



BSDS Guidance on Antithrombotics and Skin Surgery 2023

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Introduction

This is a scheduled update to the 2016 guidelines. A survey of the BSDS membership in 2022 showed broad support for the previous guidelines in clinical practice. A few additions were requested which we have tried to accommodate. We have brought the literature search up-to-date and reviewed the advice and flowchart summary accordingly.

We would draw your attention to some detail added:

- relating to the risk/benefit evaluation of omission of Direct Oral Anticoagulants (DOACs), and practical advice
- evidence for specific drugs on the absolute and relative risks of bleeding after skin surgery vs adverse events relating to omission for surgery
- specifics relating to Tranexamic acid use
- use of CHA₂DS₂-VAS_c tool to estimate risk of stroke

Executive summary and disclaimer:

The peri-operative management of antithrombotic drugs for skin surgery varies widely amongst dermatologists and other clinicians. A 2016 survey suggested most departments did not have access to specific guidance on skin surgery and Direct Oral Anticoagulants (NOAC/DOACs).¹ There were concerns about a lack of standardisation of care risking poor outcomes, and resulting in unnecessary last-minute cancellations of surgery causing distress and inefficiency. The BSDS therefore produced a relevant guideline, which is updated here.

The introduction of dabigatran, rivaroxaban, edoxaban and apixaban – previously termed Novel Oral Anticoagulants (NOAC) - now Direct Oral Anticoagulants (DOAC) - has changed the landscape of clinical decision-making peri-operatively. These are now more commonly prescribed than Warfarin amongst patients having skin surgery.



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This guidance has been developed to complement generic local hospital protocols that mainly relate to major internal surgery. Typically those protocols address procedures with a much larger risk to patients from bleeding than skin surgery, and what constitutes 'minor' skin surgery is often not clearly defined.² This can result in an over-cautious recommendation to stop antithrombotic therapy which may put patients at unnecessary risk.

Skin surgery varies in complexity and bleeding risk, as do the characteristics of individual patients, so temporary cessation of antithrombotic therapy is sometimes advisable on the balance of risks. We have tried broadly to classify the relative risks of different skin surgery procedures, and the main patient factors that influence problems with bleeding.

This is a guide only and clinical judgement should ultimately determine the degree of risk, particularly for complex patients. Advice from a multidisciplinary team may also be helpful.

Bleeding risk can refer both to the risk *of* bleeding and the risk *from* bleeding. We recommend the continuation of most anti-thrombotic agents for most skin surgery procedures. This is on the basis of evidence of a very low risk of morbidity and mortality from peri-operative bleeding, versus a variable risk of highly morbid or fatal thrombotic events associated with cessation.³⁻¹⁰ Many surgeons already avoid stopping any antithrombotic drugs pre-operatively.⁸ However the safety of this approach does depend on careful case selection, patient preparation and support, and the choice of therapy. Many high bleeding risk procedures could potentially be avoided altogether.

Individual patients vary in their attitudes towards balancing the risk of post-operative bleeding versus a thrombotic event. Achieving the patient's informed consent is crucial in decision-making for complex skin surgery, as recently redefined by the UK supreme court 'Montgomery' ruling.¹¹

Since the last version of these guidelines, we now have available improved safety data on the temporary cessation of DOACs if required in certain circumstances, and the use of tranexamic acid to treat or prevent bleeding problems.

Background

Risks to patients from haemorrhage or haematoma are mainly inconvenience, distress, pain, prolonged wound healing, failure of graft or flap, and wound infection. Bleeding can also lead to falls or in-patient admission in the elderly. Serious morbidity or mortality is extremely unlikely.^{3-4,9} Risk factors can be additive (e.g. multiple drugs + repair type + age >65).

Clearly meticulous operative technique is always required to minimise the risk, but bleeding problems can still occur. Excessive bleeding during surgery usually responds to more meticulous electrosurgery or vessel tying, followed by a pressure dressing and



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patient rest and elevation where possible. However some agents can cause prolonged oozing after the local anaesthetic (LA) wears off, or for several days post-operatively, even if excellent haemostasis is achieved intra-operatively. Therefore reducing this risk by postponing surgery, altering the choice of procedure or repair, or sometimes withholding medications may be prudent. It is also crucial to pay greater attention to post-operative follow-up, considering home support, and day case vs overnight in-patient stay, especially for the elderly.

Key point

Weigh up the risk factors and obtain informed consent for a plan agreed with the patient, other relevant physicians and surgeons, and the patient's family or advocate.

