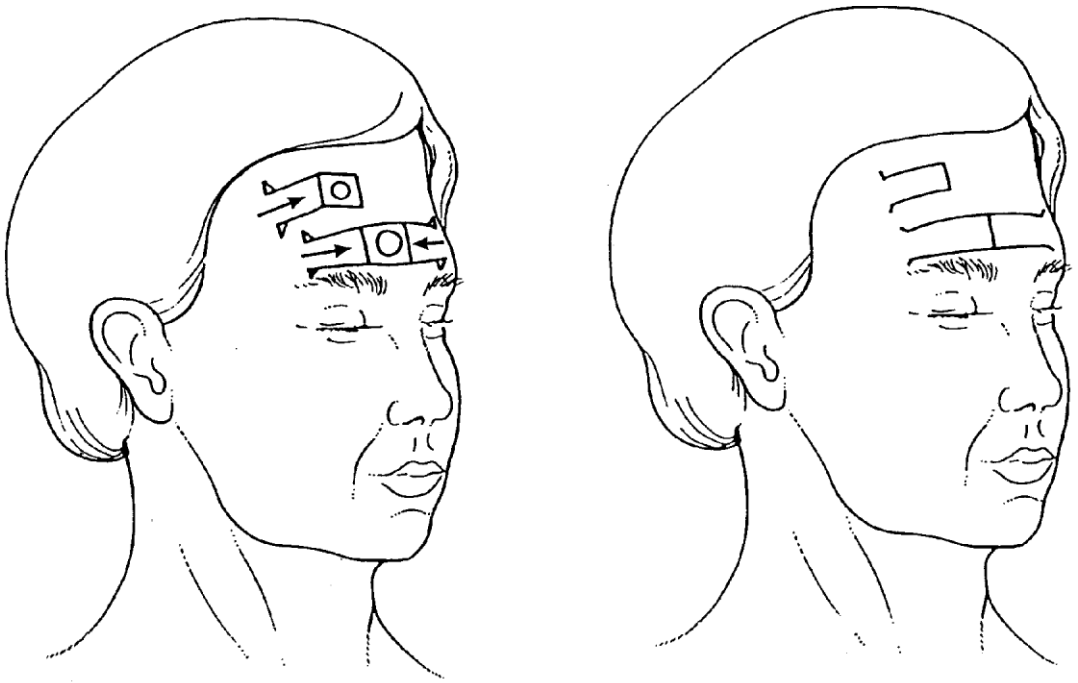




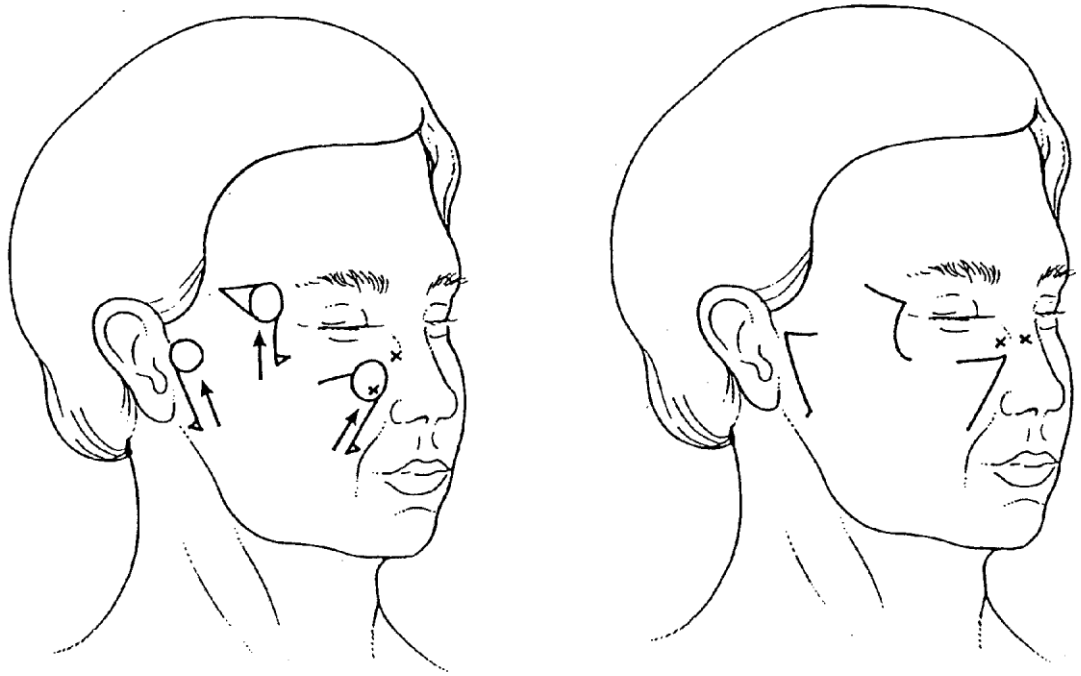
Burow's L-plasty advancement

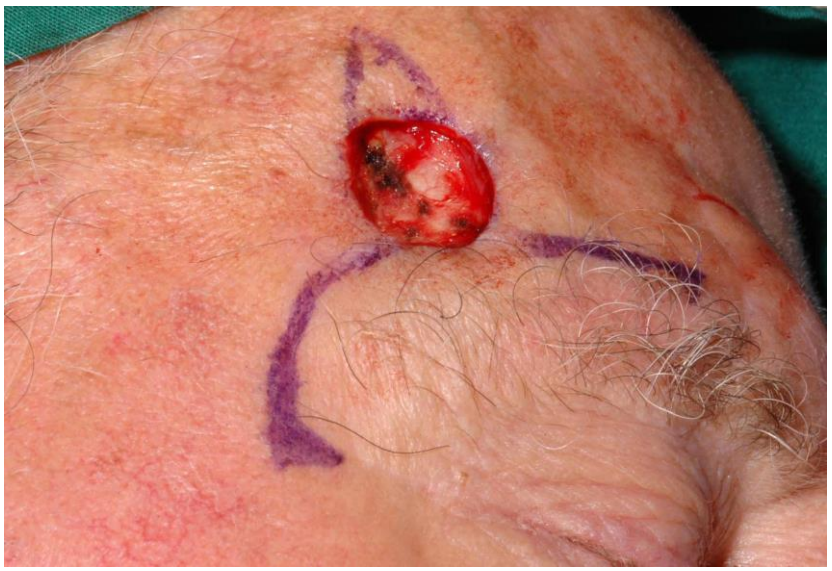


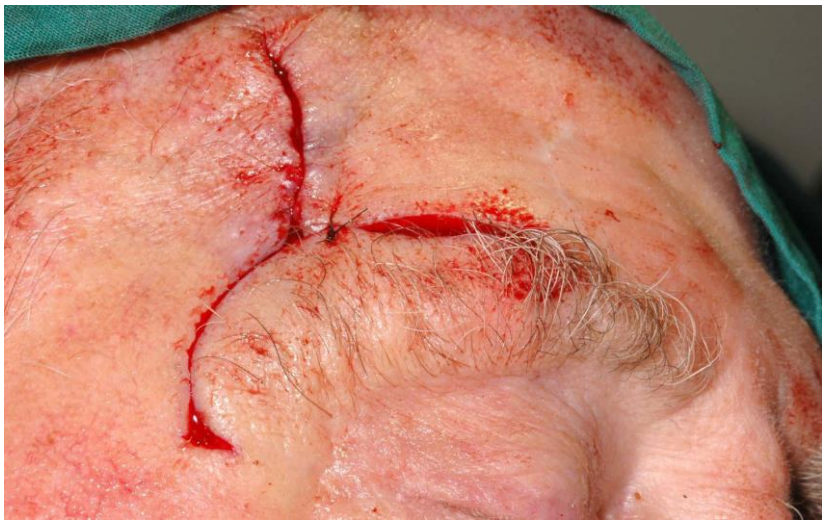
SINGLE AND DOUBLE ADVANCEMENT



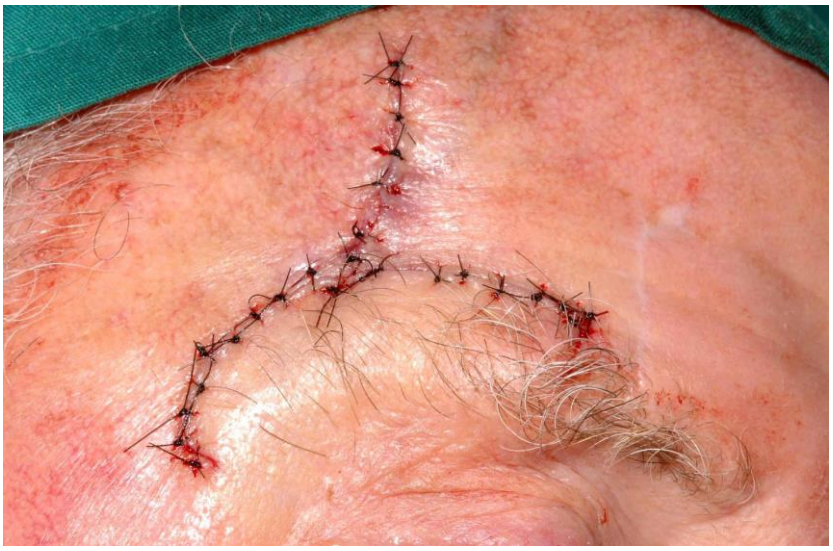
BUROW'S WEDGE DESIGN aka. O to L Burrow's advancement



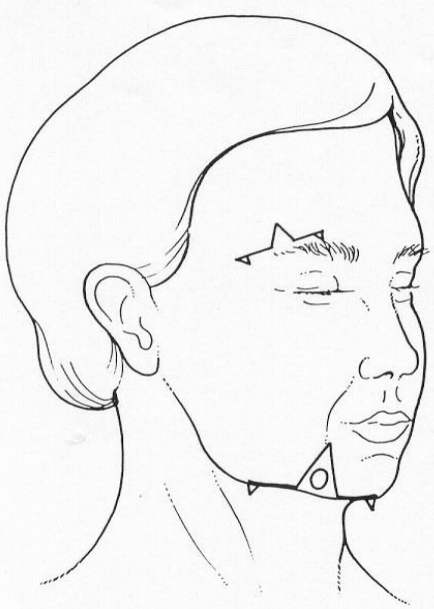


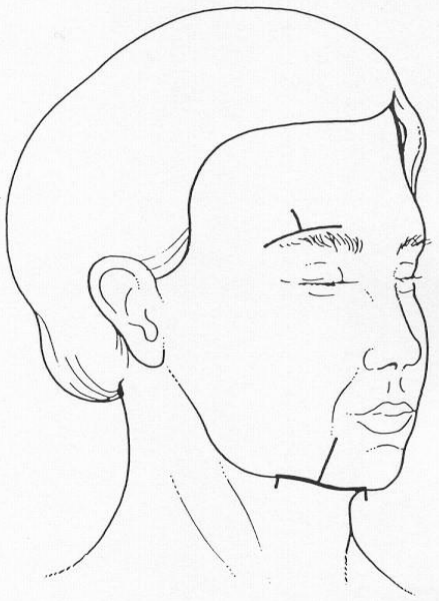


A to T closure following excision of BCC

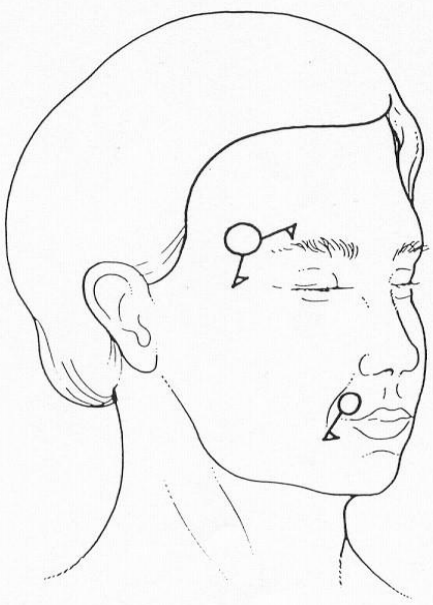


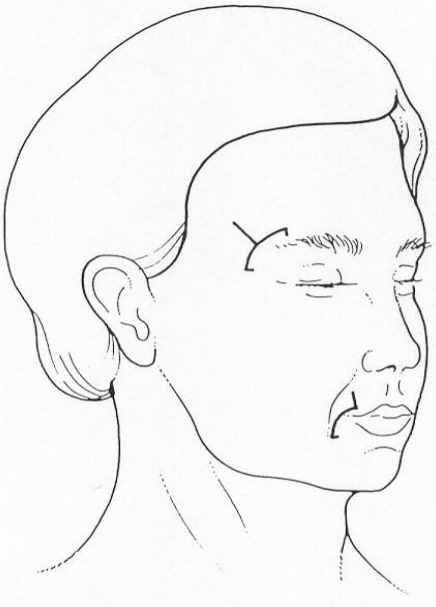
A to T CLOSURE





O to T CLOSURE





Rotation flaps

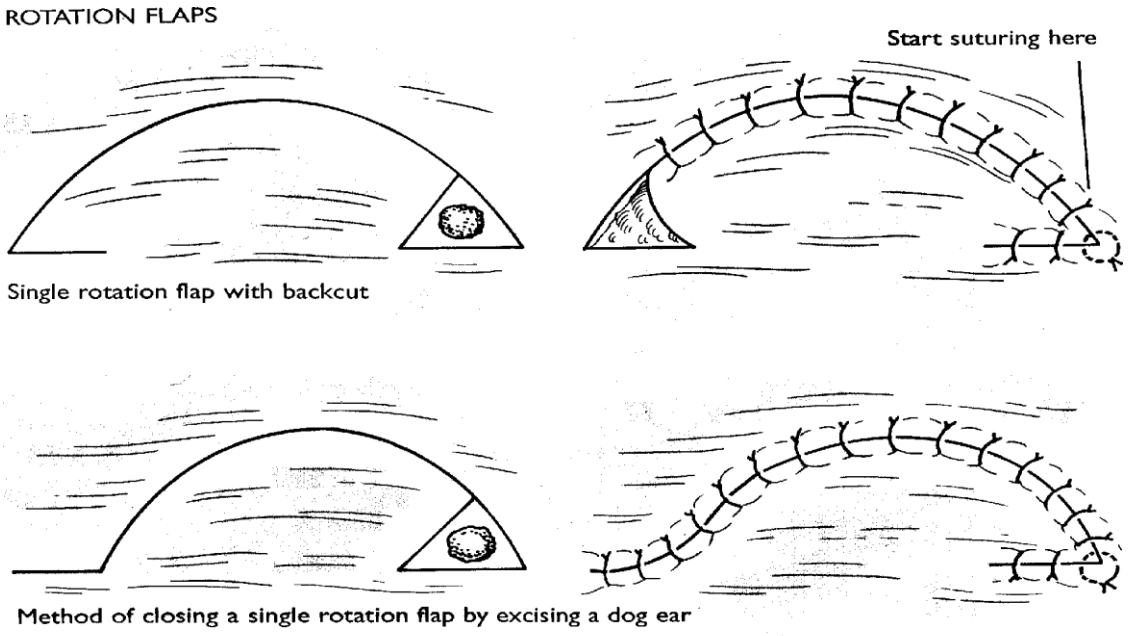
"*Draw twice; cut once*"

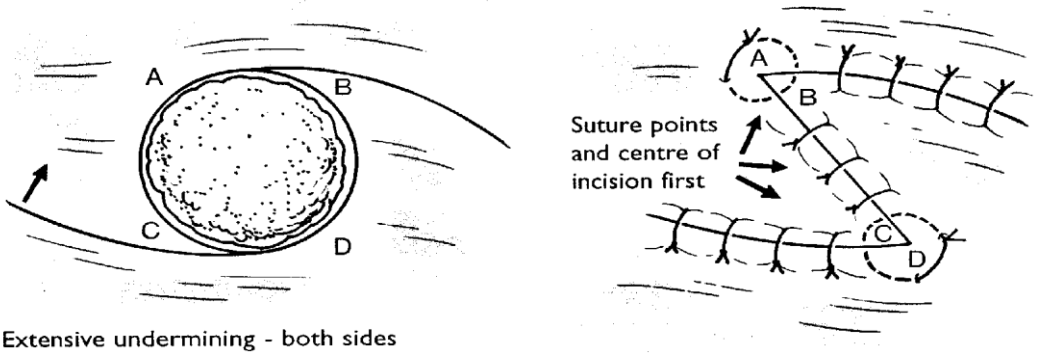
The defect is covered by rotating the skin from one side. On skin with little elasticity, for example the scalp and back of the hand, the arc should be long enough to create a flap whose area is 3 to 4 times the area of the primary defect. On more movable and elastic skin, for example the cheek and forehead, the arc may be shorter.

