ACTAS Dermo-Sifiliográficas 113 (2022) T67–T71

ACTAS
Dermo-Sifiliográficas

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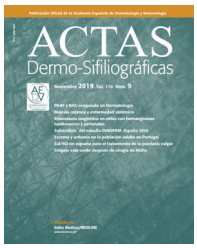

PRACTICAL DERMATOLOGY

[Translated article] Safety in Dermatologic Procedures: How to Prevent, Recognize, and Treat Bleeding Complications in Dermatologic Surgery☆

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Received 17 March 2021; accepted 23 May 2021

KEYWORDS
Hemorrhage;
Dermatologic surgery;
Oral anticoagulants

Abstract Bleeding complications during dermatologic surgery are uncommon and usually minor, but bleeding occasionally leads to infection, wound dehiscence, or flap/graft necrosis. This review covers the keys to preventing, recognizing, and treating excessive bleeding during and after surgery.

PALABRAS CLAVE
Hemorragia;
Cirugía dermatológica;
Anticoagulantes orales

Seguridad en procedimientos dermatológicos: hemorragia quirúrgica en cirugía dermatológica. Cómo reconocerla, prevenirla y tratarla

Resumen Las complicaciones por hemorragia quirúrgica en la cirugía dermatológica son infrecuentes y poco relevantes en la mayoría de los casos. En algunas ocasiones la hemorragia quirúrgica puede conllevar infección de la herida quirúrgica, dehiscencia de sutura o necrosis del colgajo/injerto. En esta revisión se muestran los aspectos más importantes para prevenir, reconocer y tratar este tipo de complicaciones durante el acto quirúrgico y tras él.

DOI of original article:
https://doi.org/10.1016/j.ad.2021.05.014
☆ Please cite this article as: Iglesias Zamora ME, Aróstegui Aguilar J. Seguridad en procedimientos dermatológicos: hemorragia quirúrgica en cirugía dermatológica. Cómo reconocerla, prevenirla y tratarla. Actas Dermosifiliogr. 2022;113:67–71.
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https://doi.org/10.1016/j.ad.2021.05.024

Table 1 HAS-BLED Scoring System.

Hypertension >160 mmHg (1 point)
Abnormal kidney or liver function (1 point for each)
Stroke: clinical history of stroke (1 point)
Bleeding: history of bleeding or predisposition to hemorrhage. Alterations in platelet aggregation/adhesion (Von Willebrand disease, Marfan syndrome, etc.), hereditary coagulation disorders (hemophilia A/B), Rendu-Osler-Weber syndrome, Ehlers-Danlos syndrome, etc. (1 point each)
Labile INR >3.5 (1 point)
Elderly: age >65 years (1 point)
Drugs: antiaggregants or anticoagulants (34% and 7.2% of operated patients, respectively), NSAIDs (6.1% of operated patients), alcohol, herbal products, or vitamin supplements[1] (1 point each)
Other: anatomical location, size of defect, surgical technique

Abbreviations: INR, international normalized ratio; HT, hypertension; NSAID, nonsteroidal anti-inflammatory drugs.
HAS-BLED evaluates the risk of bleeding complications based on the indicated parameters.
Significant risk of intervention-related bleeding if score $\geq$3.

Description of the Complication: How is an At-Risk Patient Identified?

While complications in dermatological surgery are infrequent, a considerable proportion are due to major perioperative or postoperative bleeding (i.e. bleeding that does not subside with compression measures). In a study of a large series of patients who underwent Mohs micrographic surgery, complications occurred in approximately 2% of patients, and corresponded to postsurgical bleeding in 40% of cases.[1] Although this complication does not usually have major implications (a decrease in hematocrit requiring blood transfusion occurred in very few cases), it can occasionally lead to infection of the surgical wound, suture dehiscence, or necrosis of the flap or graft.[1]

Bleeding is defined as a noncircumscribed accumulation of blood that infiltrates tissues after rupture of a blood vessel wall. A hematoma is defined as the localized collection of usually coagulated blood in an organ, space, or tissue due to rupture of a blood vessel wall. Hematoma formation consists of 4 stages: early formation (I), gelatinous (II), organized (III), and liquefaction (IV) stages.[1] It is important to detect the hematoma as early as possible to avoid the aforementioned complications.