Risk assessment & management

Risk factors for significant post-operative bleeding events (in no particular order)

General patient factors

- Previous post-op bleeding episode
- Unable or unwilling to rest post-op
- Poor home support if bleeds
- Bleeding tendency
- Age >65

General risk of bleeding by procedure type (highest to lowest risk):

Secondary intention wounds following excision

Local flaps

Grafts

Direct closure

Curettage and electrocautery

Specific points about bleeding agents or tendencies

Aspirin

May be taken by patients without clear indication (in which case can be stopped). Unlikely to cause significant bleeding problems in isolation at 75mg once daily. If necessary stop 10 days pre-op for full reversal, 5 days for 50% efficacy.

Clopidogrel/dipyridamole

Can cause prolonged oozing. Often used for 1 year post percutaneous coronary intervention (PCI) in combination with aspirin. Consider postponing surgery until off clopidogrel if possible (e.g. surgery for BCC), especially if taking as part of dual-antiplatelet regimen. If a high bleeding risk procedure is necessary urgently, ask the prescriber for advice about the risk of stopping clopidogrel for 7 days pre-op and if a substitute drug should be used during this period.



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Warfarin

International normalised ratio (INR) targets for different indications may be 2.0-2.5, 2.5, 3.0, or 3.5. Stopping warfarin is not usually justified for skin surgery. Most procedures can continue without a significant bleeding risk where the INR is <3.5 ,²⁹ if the patient has satisfactory post-operative advice and support. For higher bleeding risk procedures, ask the prescriber to optimise dosing in advance, aiming for the lower end of the patient's therapeutic range. Take advice from GP, Venous thromboembolism (VTE) clinic or Haematology if INR reduction is needed. Point of care INR test machines (i.e. bedside finger prick with immediate results) are now readily available, and may provide reassurance or prevent cancellations.

Direct Oral Anticoagulants (DOACS)

Current evidence suggests the bleeding risk following primary closure skin surgery is not significant¹²⁻¹⁶; however the risk following more complex reconstruction is unclear.

The highest thrombotic risk patients:

- 1) Valvular atrial fibrillation (AF) - prosthetic heart valves or moderate to severe mitral stenosis and atrial fibrillation. These patients are usually on warfarin
- 2) Following VTE - the highest risk is in the first 3 months. During this period the DOAC should be continued unless discussed with the prescribing clinician. Often after 3-6 months the dose is reduced to a more prophylactic dose with lower bleeding risk so there may be the possibility of delaying the procedure.
- 3) Clinicians should consider using the CHA₂DS₂-VAsc score (see table 1 and 2) to calculate stroke risk. Scores of 5 or above are considered higher risk.¹⁷⁻¹⁸

If both bleeding and thrombotic risks are deemed high, change to a lower risk procedure type where possible following an informed discussion with the patient.

Lower thrombotic risk patients (e.g. non-valvular AF):

If there is concern about bleeding, stopping the DOAC 24-48 hours prior to the procedure should pose a low risk.¹⁷⁻¹⁹

How long pre-op to stop DOAC:

1. No renal failure i.e. eGFR >50 ml/min: stopping 24 hours prior to the procedure and restarting 24 hours after is likely to be sufficient to remove the majority of anticoagulant effect, given the short half-life of these medications.¹⁸
2. Renal failure i.e. eGFR <50 ml/min: consider stopping 48 hours prior to the procedure as the half-life is prolonged.¹⁸

N.B. eGFR will overestimate renal function in patients with lower than average muscle mass or body weight, which could lead to stopping too late. The converse is true for those with higher than average muscle mass or body weight. Creatinine clearance can be used for greater accuracy if required.



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When to re-start DOAC post-op:

DOAC peak activity is approximately 3hrs after administration. Re-start when haemostasis secure (usually 24hrs post-op or next day).

Fondaparinux, heparin, prasugrel, danaparoid, ticlodipine

Usually used for acute illness or in-patients. Ask prescriber advice & postpone procedures if possible. Small biopsies can usually proceed without delay. Low molecular weight heparin (LMWH) prophylactic dose usually low risk to proceed if necessary but for treatment dose (e.g. for DVT/PE/MI) take advice.

Combinations of multiple drugs

Potential to increase the risk of bleeding significantly.²⁰⁻²¹ If procedure has high bleeding risk, delay where possible until patient on monotherapy (e.g. for patients on dual anti-platelet treatment following percutaneous coronary intervention). If urgent, consider taking advice on modification of regimen, or changing the procedure.

Low platelets or other bleeding tendencies

If platelets are low as an isolated risk factor, but more than $50 \times 10^9/L$, most procedures can proceed as normal. For disorders of platelet function or procedures at high risk of bleeding take advice from Haematology about platelet transfusion pre-op. Other bleeding disorders will also need tailored advice. N.B. Some patients may be asked to take aspirin despite having a low platelet count, which will increase their bleeding risk.