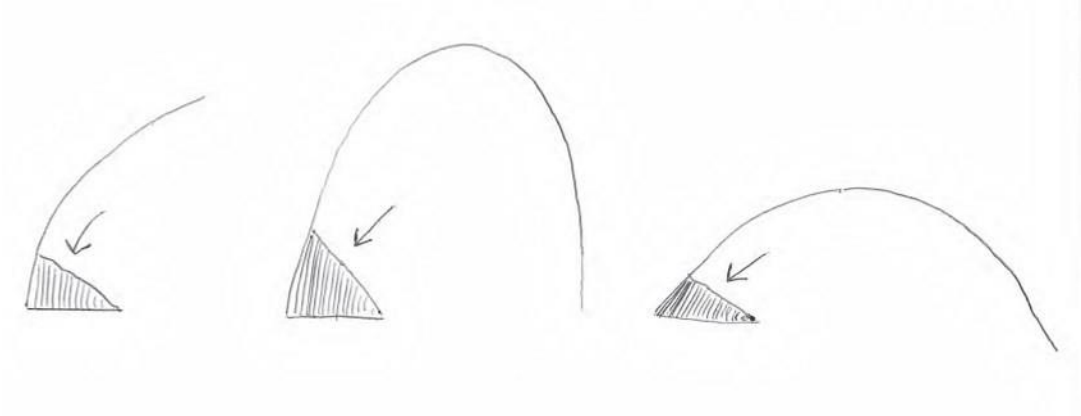
The shorter defect is closed by side to side suturing. The sides will be of an unequal length depending upon the degree of rotation. This may necessitate a Burrow's triangle correction at the end of the larger side.

To facilitate rotation, a back-cut may be used. This must not be long otherwise it will reduce the width of the flap pedicle.

Rotation flaps from opposite sides of a defect results in an O - Z closure. The two flaps not only rotate but advance to close the primary surgical defect.

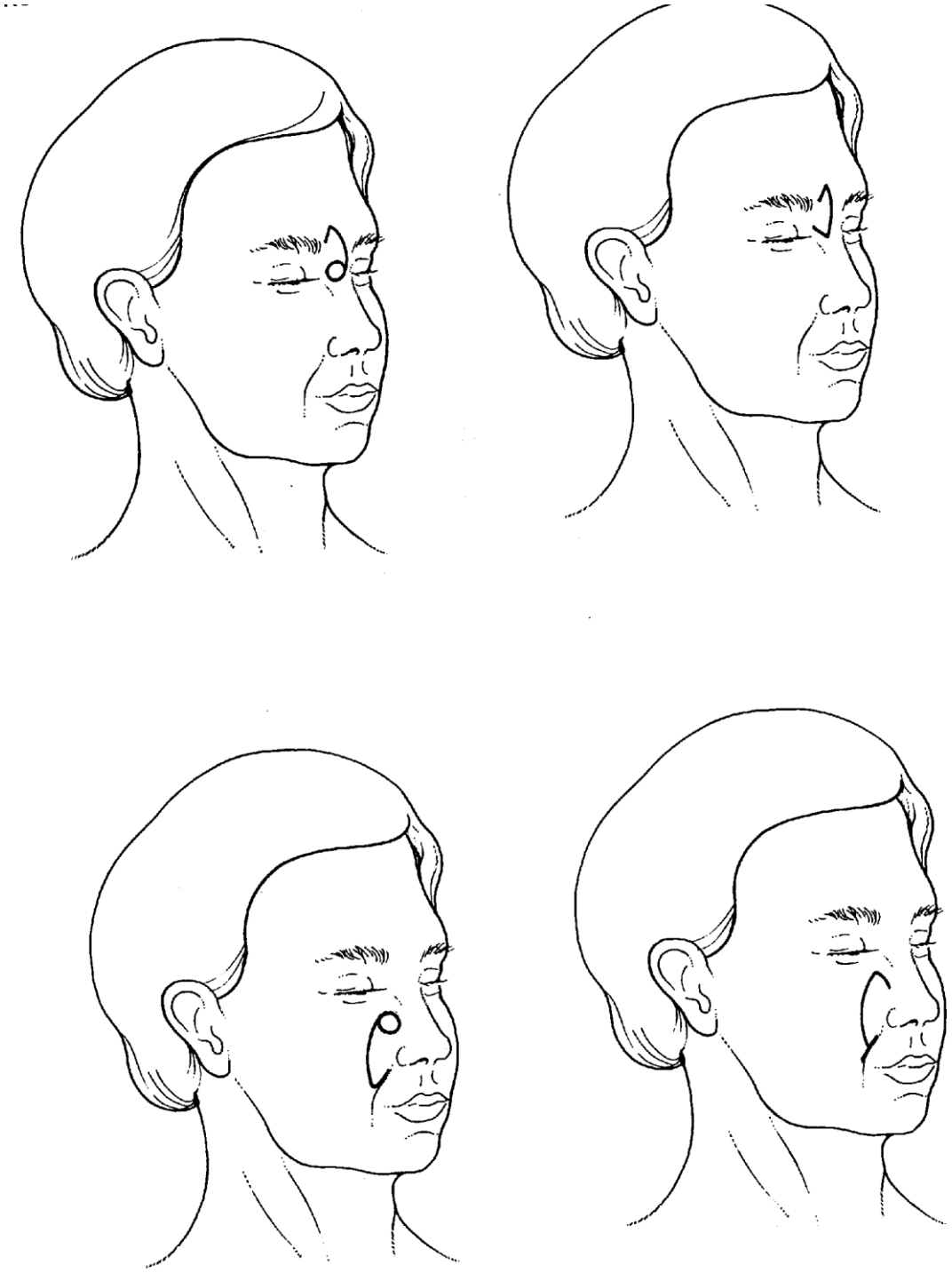




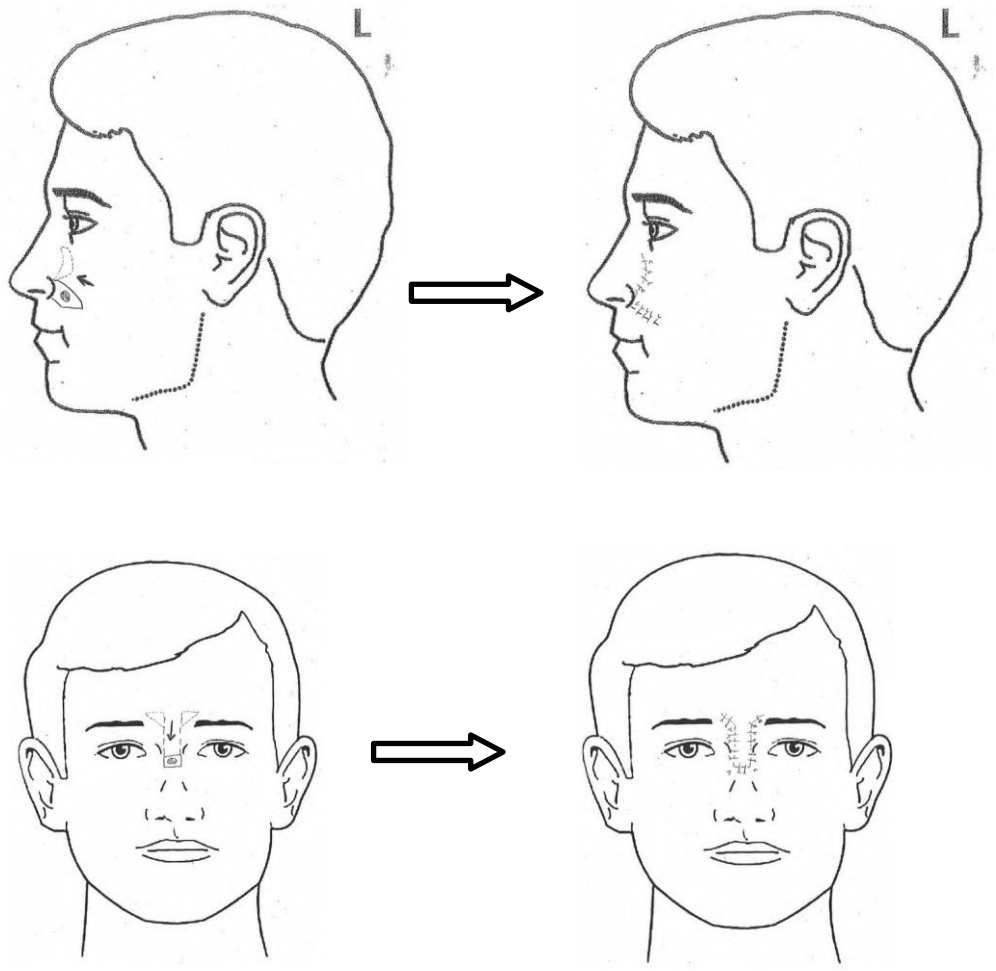


Modifications in design of rotation flaps depend on surrounding landmarks including free margins and availability of adjacent skin reservoirs.
In practice there is both advancement and rotation movement—the amount of each depends on the arc of the flap. Increasing the size of the flap in relation to the defect reduces the tension of tissue transfer.