It is essential to recognize the possibility of bleeding both during and after the intervention, and to perform a meticulous medical history and physical examination in the consultation before surgery. Indices such as the HAS-BLED2 are useful to assess a patient's risk of bleeding (Table 1).

Other factors to take into account are the anatomical location and the surgical technique performed, although some authors have reported no significant differences in bleeding risk between different surgical procedures.[5] Larger defect size, administration of perioperative antibiotics, and a history of hidradenitis suppurativa are associated with an increased risk of bleeding.[6]

Three specific regions are associated with a higher risk of bleeding: the frontotemporal region, where the temporal artery is located; the mandibular rim, over which the facial artery runs; and the area adjacent to the nose, where the angular artery runs.[1] Other regions that in our experience are associated with a greater risk of bleeding include the genital region (especially in interventions involving the scrotum and vulva) and the flexures (armpits and groin). Furthermore, in areas such as the periorbital or cervical regions formation of a hematoma entails significant risk of compression of neighboring structures due to the mass effect (and greater risk of tissue necrosis or surgical wound dehiscence).[1]

Prevention

Different measures can be taken before the intervention to prevent both perioperative and postoperative bleeding. Twenty years ago, anticoagulant and antiplatelet treatments were withdrawn to prevent bleeding in most patients undergoing dermatological surgery. Nowadays, the trend is to maintain these therapies, especially in cases of minor outpatient surgery. Given the usually minor implications of surgical bleeding complications and the serious consequences of thromboembolic phenomenon after surgical intervention when anticoagulant therapy is withdrawn (despite the low frequency of these episodes), we recommend making the decision to withdraw treatment on a case-by-case basis.

Acetylsalicylic acid does not appear to increase the risk of surgical bleeding, and therefore withdrawal of antiplatelet therapy is not recommended. Patients who take clopidogrel have a higher risk of bleeding than those not receiving anticoagulation or antiplatelet therapy. Nonetheless, given the low severity of bleeding episodes, continuation of this treatment or replacement with acetylsalicylic acid is recommended.[3] For patients receiving dual antiplatelet therapy (e.g. acetylsalicylic acid + clopidogrel) there is no clear consensus on the appropriate course of action. In these patients the risk of bleeding appears to be greater than in patients receiving antiplatelet monotherapy, and therefore it is recommended to reduce antiplatelet therapy to a single agent if possible.[7]

In patients receiving anticoagulant therapy, the international normalized ratio (INR) should first be assessed, when possible, as in the case of acenocoumarol (Sintrom), and postponement of the intervention should be considered if the value exceeds 3.5.[8]

There is little information on the preoperative management of patients being treated with new direct oral