Herbal remedies and supplements that can increase bleeding

Most other surgery guidelines advise discontinuation of all supplements (including herbal teas) at least 2 weeks pre-operatively, although this addresses all risks including for general anaesthesia interactions, not just bleeding.⁶ Examples include (but are not restricted to): Garlic, Ginger, Ginkgo, Ginseng, Saw Palmetto, Fish Oil (e.g. cod liver), Chamomile, Feverfew. Many can promote bleeding (and other relevant effects). However for skin surgery these are only likely to be significant for patients also taking other antithrombotic agents, or those at high risk from post-operative bleeding.²³⁻²⁴

Thrombotic risks from stopping anticoagulation or antiplatelet drugs

There is general agreement in the skin surgery literature that medications such as anti-platelet drugs (e.g. aspirin and clopidogrel) and warfarin (where the INR is <3.5) can be continued without a significant risk of bleeding following skin surgery when taken as a monotherapy.^{4, 6-7, 25}

Cases of stroke, VTE, myocardial infarction, and death have been reported in association with stopping anticoagulation peri-operatively for skin surgery. However these are uncommon, and there is a baseline risk of thrombotic complications (about 0.6-1.1% peri-procedural risk in meta-analysis of elective procedures) even when antithrombotic medications are continued.^{19,16-28}



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The risk of thrombosis from stopping DOACs is likely to be very low due to their predictable pharmacokinetic profile and short half-life, which allows them to be stopped for a very short period peri-operatively (see above).^{17,19,28-30}

The highest thrombotic risk patients:

- 1) Thrombotic event on an anticoagulant in the past
- 2) Prosthetic heart valve (especially mitral)
- 3) Valvular atrial fibrillation (AF) - prosthetic heart valves or moderate to severe mitral stenosis
- 4) Following VTE - the highest risk is in the first 3 months
- 5) Clinicians should consider using the CHA₂DS₂-VAsc score (see table 1 and 2) to calculate stroke risk. Scores of 5 or above are considered higher risk.^{17-18,31}

For these patients, if a drug needs to be stopped for an urgent procedure with high bleeding risk, then bridging therapy with a shorter half-life medication may be required, especially if the patient is on warfarin. Take advice and discuss alternatives.

Tranexamic acid

Tranexamic acid can be applied topically, injected into the wound, taken orally or administered intravenously.

The benefit for reducing intraoperative bleeding and need for transfusion has been clearly demonstrated in major surgery,³² but there is less evidence of benefit in minor surgery. A systematic review of plastic surgery procedures suggested use of tranexamic acid (including topical, subcutaneous, oral and intravenous administration) is safe without increasing the risk of thrombotic events.³³ Large meta-analyses also suggest the safety of tranexamic acid in surgery, specifically looking at intravenous dosing, including in patients with a history of thromboembolism.³⁴ A randomised controlled trial (RCT) demonstrated reduced intraoperative bleeding during skin surgery following subcutaneous injection of tranexamic acid (100mg / ml diluted 1:1 with lidocaine 2%).³⁵ Further evidence is required assessing reduction of post-operative bleeding complications from topical or injected administration versus oral administration.

Based on current evidence in skin surgery, topical, subcutaneous or oral tranexamic acid may be considered on an individual basis when there is a high risk of bleeding problems or to help manage post-operative bleeding. It is not licensed for these indications, but is used orally at 1g 3 times per day for 4-7 days for other indications.⁴⁰ Where there is uncertainty regarding risk and benefit, discussion with Haematology is advised. Based on current evidence, it is difficult to rule out a small risk in patients at high risk of thromboembolic events e.g. those with a metallic heart valve, high CHA₂DS₂-VAsc score or recent VTE.

General tips to reduce the risk of bleeding:



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- Consider postponing surgery until risk factor(s) can be removed or optimised
- Choose safer procedure type if possible, or alternative treatment if sufficiently effective (e.g. radiotherapy or non-surgical)
- Increase home support or admit patient overnight (e.g. ask a relative to stay with them, or refer to another surgeon with in-patient capacity)
- Elevate and compress post-op
- Change operative setting (e.g. to improve equipment access, nursing support or more suitable operator)

Paediatric patients

The same principles apply as for the rest of this guidance. However it is much less common for children to be prescribed antithrombotic medication, so specific advice case-by-case is recommended. Skin surgery for children is usually of low bleeding risk, and those taking antithrombotics are likely to be at high thrombotic risk, therefore usually the continuation of the medication might be expected.