Rotation flaps—shallow arc with a back-cut - “hatchet” flap



“ A surgical short cut often ends up taking longer”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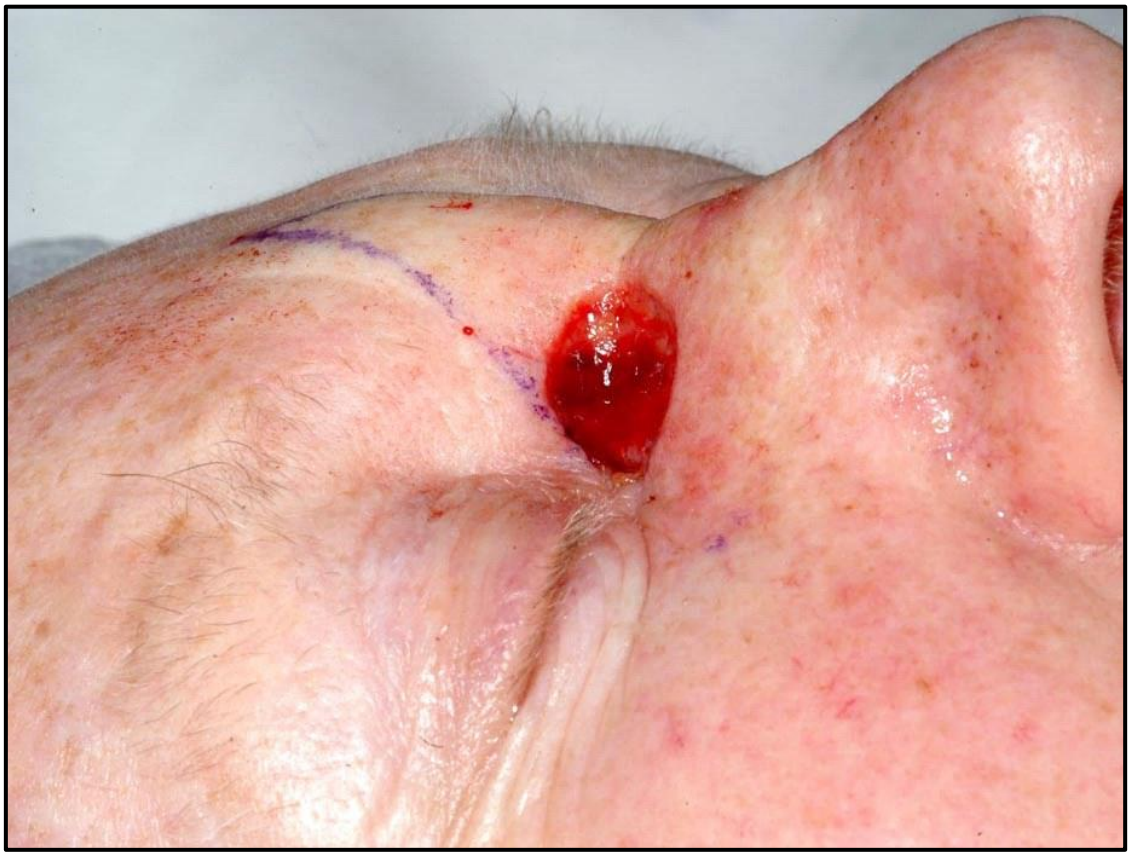
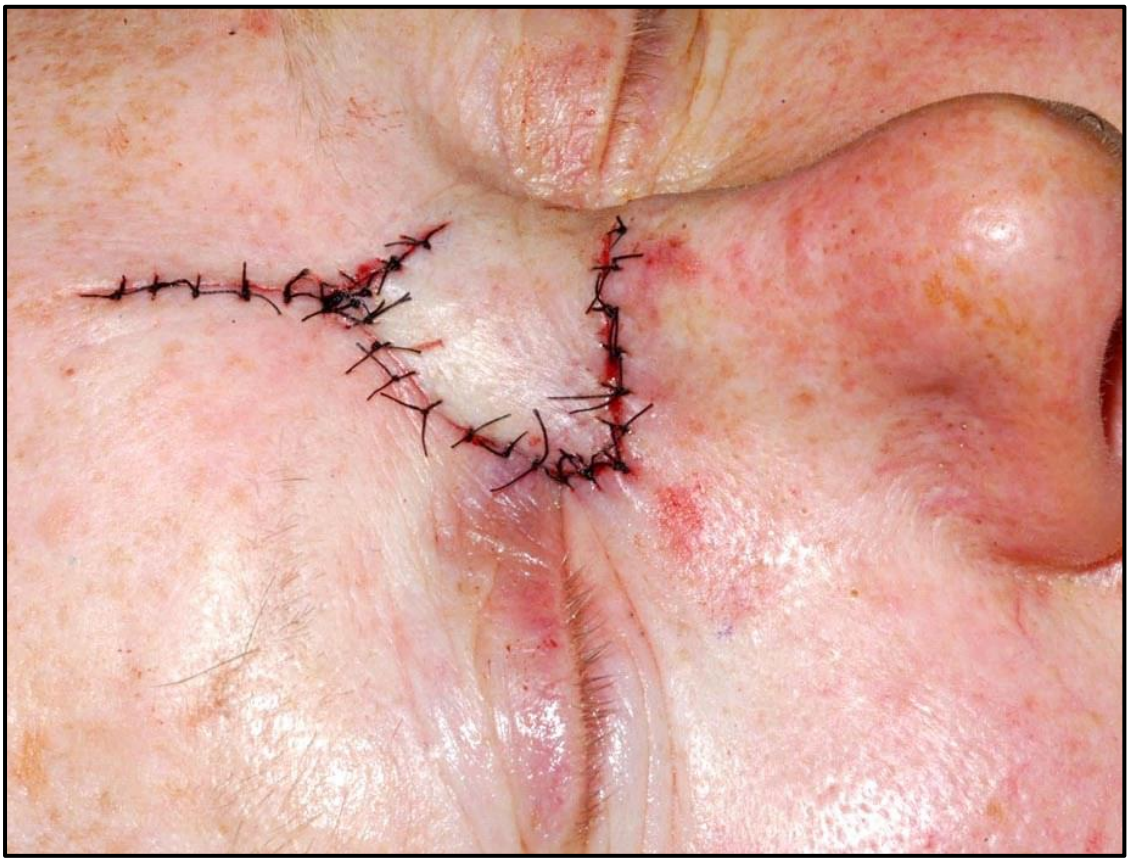
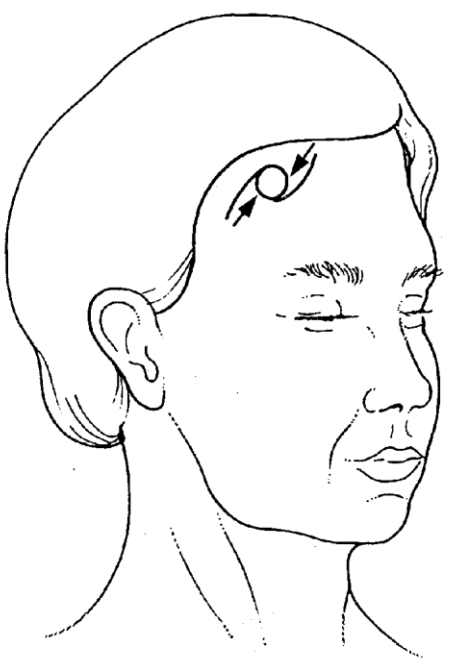
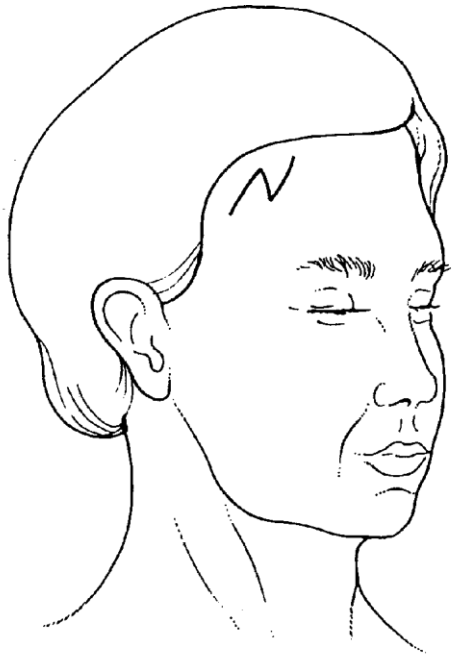
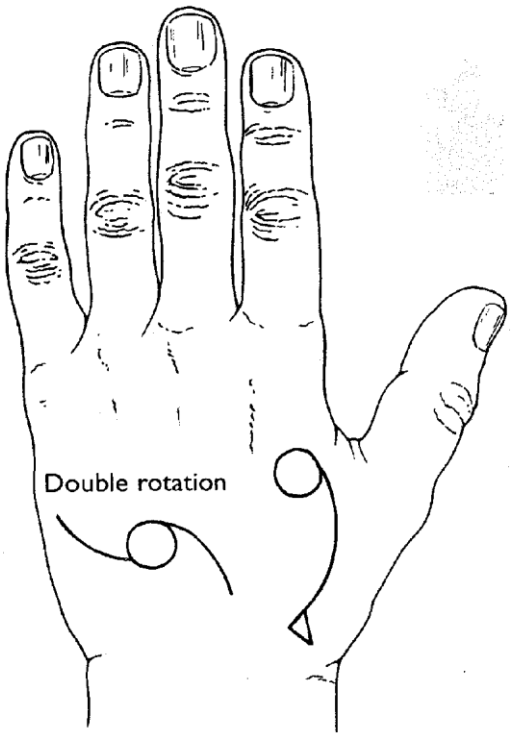
Sliding glabellar rotation flap

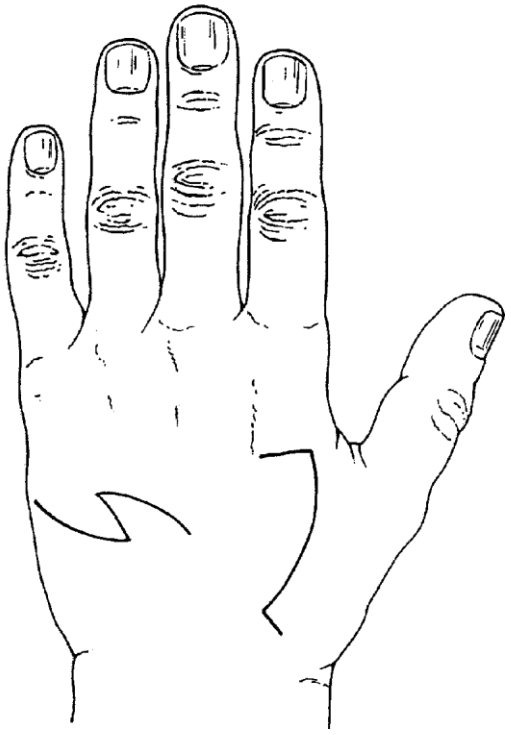


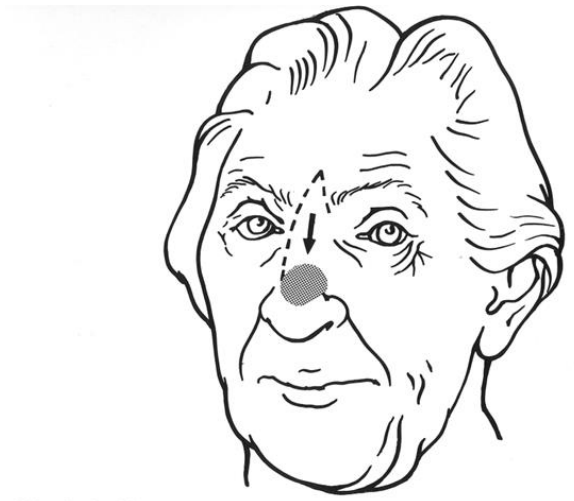







Double rotation

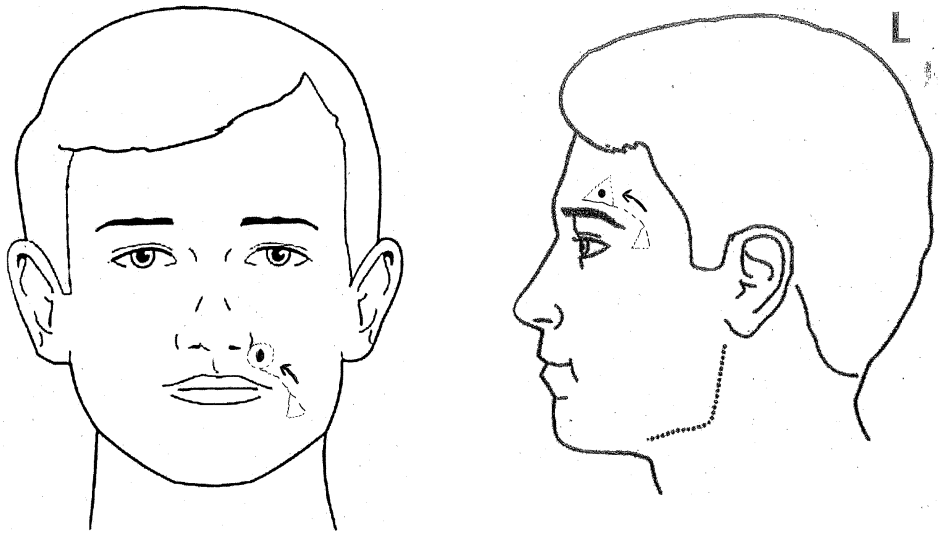




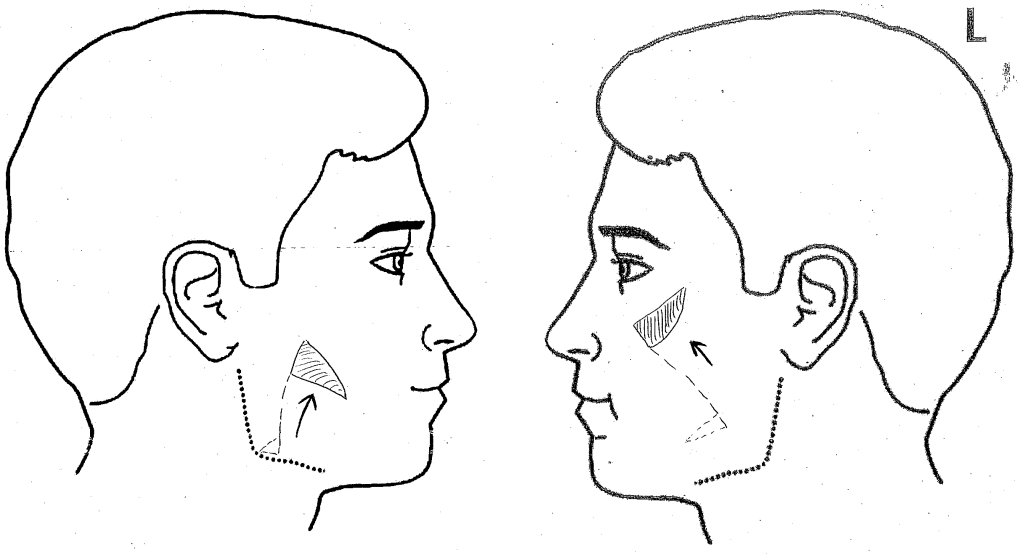
. The defect is covered by sliding and rotating the tissue.

The distal part of the hatchet flap is usually closed using the V to Y technique

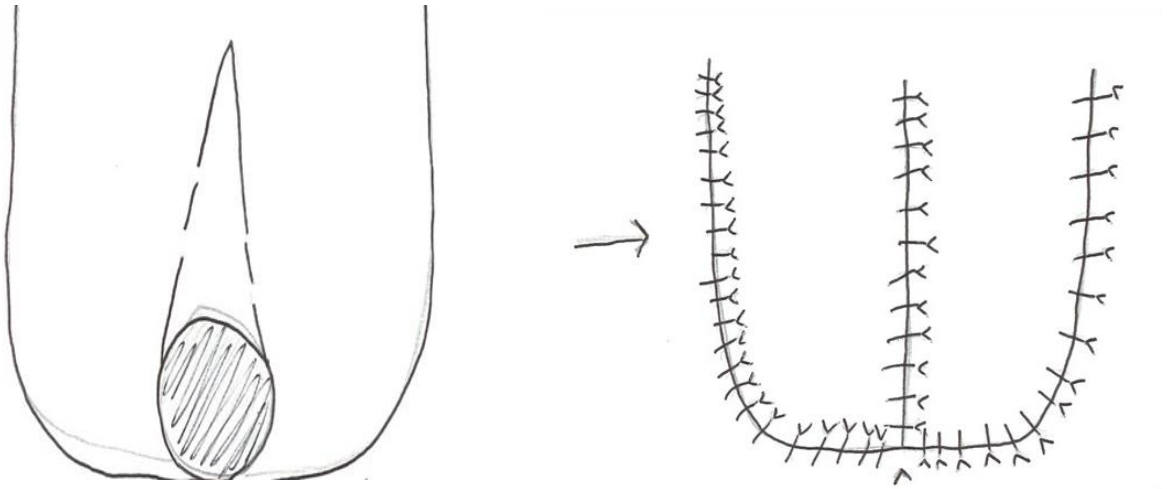
Examples of Burrow's triangle flap on the face to repair defects beside free margins



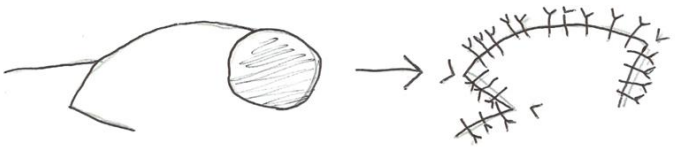
Large rotation flaps to repair defects of inferior and superior cheek



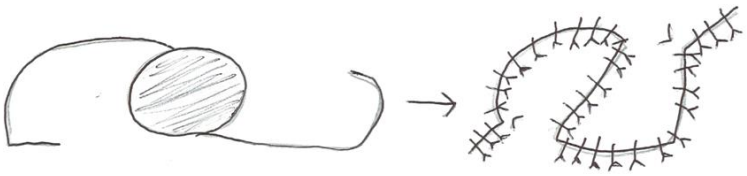
In practice there is often a combination of advancement and rotation with varying quantities of each—rarely is a flap purely advancement or rotation