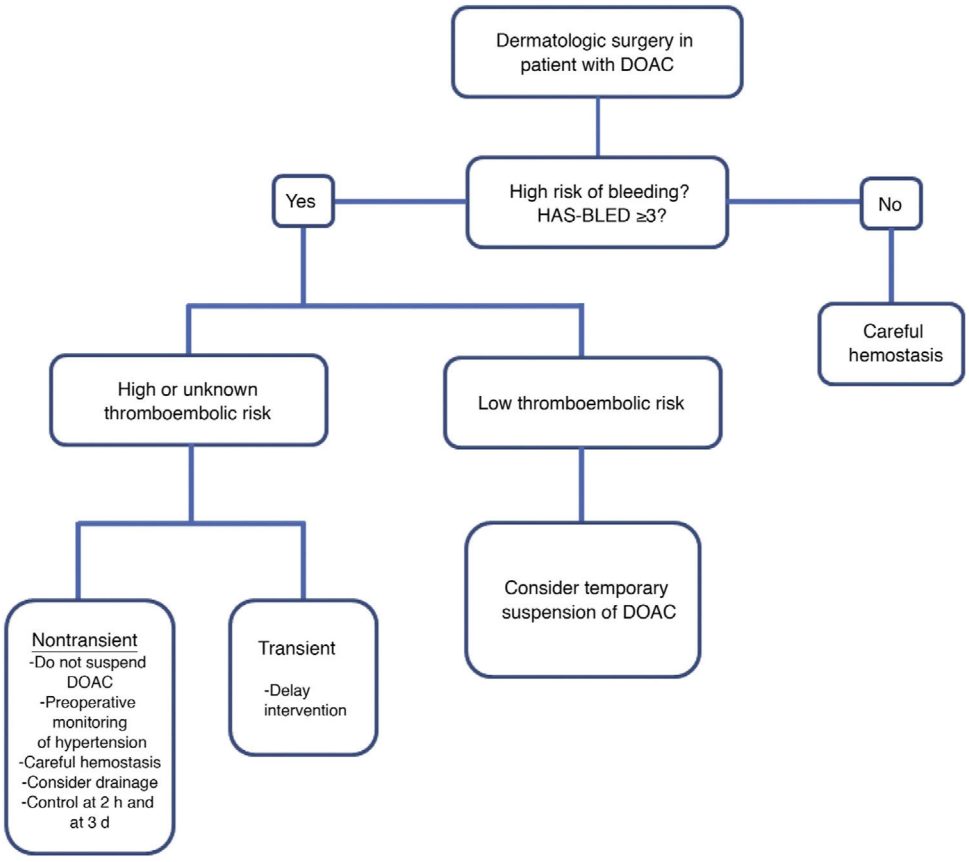

Figure 1 Dermatological surgery: management of patients receiving direct oral anticoagulation therapy. *High thromboembolic risk in patients with any of these characteristics: recent venous thromboembolism (<90 days), active malignancy, severe thrombophilia, atrial fibrillation with a CHADS2 score of 5–6 or a CHADS2-VASc score of 7–9, stroke <90 days or mechanical heart valve (mitral or aortic, tipping disc or balloon type, multiple mechanical valves, or recent cerebral ischemia [<6 months]). Abbreviations: DOAC, direct oral anticoagulants.
Modified from Cabezas Calderón et al.[2]

anticoagulants, which are prescribed with increasing frequency. Figure 1 shows the algorithm for the management of patients undergoing treatment with these drugs.[2]

As mentioned above, nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used to control pain and inflammation. Given the potential risk of bleeding caused by this type of drug, it is recommended to discontinue treatment 1 week before surgery until up to 2 days after the intervention. It is advisable to manage postoperative pain with paracetamol or metamizole.[1]

Given that blood pressure (BP) is a risk factor for bleeding, it is recommended to perform the intervention provided the patient has a systolic BP $\leq$ 160 mmHg or a diastolic BP $\leq$ 100 mmHg (BP monitoring before and during the intervention is advisable). If the patient's BP exceeds the aforementioned values, the intervention should ideally be postponed until values are brought to within the recommended range.[1,2]

Table 2 lists the points that should be taken into account to prevent intraoperative bleeding.

In our experience, patients who undergo general anesthesia may experience an increase in BP in the recovery room after the intervention, with a consequent increase in the risk of bleeding due to improperly ligated or coagulated vessels. For this reason, we believe it is useful to evaluate the intervened area a few minutes after surgery to rule out the presence of postoperative bleeding.

It is also advisable to apply a compression bandage during the first 24 hours in at-risk patients or after risky interventions. After 24 hours the efficacy of this measure likely decreases. It is also important to instruct the patient about correct care of the postoperative wound and any warning signs about which the surgeon should be notified (e.g. bleeding or hematoma, necrosis of the flap or graft, dehiscence, or infection). Ideally the patient should not consume alcohol in the first 7 days after the intervention owing to its vasodilatory effect.[11]

Treatment

As mentioned above, bleeding in dermatological surgery does not usually have major implications, and in most cases can be controlled using compression for a maximum of 15 to 20 minutes. In cases of severe bleeding the affected vessel can be compressed. This allows time for platelet adhesion and initiation of the coagulation cascade, as well as application of other techniques to stop the bleeding.[4] As indicated

Table 2 Preoperative, Intraoperative, and Postoperative Prevention of Surgical Bleeding.