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Table 1- Assessment of stroke using CHA₂DS₂-VAsc

CHA₂DS₂-VAsc	Score
Congestive cardiac failure	1
Hypertension	1
Age ≥ 75 y	2
Diabetes Mellitus	1
Stroke / TIA / TE	2
Vascular disease (prior MI, PAD, aortic plaque).	1
Age 65 – 74 y	1
Sex category (i.e. female sex)	1

Table 2 - CHA₂DS₂-VAsc and annual stroke risk³⁶⁻³⁷

CHA₂DS₂-VAsc	Annual risk of stroke (%)
0	0-0.2
1	0.6 – 1.3
2	1.6 – 2.2
3	3.2 – 3.9
4	1.9 – 4.8
5	3.2 – 7.2
6	3.6 – 9.8
7	8 – 11.2
8	10.8 – 12.5
9	12.2 – 15.2



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Table 3 - Summary of most commonly used anti-thrombotic medications and advice

Anti-thrombotic	Bleeding complication risk	Thrombotic risk from stopping peri-operatively	Advice
Aspirin	Low risk	Low risk if taking as primary prevention. High risk if secondary prevention of stroke or recent acute coronary event (particularly first 3 months).	Continue
Clopidogrel	Low risk for primary closures Medium risk for complex procedures e.g. flaps and grafts.	Low risk if taking as primary prevention. High risk if secondary prevention of stroke or recent acute coronary event (particularly first 3 months).	Usually continue Consider postponing high bleeding risk procedures
Warfarin	Low-Medium risk if INR <3.5 High risk >3.5, particularly for complex procedures e.g. flaps and grafts.	Unclear risk, but likely low for lower risk patients e.g. non-valvular AF, >3 months following VTE. Risk likely significant for patients at higher risk of thrombosis e.g. valvular AF, <3 months following VTE, or CHAD CHA ₂ DS ₂ -VAsc score >4.	Continue if INR <3.5
DOAC	Low-Medium for primary closures.	Low or none for lower risk patients e.g. non-valvular	Continue for standard primary closures.



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	Unclear for more complex reconstruction – moderate to high (post-operative haematoma risk / persistent ooze)	AF, >3 months following VTE. Unclear risk if higher risk of thrombosis e.g. valvular AF, <3 months following VTE, or CHAD CHA ₂ DS ₂ -VAsc score >4.	For higher risk procedures (e.g. flaps and grafts), consider stopping for 24-48 hours pre-op depending on renal function, unless higher thrombotic risk (e.g. valvular AF, <3 months following VTE, or CHAD CHA ₂ DS ₂ -VAsc score >4.)
Dual anti-platelet treatment / combination therapies	Medium - high risk	Often taken following PCI, therefore high risk from stopping.	Continue for low risk procedures. Consider delaying procedure if low risk lesion e.g. BCC.



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Table 4 - Key operating tips for managing bleeding:

General

- Consider screening for hypertension and asking GP to optimise BP control³⁸
- Book longer procedure time
- Leave local anaesthetic (LA) to work for longer until adrenaline fully active (i.e. 15-20 mins)
- Use higher concentration of adrenaline if volumes safely allow (i.e. 1:80,000 vs 1:200,000)
- Consider adding tranexamic acid to the LA (e.g. 100mg/ml diluted 1:1 with lidocaine 2%)

Anatomy, positioning and visualisation

- Pay attention to the anatomy of any named vessels expected in the operating field anticipate their position and be ready to clamp/tie/electrocoagulate; especially:
 - superficial temporal artery
 - angular artery (by the nose)
 - facial artery (over the mandible)
- Use good operating light; positioning can help; consider magnifying loupes+-lamp
- Consider using fine suction or sterile cotton buds to help find bleeding points
- Elevate operative site above heart level if possible

Undermining

- Avoid undermining in higher risk patients unless essential (many wounds will close without undermining).
- Visualise undermining areas (avoid damaging nearby vessels under the edge)
- Undermine in the correct plane for the anatomical area.

Electrosurgery

- Use bipolar electrosurgery (preferably with a specific coagulation optimised machine)
- Use swabs/pressure/assistant to ensure you can see into the operating field to find the bleeding points - this will be quicker and more effective than blind electrosurgery.
- Remember superficial char may work temporarily but can dislodge later. Find the bleeding point and hold the tip(s) in contact for deeper coagulation (i.e. desiccate not fulgurate).
- Remember fluid or tissue (e.g. fat) with high water content conducts too well (i.e. low resistance) to create the heating that is required for effective coagulation - that is why you must blot away any blood, and target the fat septae or vessels, not adipocytes.
- Address any vessels seen straight away whilst you can see them rather than going back later (they may have constricted and contracted away from the wound edge by then, so you won't find them until the LA wears off)
- Tie off any vessels or areas of persistent bleeding if they don't respond quickly to electrosurgery

Post-op

- Use pressure dressings where possible
- For open wounds consider an alginate dressing to absorb exudate and may aid haemostasis
- Remind the patient to elevate the area and rest post-op for 48hrs minimum
- Unless low risk procedure, observe higher bleeding risk patients in recovery for minimum 60 mins post-op (to allow time for LA to wear off)⁴
- In rare cases tranexamic acid can be obtained from any trauma areas. Inject into wound or pour vial onto gauze and apply to wounds that will not stop bleeding otherwise.⁶