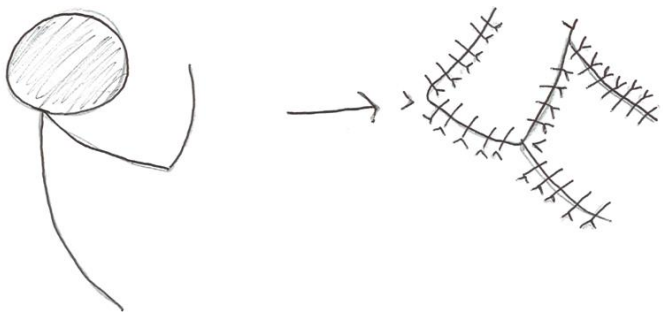
Peng Flap



Hatchet flap with proximal z-plasty



Double hatchet flap (V to Y to S)



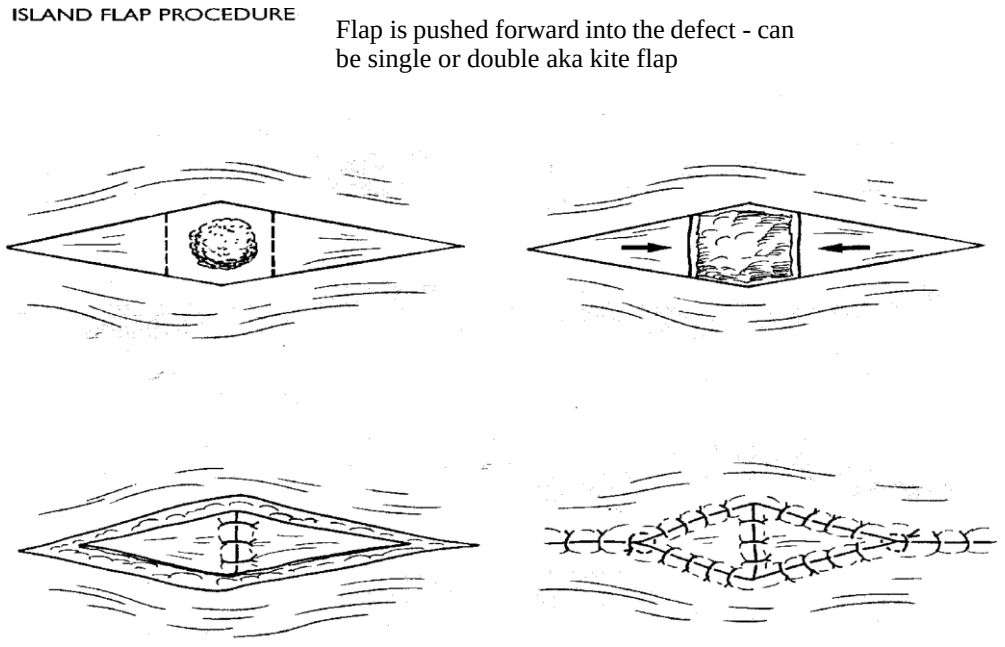
Reading man flap

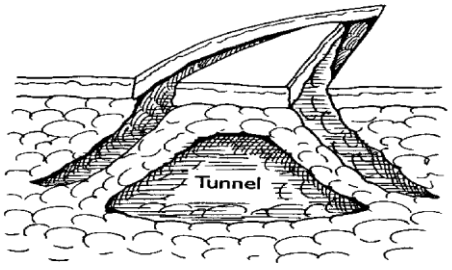
Island pedicle flaps

This is an island of skin having a subcutaneous pedicle which provides the blood supply. The movement of the flap depends on the ability of the subcutaneous tissues to stretch. It is useful in areas where there is a substantial thickness of subcutaneous fat, for example, the medial cheek or the calf. It is much less effective in areas of reduced subcutaneous fat, such as the back of the hands, forehead and scalp.

The flap is an isosceles triangle, whose height is one to two times the diameter or the length of the defect. In its basic design the triangular incision is carried through the skin and subcutaneous tissues creating an island of skin on a full thickness fat pillar. Obviously one cannot use this flap in areas where deep incisions through fat could damage motor nerves which lie superficially in the fascia adjacent to the fat. The flap advances on its mobile fatty bed and is secured to the opposite side of the defect. Closure of the secondary defect is side to side utilizing a V - Y repair. For larger defects, the islands are taken from the opposite sides.

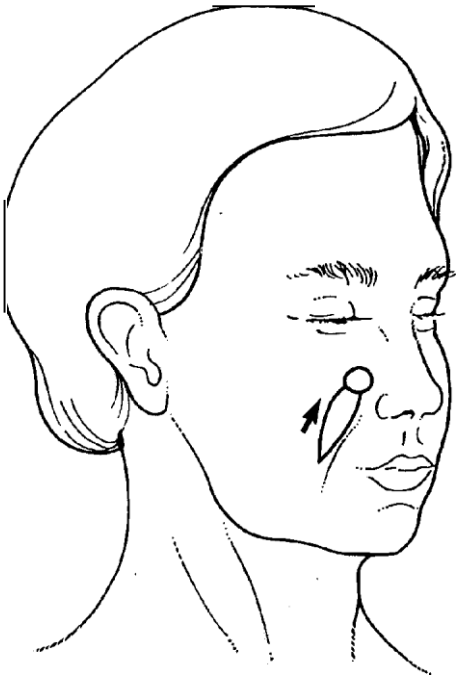
It may help to reduce the bulk of the flap by undermining the flap on two pedicles extending laterally. There are some locations where the island can be mobilised using a highly vascularised muscle pedicle, such as nasalis island pedicle flaps on the nose. These have the benefit of a more robust blood supply and can be mobilised further by freeing up a longer muscle pedicle than would otherwise be achieved with a fat pedicle.

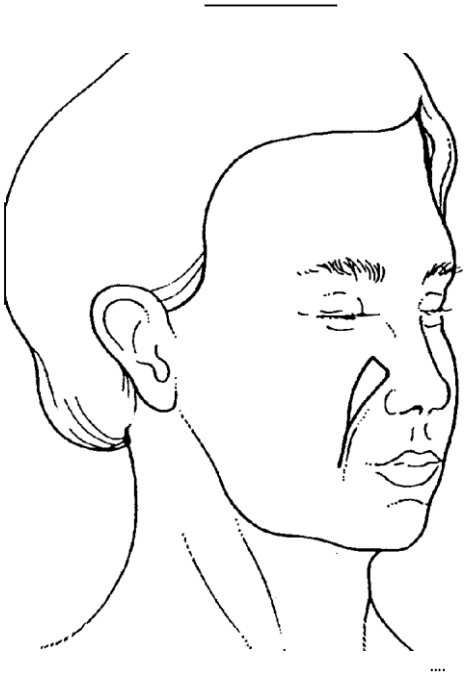


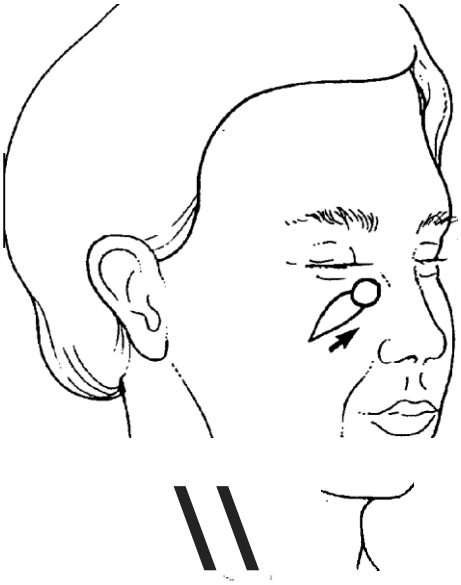


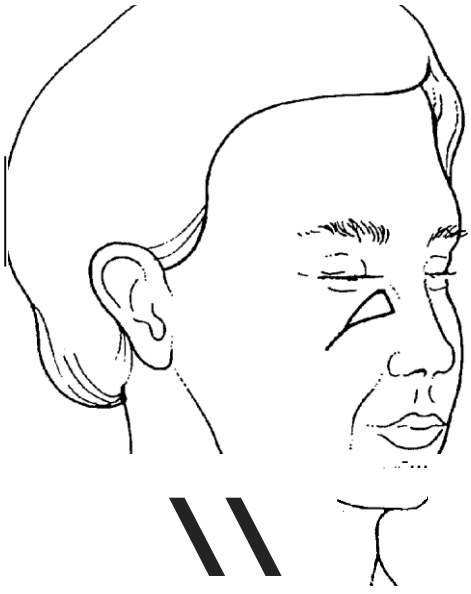
A unilateral myocutaneous pedicle can be used at certain sites eg nasal sidewall

SUBCUTANEOUS ISLAND PEDICLE FLAPS

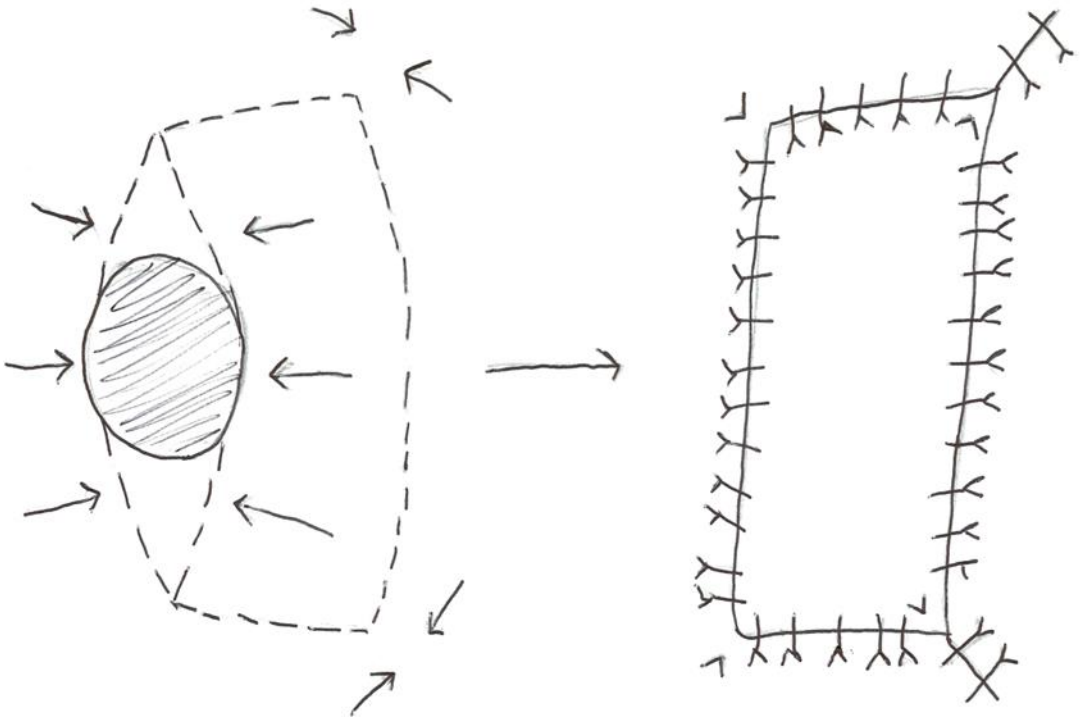




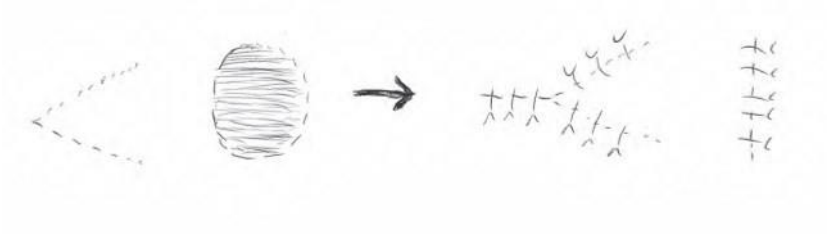




Keystone design IPF

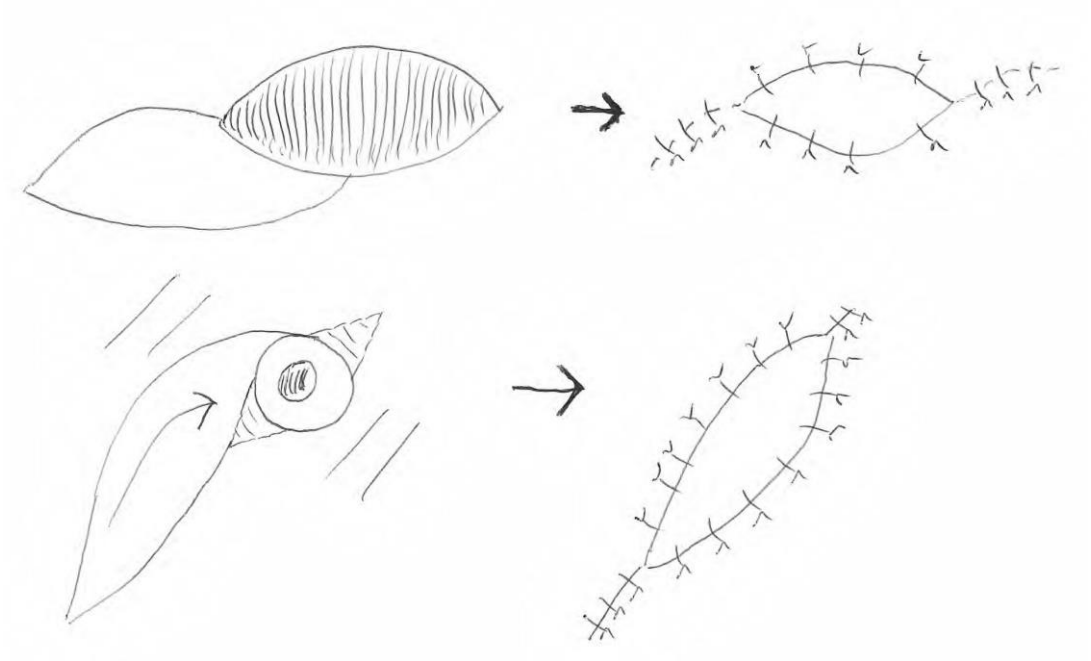


Note - several modifications are possible resulting in different subtypes



V to Y-plasty

Modifications of IPFs—
Bezier island flap (French curve)
Sigmoid oblique rotating IPF of Ono, 1993



TRANSPOSITION FLAPS

Efficient and useful. The skin adjacent to the defect is moved directly over the defect using combined rotation and advancement movements.

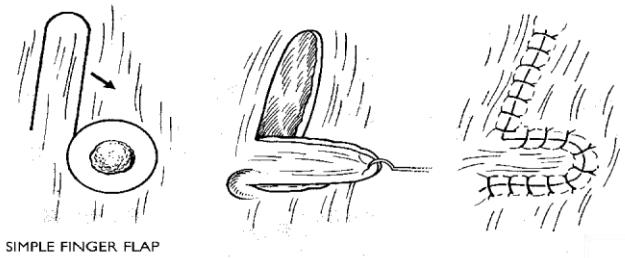
A portion of the flap is moved over (transposed) a bridge of neighbouring skin before it reaches the defect. The secondary defect is closed side to side.