Preoperative prevention	Intraoperative/postoperative prevention
Determine risk of bleeding prior to intervention (see Table 1)	Reverse Trendelenburg position
ASA 300 mg/clopidogrel 75 mg: do not suspend	Local anesthesia with epinephrine
Acenocoumarol (customize HAS-BLED risk): if INR >3.5, consider substitution or postpone intervention	Tumescent anesthesia[9,a]
DOAC (adjusted according to renal function)[2]:	Tranexamic acid[10,b]:
Suspend 24 h before intervention	Oral or intravenous (maximum effective dose, 1 g/8 h)
Reintroduce 6–12 h after intervention	Subcutaneous (lidocaine 2% + TXA 100 mg/mL, delivered in a volume of 1–6 mL)
	Contraindications: severe kidney disease, hypersensitivity, acute arterial/venous thrombosis, history of seizures, disseminated intravascular coagulation
NSAIDs: suspend 1 wk before	Careful surgical technique
Blood pressure <160/100 mmHg	Apply compression dressing/bandage (first 24 h)
If greater: treatment to decrease value	Insert drain in cases of large flaps or detachments with marked bleeding and in patients with very high risk of postsurgical bleeding

Source: Bunick et al.,[1] Davila and Garcia-Doval,[9] and Zilinsky et al.[10]
Abbreviations: ASA, acetylsalicylic acid; DOAC, direct oral anticoagulants; INR, international normalized ratio; NSAIDs, non-steroidal anti-inflammatory drugs; TXA, tranexamic acid.
[a] Safe technique, which consists of the introduction of a large volume of diluted anesthetic and adrenaline. This ensures sufficient anesthesia with a reduction in bleeding and easier dissection for the surgeon.
[b] Several studies in animals have demonstrated a theoretical risk of decreased graft/flap survival after application of tranexamic acid. However, this has not been demonstrated in studies in human patients, and further studies of this possible complication are required.

Table 3 Treatment of Bleeding.

Intraoperative bleeding	Postoperative bleeding[1,10]
Compressive measures (15–20 min)	Tranexamic acid (oral, intravenous, or subcutaneous)
Electrocoagulation[a]: limited to the bleeding vessel (avoiding damage of adjacent tissue)[b]	Hematoma, first 24 h:
Ligation of vessels >2 mm in diameter[4]	- Manual compression, bandage
	- No remission: reintervention and electrocoagulation/ligation of site of bleeding
	Drain placement
Superficial bleeding:	Late hematoma:
• Caustic hemostatic agents[1]:	- Observation if small
- Aluminum chloride	- Material extraction if larger (reintervene)
- Ferric sulfate 20%	Given the high risk of infection, it is advisable to add antibiotic treatment or to closely monitor the patient
- Silver nitrate	
• Noncaustic hemostatic agents[1,c]:	
- Gelatin sponges (Gelfoam)	
- Oxidized cellulose (Surgicel)	

Source: Bunick et al.,[1] Henley et al.,[4] and Zilinsky et al.[10]
[a] In the case of patients with a pacemaker or implantable automatic defibrillator, it is recommended to use a bipolar electric scalpel, which has a greater safety profile (the current flows between 2 electrodes placed in the area of application, and does not flow through the patient).[12].
[b] In cases of deeper bleeding, diffuse oozing may occur, requiring more extensive and less specific electrocoagulation.
[c] Useful in procedures such as punch biopsy, healing by second intention, or interventions in which the wound remains open for extended periods (e.g. margin control surgery, Mohs surgery).

in Table 3, other therapeutic options in cases of intraoperative bleeding include ligation or electrocoagulation of the affected vessel.

A case series of 9154 operated patients found that 7.4% presented some form of postoperative bleeding, which in most cases (87.5%) was controlled by applying pressure or replacing bandages.[6] Intervention by a dermatologist was required in 12.5% of postoperative bleeding cases; electrocautery was used to stop bleeding in 10% of cases; and bleeding was considered severe in only 2.2% of patients.[6] Table 3 describes the management of patients with post-

surgical bleeding, differentiating between hematoma within the first 24 hours and late hematoma.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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