The 90 degree banner transposition flap is probably the easiest design—see below. Its use is limited by the common formation of a large standing cone. In practice the Zitelli modification is often used—this removes a standing tricone in advance thus facilitating more advancement and less pivotal restraint. The mini-banner flap or switch flap is also useful in practice.

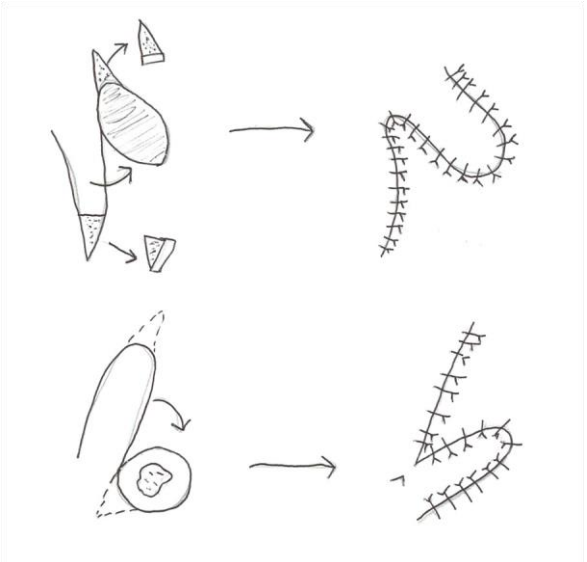
The rhombic flap is a classical example of a transposition flap. The initial key closure is between DB'. In order to achieve this without tension, this movement must be in the lines and direction of the maximum tissue laxity. Therefore careful pre-operative evaluation of the laxity and relaxed skin tension lines is necessary before planning the design of the flap. The first incision arises from the defect and should lie in a relaxed skin tension line (RSTL) to hide the resultant scar as best as possible.

The classic rhombic transposition flap is quite large and wastes some normal skin around a circular defect in order to create the rhombus. A modification of the design results in a smaller flap to close a circular defect.

TRANSPOSITION FLAPS

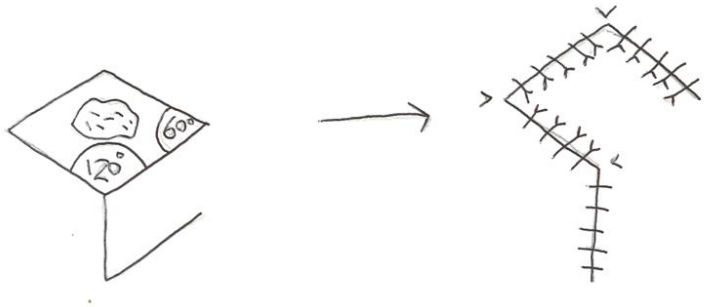


SIMPLE FINGER FLAP

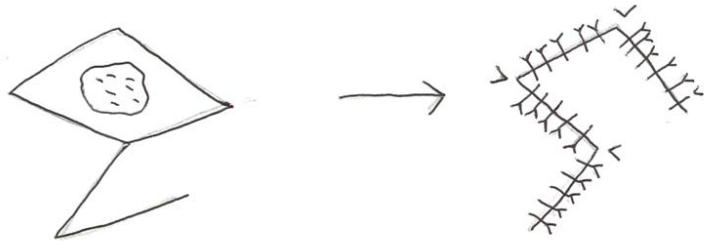


Banner Transposition Flap
Superiorly-based pedicle and inferiorly -based pedicle designs

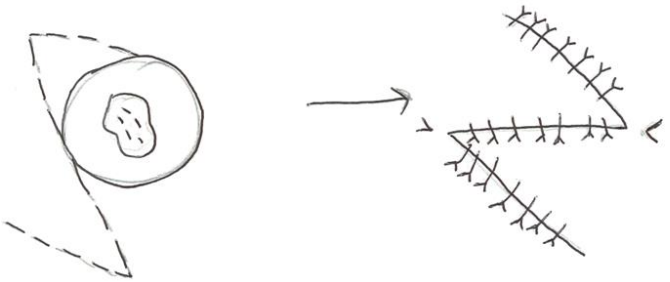
Standing tricone excised (Zitelli) which increases advancement / rotation and reduces transposition



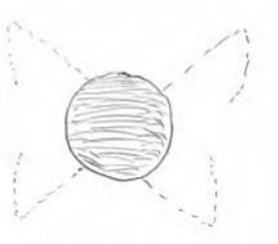
Classic rhombic transposition flap of Limberg



Dufourmentel Modification of rhombic transposition flap

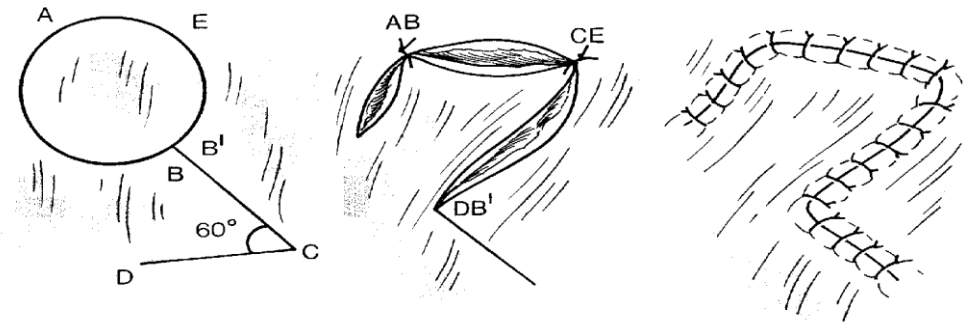


Mini-banner transposition flap / note flap / exchange transposition flap / off-set z-plasty flap / side-swing flap



The versatile “square peg in a round hole” modified rhombic transposition flap - recruitment can be from any circumferential reservoir—here 4 potential flap designs are shown

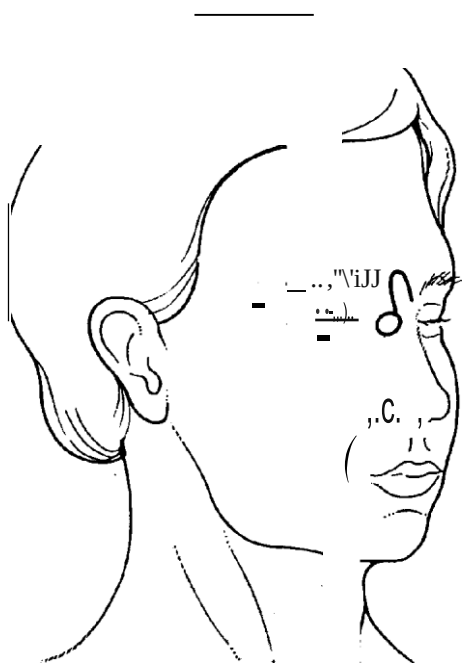
Distance BC is approximately 2/3 distance AB

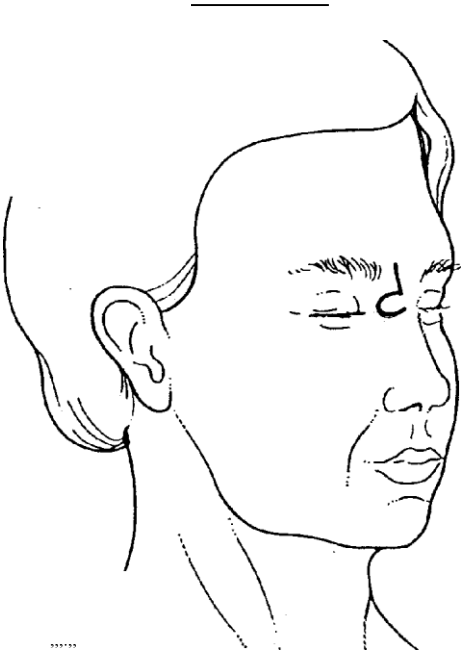


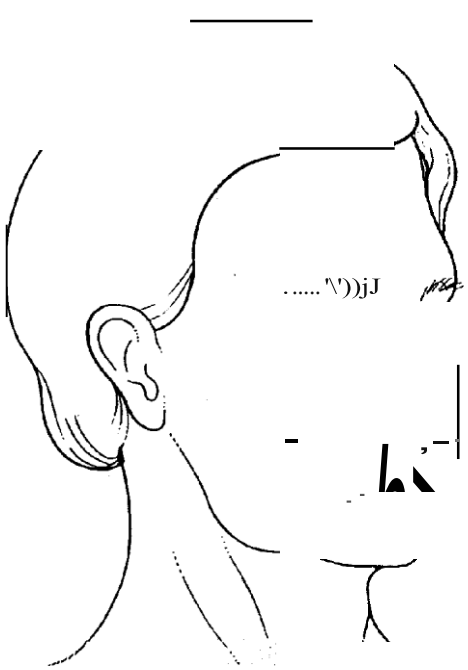
MODIFIED RHOMBIC DESIGN

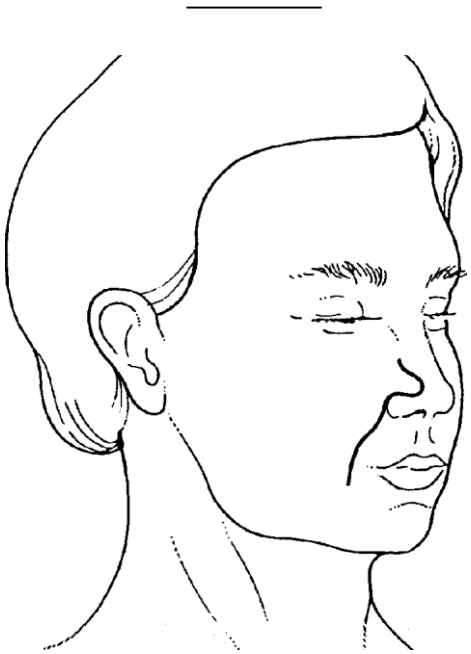
The flap is planned so that movement DB' is in the direction of maximum tissue laxity and minimum resistance based on knowledge of relaxed skin tension lines in the region of the defect.

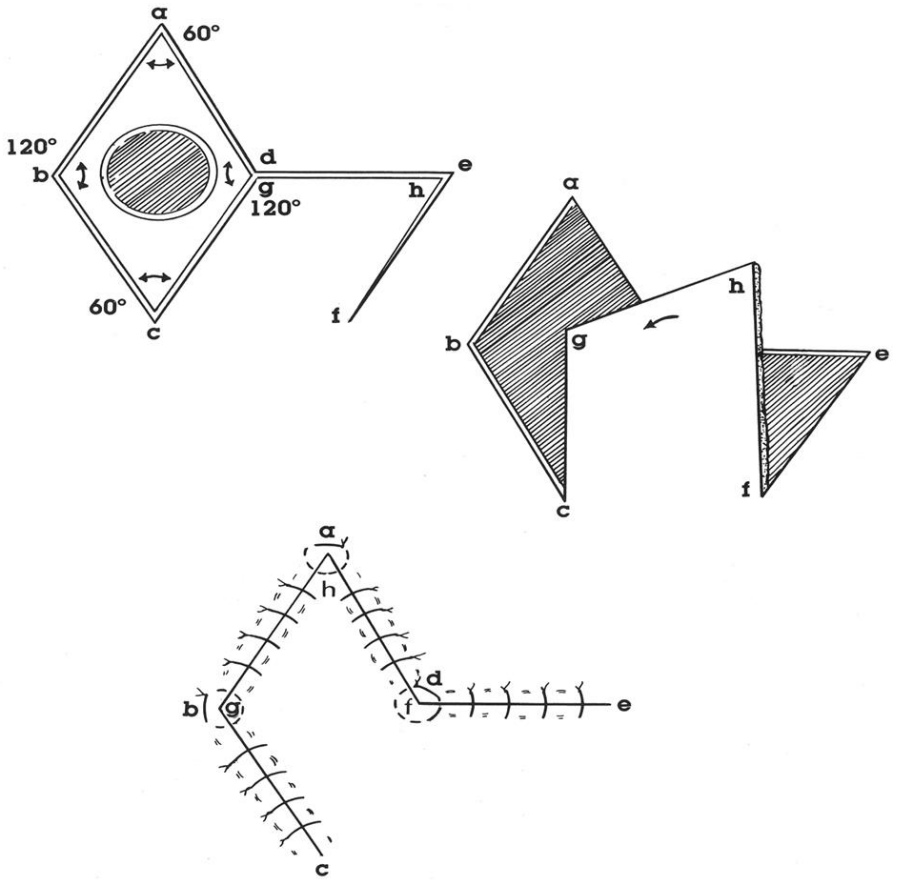
FINGER TRANSPOSITION FLAPS



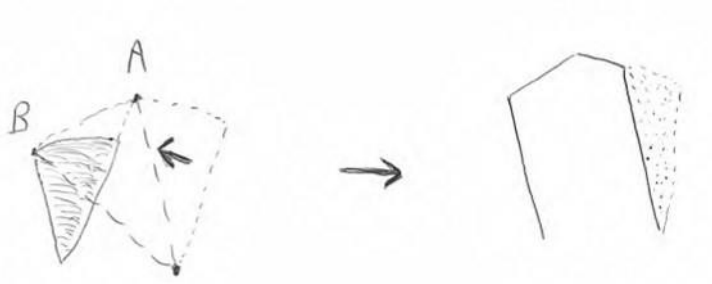






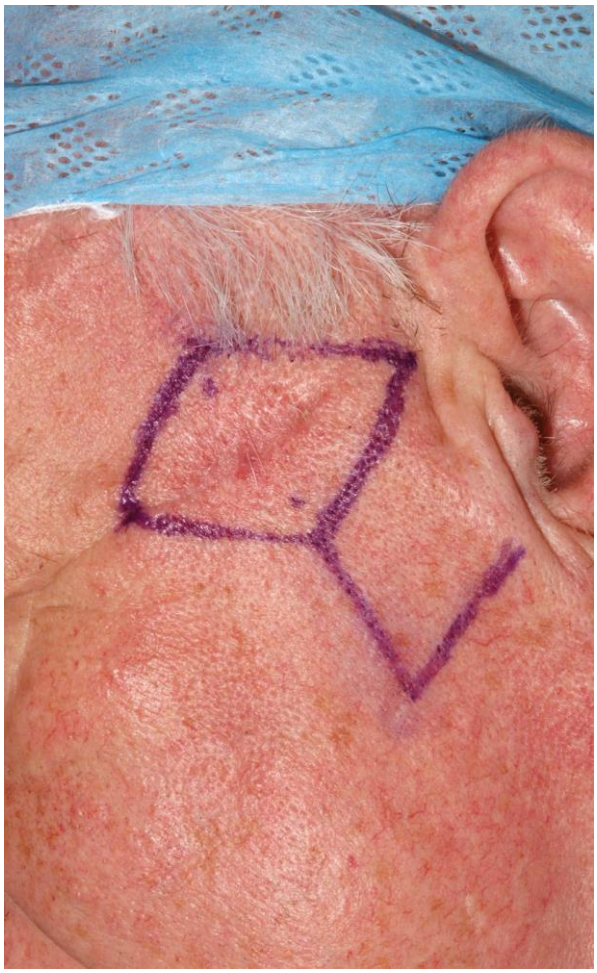


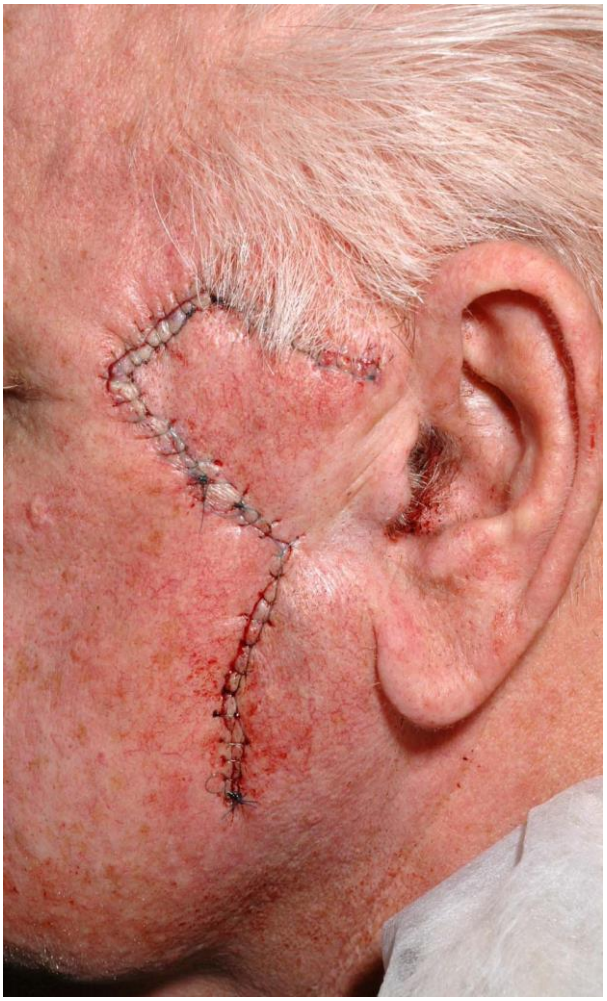
Ways to reduce pivotal restraint in a rhombic transposition flap—
1. extend e to f limb 2. reduce angle ade 3. start d nearer a (reduce distance to travel)

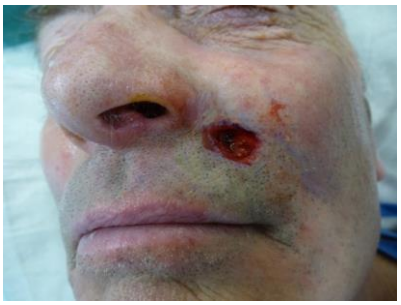


Modified transposition flap - note formation of secondary defect which may be closed side-to-side, left to heal by second intention, closed with a skin graft or closed with another local skin flap

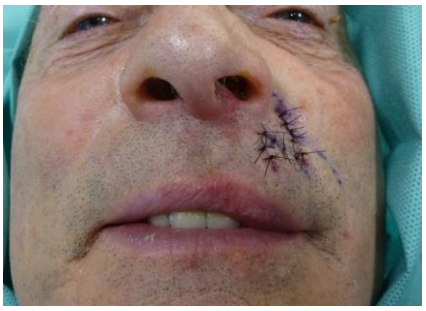
Rhombic Transposition Flap



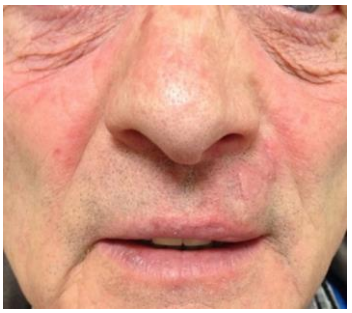




Surgical defect left proximal nasolabial crease

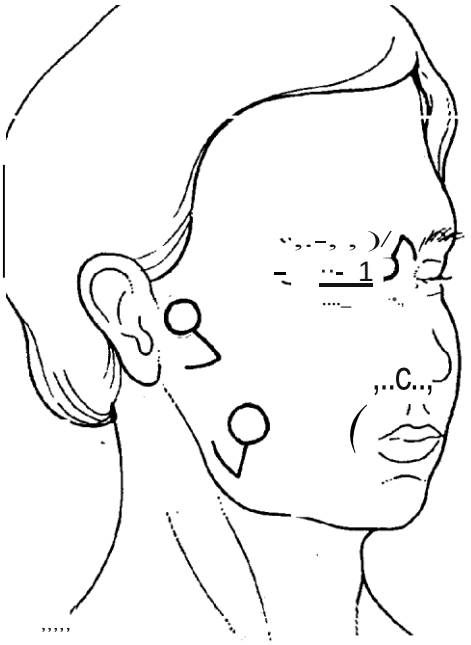


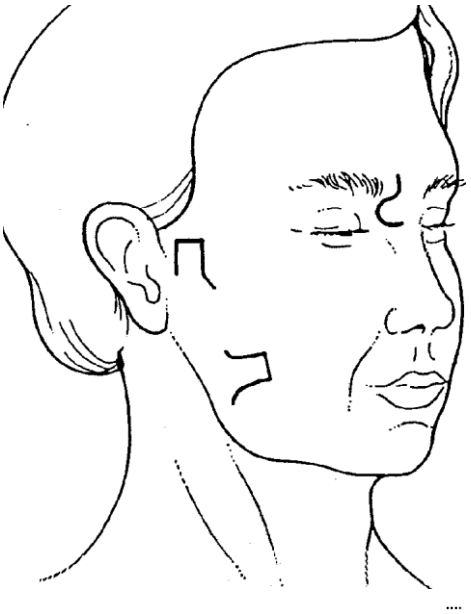
Closure with mini-banner (exchange) transposition flap immediate post-up appearance

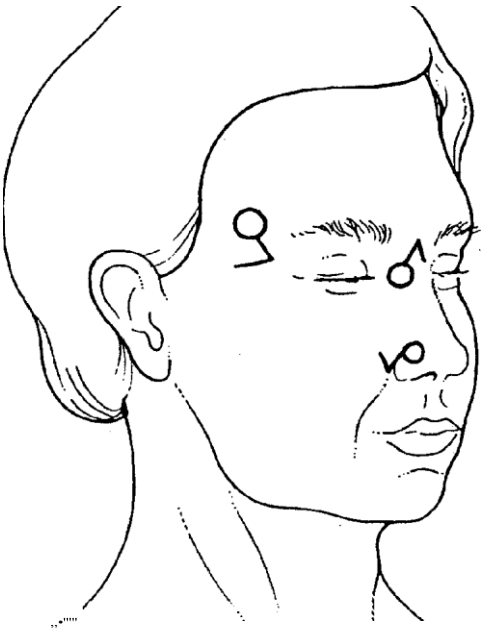


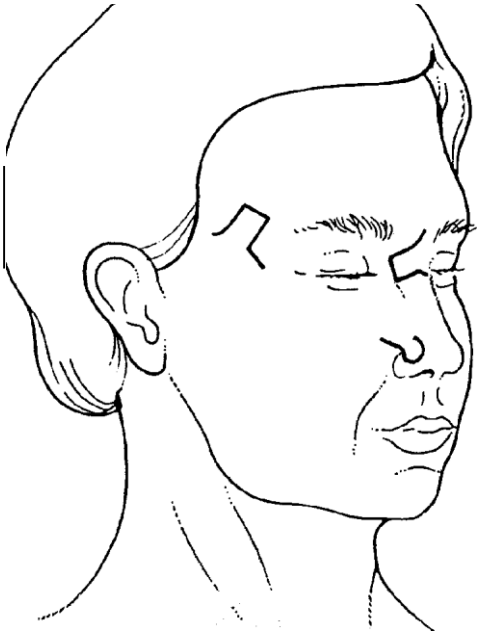
Appearance at 3 months

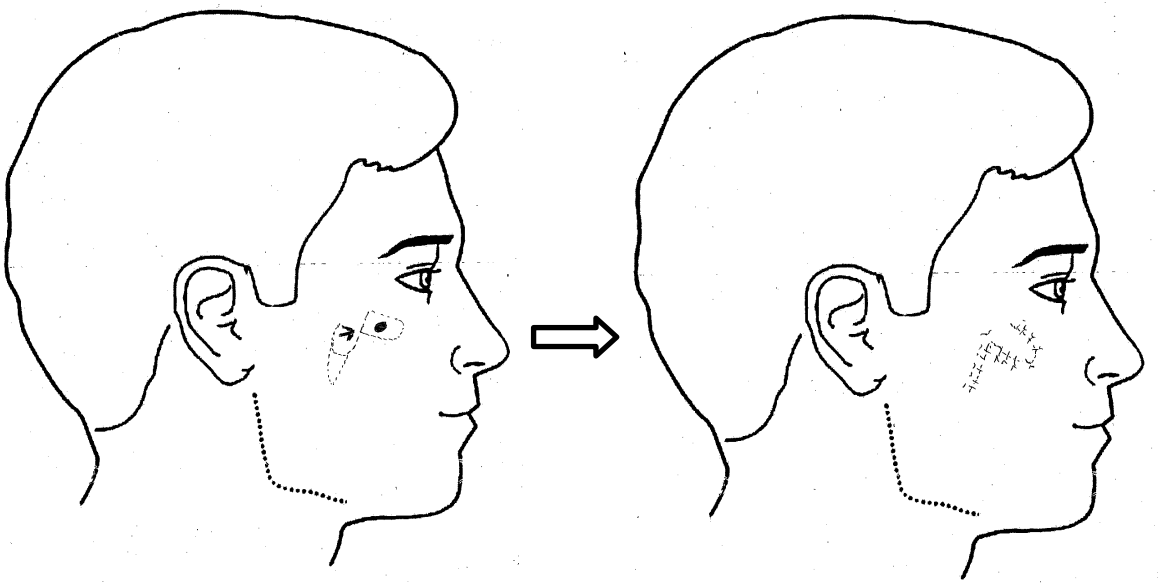
MODIFIED RHOMBIC TRANSPOSITION FLAPS



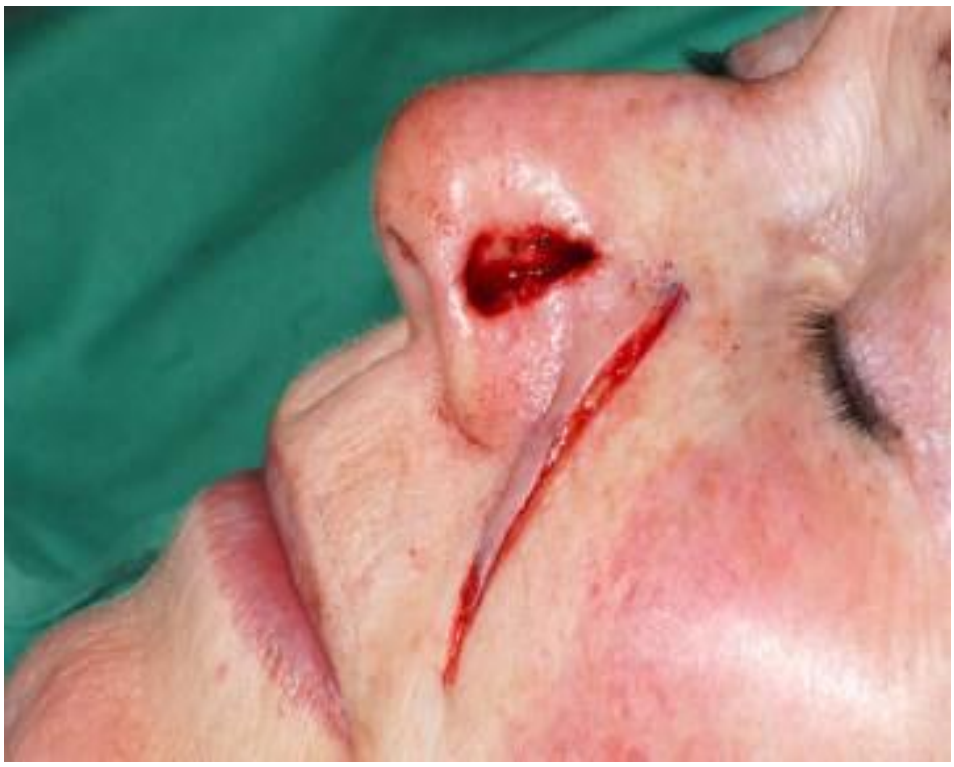


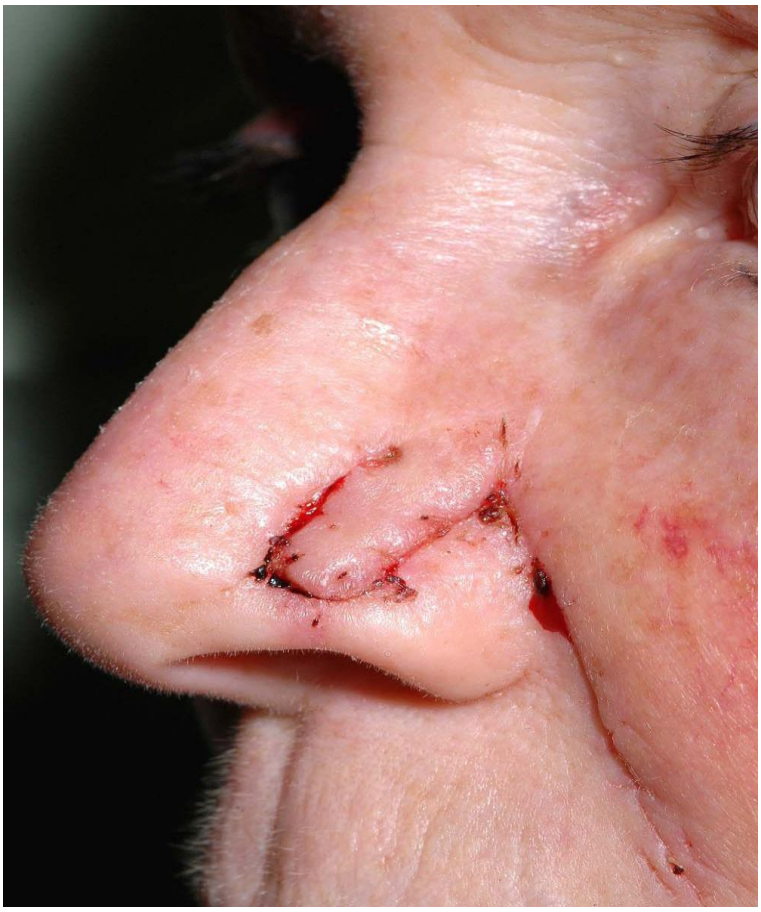






Banner design transposition flap on cheek



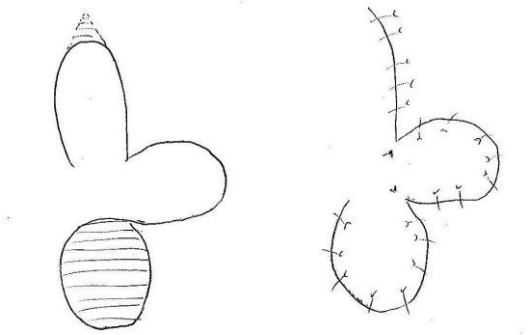


Nasolabial banner transposition flap- lower photograph taken at day 7

The Bilobed Flap

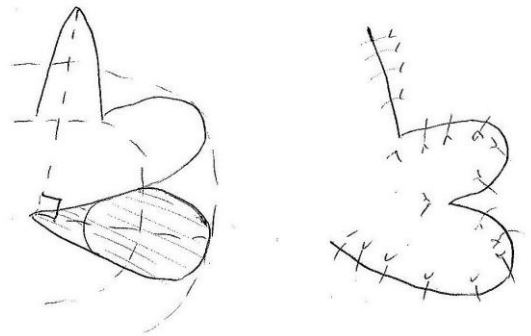
The bilobed transposition flap is a workhorse flap for many dermatological surgeons. Defects <15mm diameter on the lower 1/3 of the nose are often ideal for repair with "a bilobe" and excellent results can also be achieved in reconstruction of surgical defects on the dorsal hand, chin, neck, lips, glabella, helical rim and scalp. Consideration must be given to the placement of incisions respecting relaxed tension lines and cosmetic units as much as possible and minimising tension on free margins eg. alar rim. There should be enough laxity to allow direct closure of the tertiary defect created by the 2nd lobe of the flap moving in to the secondary defect created by the 1st lobe of the flap moving in to fill the primary surgical defect. In the original design, tissue transfer of > / = 90' between each lobe is achieved as is shown in Figure 1. This allows for maximum movement but often results in significant standing tricones. Pin-cushioning deformity of both lobes of the flap is also common with the original design. Several design modifications have been described which reduce the angle of tissue transfer between the flap lobes to < / = 45' (Figures 2 +3) reducing pin-cushioning and dog-ear formation. Minimising the arc of rotation, increases advancement as the mechanism of flap movement.
Oedema of the flap lobes is not uncommon but often settles spontaneously over 3-12 months. The main disadvantages of the bilobe flap are the length of resultant scars most of which do not follow RSTLs.
There have been several recent excellent reviews of the bilobed flap which describe variations in design and detail the precise steps to minimise complications and so optimise aesthetic outcome.
Cook

Figure 1



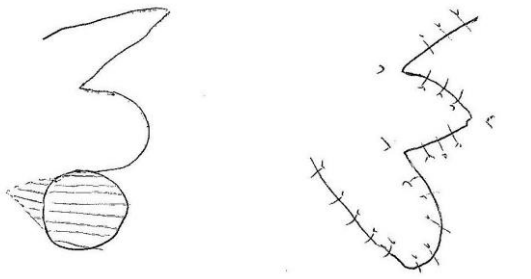
Classic bilobe design –
180' total transposition
(90' between each lobe)

Figure 2

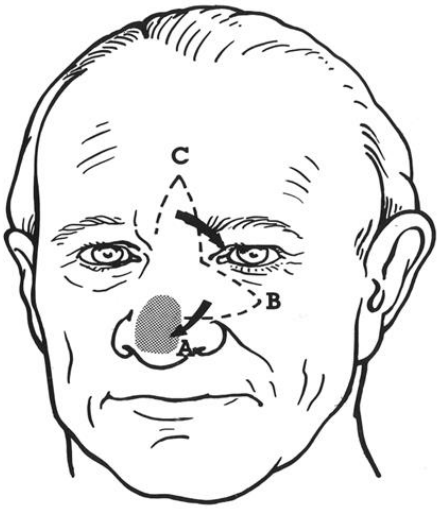


Modified bilobe design –
90' total transposition
(45' between each lobe)

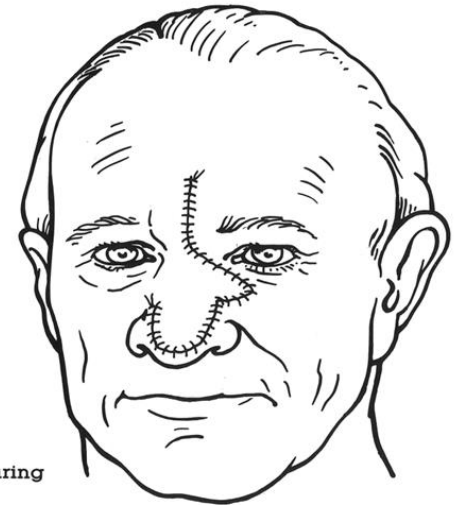
Figure 3



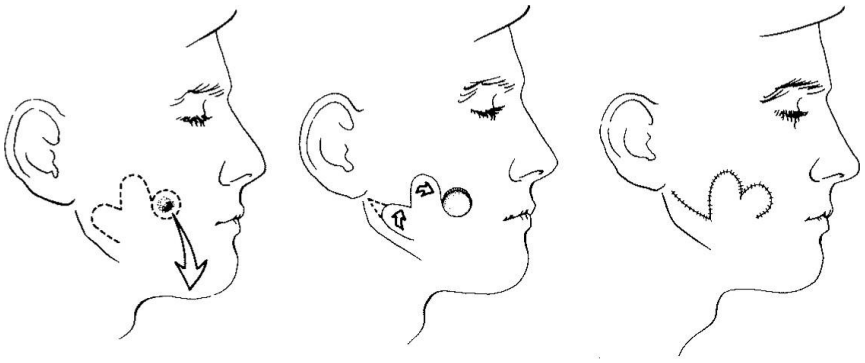
Modified bilobe design -
<90' total transposition
(<45' between each lobe)



The bilobed flap procedure.

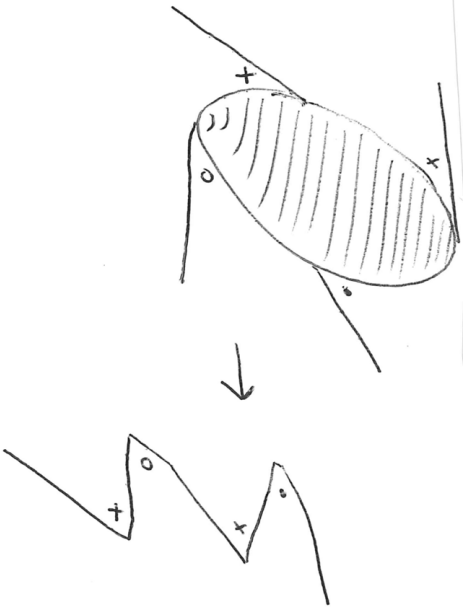


Wound after suturing is completed.

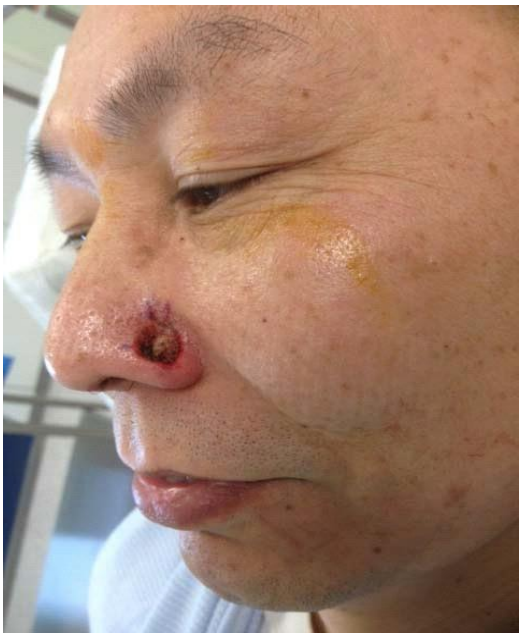


Bilobed flap to reconstruct a mid-cheek defect

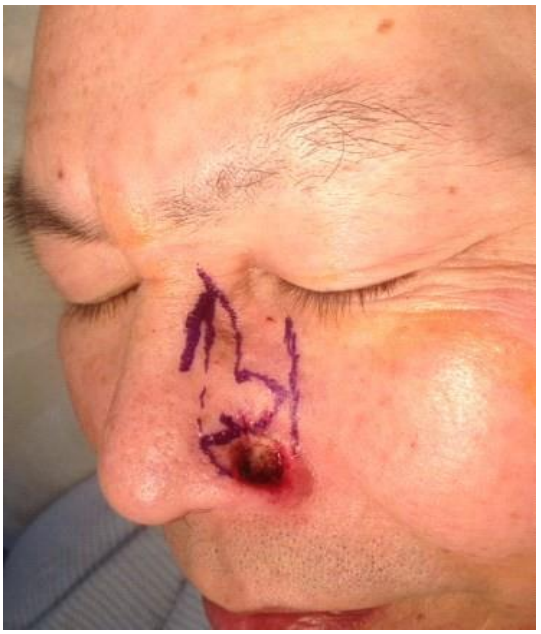
Trilobed transposition flap design



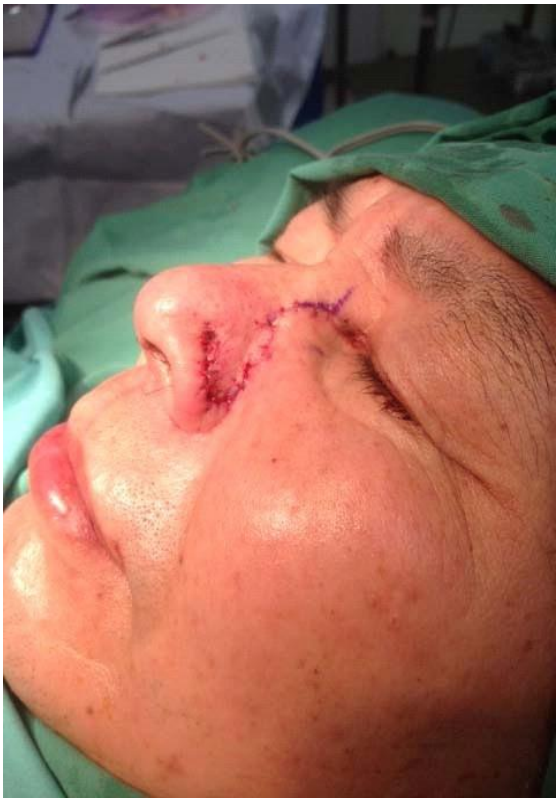
Use of 2 z-plasties to repair an oval defect



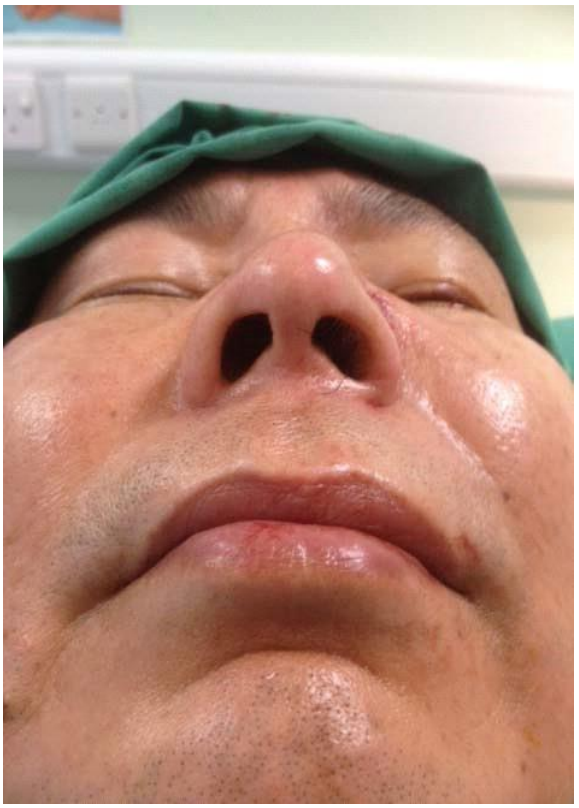
12mm diameter circular Mohs defect left lateral ala nasi



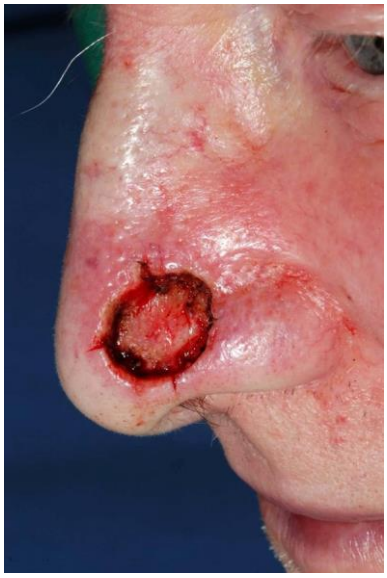
Bilobed transposition flap planned (medial base)



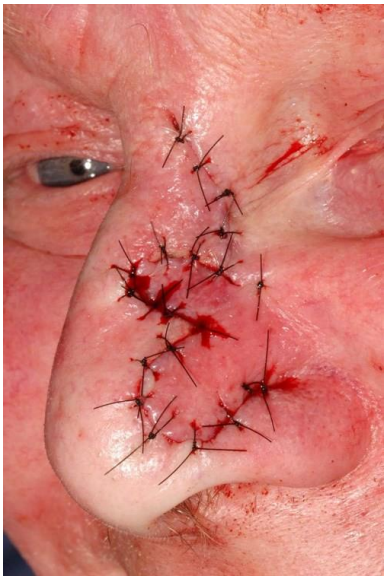
Flap inset—no alar displacement



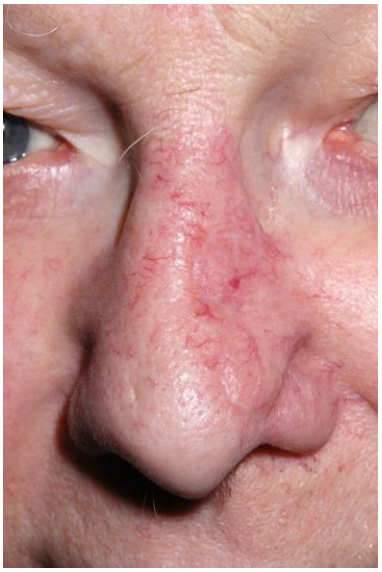
Good symmetry of nares on worm's eye view



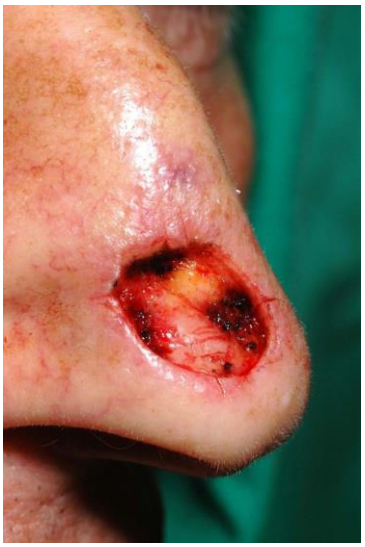
Mohs defect left ala nasi



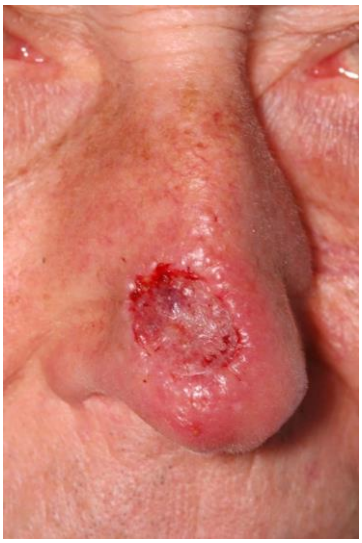
repair with a bilobed flap (lateral pedicle)



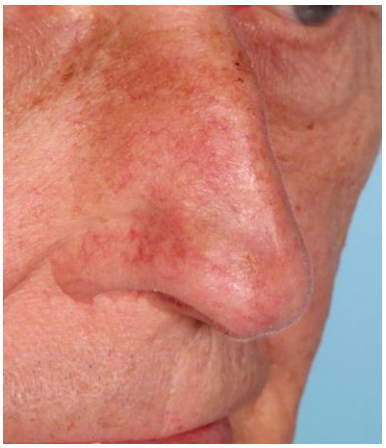
appearance at 3 months



Mohs Defect nasal tip



FTSG at 1 week



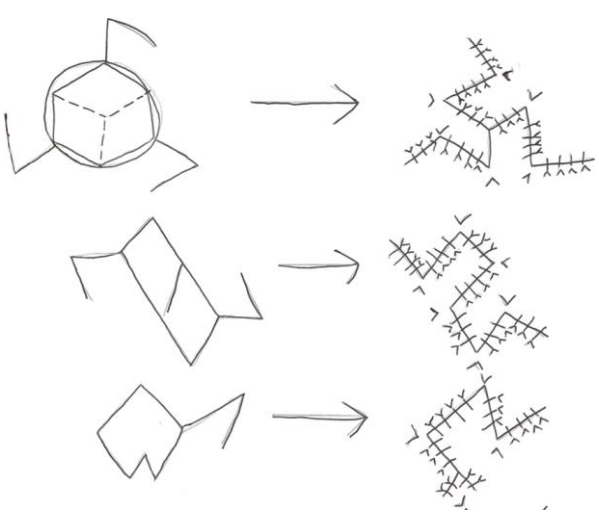
FTSG at 3 months

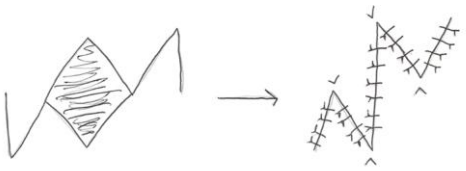
Full thickness skin grafts can be as good as or better than local skin flaps aesthetically

"If you want to climb mountains, you have to climb mountains"

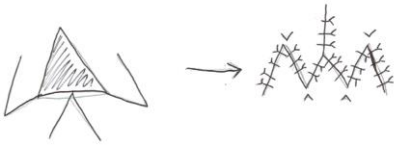
Advanced transposition flaps-recruitment from different reservoirs facilitates tension-free closure

Double Z-rhomboid plasty

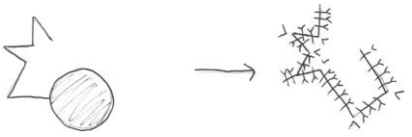




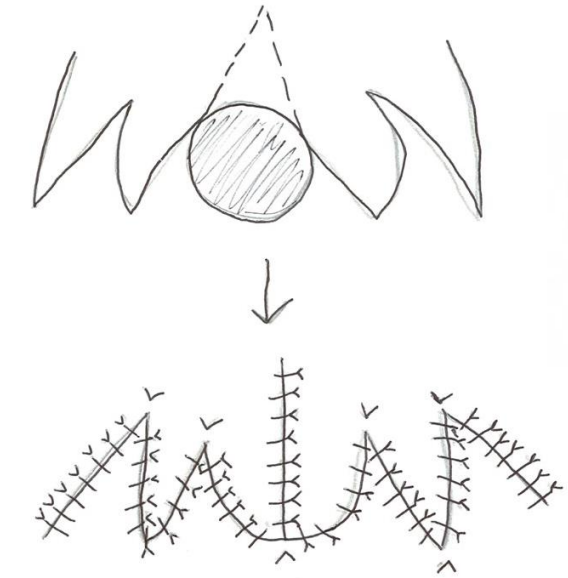
Jumping man flap

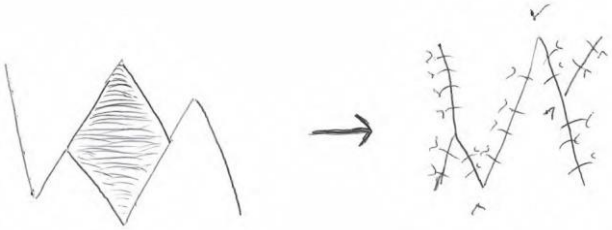


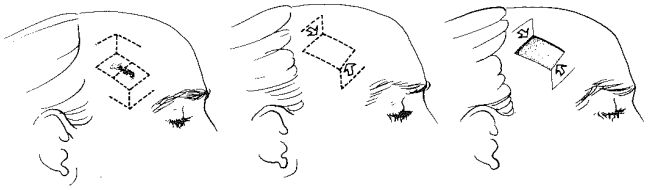
Modified rhombic with a double z-plasty



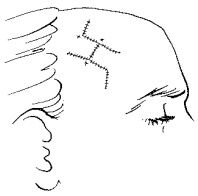
Rhomboid to w-plasty



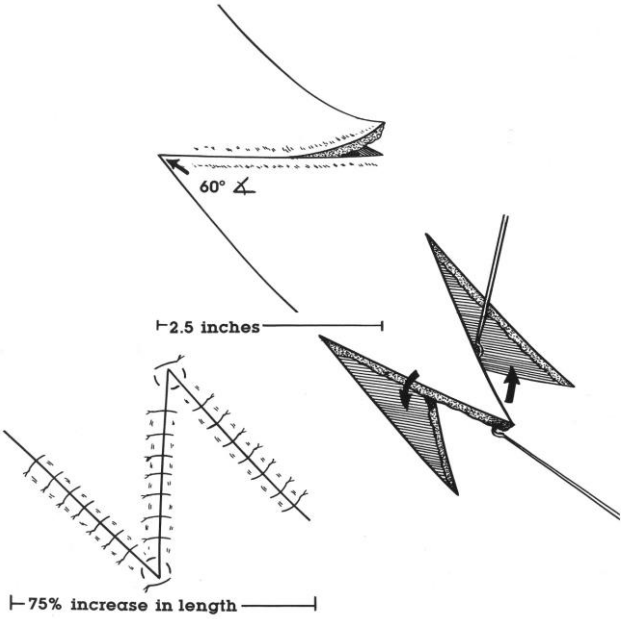




Double rhomboid flaps (W-plasty) to repair a defect on the right temple

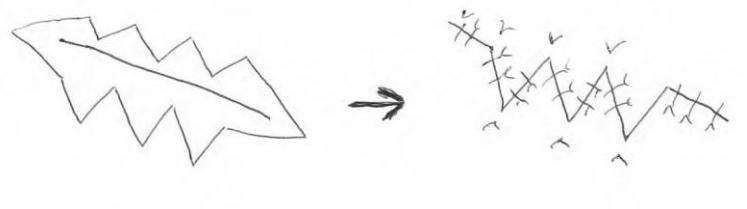


Z-plasty - used to realign scars to a more favourable orientation and to lengthen scars / contractures eg reverse ectropion, eclabian



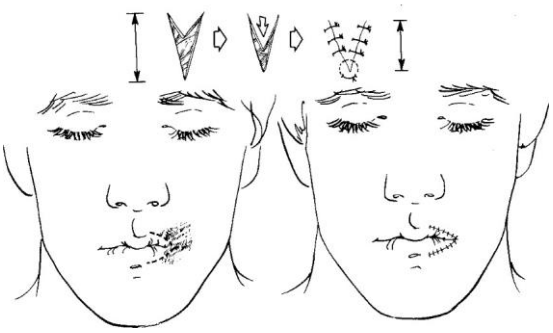
Increasing the angle at the apex of the triangle increase the amount of length gained

30 degrees	45 degrees	60 degrees
25% gain	50% gain	75% gain

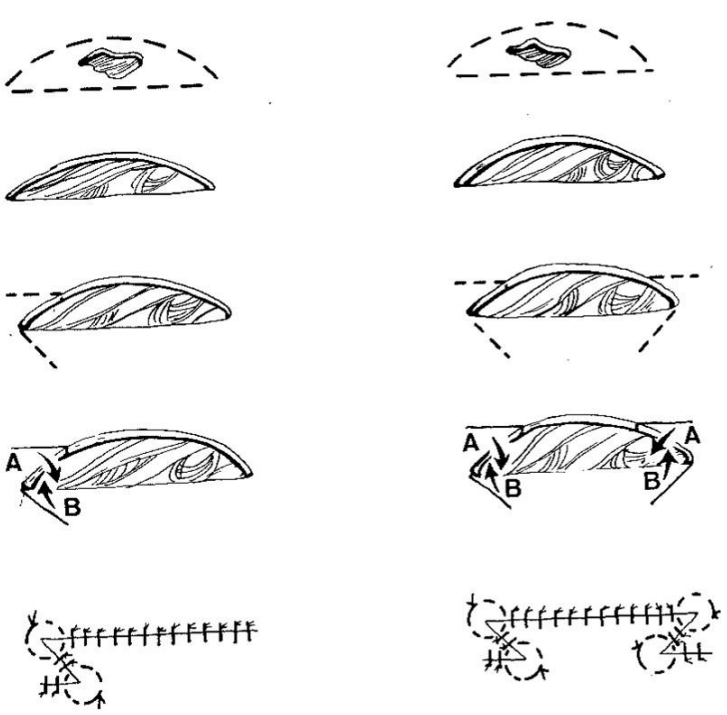


W-plasty - to break up / re-orientate a linear scar

V to Y advancement flap to lengthen / "release" a scar



The Y to V flap to shorten a scar



Repair of anticipated dog ears from a defect of unequal sides by a single or two Z-plasties

Z-plasty can also be used to facilitate movement or to help close the secondary defect in a local skin flap

APPENDIX "The harder you work, the better you are and the luckier you get"

Checklist for self-rated confidence of performing techniques during the workshop - please record your level of confidence for each bullet point by ticking in the Red (no confidence), Amber (some confidence) or Green (confident) columns

1. INSTRUMENT HANDLING

How confident do you feel in the following:	✓	✓	✓
Handling of sharps / no touch technique			
Correct insertion and removal of scalpel blade on / off handle			
Holding scalpel			
Holding needle			
Holding needle driver			
Holding forceps			
Use of skin hook			
Needle entry and exit			

2. CUTTING AND PREPARING FOR REPAIR OF DEFECTS

How confident do you feel in the following	✓	✓	✓
Eversion principle and ways to optimise it			
Incision technique			
Excision technique			
Excising a circular defect			
Ways to close a circular defect - cutaneous PSS			
Converting to a fusiform defect			
Undermining			

3. SUTURING TECHNIQUES

How confident do you feel in the following	✓	✓	✓
Simple buried dermal suture			
Simple interrupted surface suture			
Cutting sutures			
Stopping knots slipping			
Buried vertical mattress super-everting suture			
Buried horizontal mattress suture			
Tying a square knot - cutaneous			
Tying a square knot - buried			
Cutaneous vertical mattress			
Cutaneous locked vertical mattress suture			
Surface pulley suture			
Buried pulley suture			
Levelling suture			
Cutaneous purse string suture (round block advancement)			
Buried purse string suture			
Simple running cutaneous			
Running locked cutaneous			
Running hybrid mattress			
Running intradermal			
Aberdeen knot			
Sliding reef knot			
Percutaneous buried knot			
Figure of 8 suture			

4. VARIANTS OF THE ELLIPSE AND ADVANCEMENT FLAPS

How confident do you feel in the following	✓	✓	✓
S-plasty			
M-plasty			
Curvilinear crescentic excision			
Removal of standing tricones and concept of displaced Burrow's triangles			
Closing defects with sides of unequal lengths by the rule of halves			
Mercedes Benz flap			
advancement flaps:			
O to L			
O to T			
O to H			

5. ROTATION FLAPS

How confident do you feel in the following	✓	✓	✓
Classic large rotation			
Role of back-cut / dog-ear removal to facilitate movement			
Modifications - lengthening leading edge / high take off			
Smaller variants e.g. hatchet design			
Emphasise varying role of advancement v rotation according to design			
Bilateral e.g. O to Z			
Multiple e.g. pinwheel			

6. ISLAND PEDICLE FLAPS

How confident do you feel in the following	✓	✓	✓
Single deep pedicle			
Single lateral pedicle			
Bilateral pedicles			
Keystone flap			

7. TRANSPOSITION FLAPS

How confident do you feel in the following	✓	✓	✓
Classic Limberg rhombic flap			
Modified Limberg flap e.g. square peg in a round hole			
Exchange (mini banner)			
Dufourmentel			
Webster			
Bilateral			
Banner flap - classic			
Banner flap with dog-ear removal to reduce pivotal restraint			
Bilobe - classic as described by Esser			
Bilobe—modification by Zitelli			
Trilobe			
Z-plasty			

8. OTHER MISCELLANEOUS PRACTICAL SKILLS

How confident do you feel in the following	✓	✓	✓
Full Thickness Skin Graft - preparation of graft, use of pexing sutures, fenestrations			
Meshed technique to facilitate direct closure			
Punch biopsy			
Curettage			
Shave			
Saucerisation			

"Excellence is never an accident. It is always the result of high intention, sincere effort, and intelligent execution; it represents the wise choice of many alternatives - choice, not chance, determines your destiny."

Aristotle