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Dispelling myths in dermatologic surgery

Mondana H. Ghias[1], Norhan Shamloul[2,3], Amor Khachemoune[4] ✉

Abstract

Several common practices and widely accepted principles implemented in dermatologic surgery are based on perpetuated beliefs not supported by evidence-based medicine. After evaluating the validity of misconceptions in dermatologic surgery, updated recommendations include restriction of antibiotic prophylaxis to patient-specific risk factors, continuation of anticoagulant therapy perioperatively, safe use of epinephrine for digital anesthesia, clean technique as an efficacious substitute for sterile, topical emollients and petroleum instead of antimicrobials to prevent surgical site infection, alternatives to elliptical excisions for decreasing scar length, wound eversion for areas of greater cosmetic concern, and cessation of systemic retinoids as an unnecessary prerequisite for most cutaneous procedures. Surgical procedures in dermatology are not as conducive to extensive validation studies, leading to the propagation of myths based on anecdotal evidence. Although current reports in the literature discredit several misconceptions, well-designed and adequately powered randomized studies are needed to verify optimal procedural guidelines.

Keywords: dermatologic surgery, myths, antibiotic prophylaxis, digital anesthesia, sterile technique, surgical site infection

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Introduction

Numerous practices in dermatologic surgery are deep-seated, based on experience and accepted beliefs that are not supported by evidence-based medicine. Although medications undergo extensive trials required by the Food and Drug Administration, surgical practices are not as conducive to rigorous validation methods. As a result, medical professionals often rely on their predecessors' expertise and carry out similar techniques as the standard of care. This leads to the perpetuation of several myths based on anecdotal evidence within dermatologic surgery from generation to generation. In an effort to debunk these ideologies, we explored several controversial subjects commonly accepted as true. The topics addressed follow the chronological course of potential deliberations during dermatologic procedures: preoperative antibiotic prophylaxis and management, anesthesia, sterility, perioperative care, surgical techniques, wound outcomes, and scarring.

Preoperative antibiotic prophylaxis and management

Myth 1: Prophylactic antibiotics should be prescribed in dermatologic procedures to decrease the risk of infective endocarditis, joint infection, and surgical site infection.

The use of prophylactic antimicrobials has remained a controversial subject with inconsistent recommendations and potential overuse by surgeons (1). Given the increasing rate of bacterial resistance and inherent risks of antibiotic administration, prophylaxis should be contingent on patient- and procedure-specific factors (2). The updated 2007 American Heart Association (AHA), American Dental Association (ADA), and American Academy of Orthopaedic Surgeons (AAOS) guidelines offer clarity on the appropriate indications for prophylaxis to prevent infective endocarditis, joint infection, and surgical site infection (SSI).

Physicians should accurately and reproducibly diagnose SSI before prescribing antibiotics because variable definitions of these infections persist in the literature (3). Per the Centers for Disease Control and Prevention, SSI is defined as an incisional, organ, or space infection with further classification of incisional SSI as superficial or deep. These infections occur within 30 days of the procedure and are limited to the skin and subcutaneous tissue. At least one of the following criteria should also be seen with SSI: purulent drainage, positive bacterial culture, pain, local edema, warmth, or erythema at the procedural site (4). Risk assessments guide the appropriate use of prophylaxis based on procedural type, location, duration, initial condition, and patient health status (3).

High-risk cardiac patients and individuals with prosthetic joints should receive prophylactic antibiotics for procedures that involve infected skin or breaching of the oral mucosa (5). Recent guidelines reported that the risk of infective endocarditis from bacterial exposure during daily activities is greater than the risk associated with specific procedures. The greatest change in prophylaxis guidelines redefined the high-risk population as patients with a history of infective endocarditis, prosthetic valve, cardiac transplant with persistent valvulopathy, prosthetic device repaired in the last 6 months, and congenital heart defect. These modifications eliminate 90% of patients who would receive prophylaxis based on the previous guidelines (3).

Antibiotics may also be warranted for surgeries of the lower extremities or groin, wedge excisions of the lip or ear, nasal skin flaps, skin grafts, and severe inflammatory skin disease (6, 7). Numerous studies have demonstrated that antibiotic prophylaxis does not reduce the risk of SSI for uncomplicated dermatologic procedures (8–10).

Due to the low risk of infection in dermatologic procedures and increasing rate of antimicrobial resistance, prophylactic antibiotics should be reserved for patient-specific circumstances and for procedures with > 5% risk of SSI.

[1]Department of Internal Medicine, Division of Dermatology, Albert Einstein College of Medicine, New York, NY, USA. [2]Drexel University College of Medicine, Philadelphia, PA, USA. [3]Veterans Affairs Medical Center, New York, NY, USA. [4]Department of Dermatology, SUNY Downstate, New York, NY, USA.
✉ Corresponding author: amorkh@gmail.com

Myth 2: Cessation of antithrombotic therapy is necessary prior to cutaneous surgery due to increased risk of bleeding.
As novel anticoagulant and antiplatelet medications continue to revolutionize the management of cardiovascular disease, dermatologic surgeons must evaluate bleeding versus thrombotic risk when determining optimal perioperative regimens. Although cessation of antithrombotic therapy may decrease the risk of bleeding, the increased susceptibility to thromboemboli requires careful consideration (11).

Brown et al. (12) reviewed the pharmacokinetics and side-effect profile of oral anticoagulants to evaluate the risk of bleeding in cutaneous procedures. Dabigatran, rivaroxaban, and apixaban demonstrated superior efficacy as anticoagulants with less than or equal risk of bleeding compared to warfarin. In contrast, prasugrel and ticagrelor may be associated greater risk of bleeding.

A prospective analysis of 1,911 patients undergoing dermatologic surgery demonstrated the risk of hemorrhage as 0.89% with antithrombotic therapy. None of the patients required hospitalization or suffered long-term sequelae. Patients on warfarin and clopidogrel concurrently were 40 times more likely to experience bleeding complications (p = 0.03); extra caution is advised for these cases. The profound consequences of a potential thrombotic event outweigh the modest benefit of anticoagulant therapy cessation (13).

Anesthetic considerations

Myth 3: Epinephrine for digital anesthesia is contraindicated due to risk of necrosis.
Epinephrine use with local anesthesia has been contraindicated for digital blocks due to suggested risk of gangrene and tissue loss. The evidence supporting this claim is predominantly limited to pre-1950 case reports with variable non-standardized formulas including cocaine, eucaine, and procaine (14). In addition, there were no cases of digital necrosis using commercial lidocaine-epinephrine mixtures (15).

A retrospective analysis of more than 1,000 cases of digital anesthesia using epinephrine found that half of the patients received 1% lidocaine with epinephrine (1:100,000) at a dosage of 0.5 to 10 cc (mean 4.33 cc). There were no reported cases of digital necrosis with epinephrine, suggesting that the proposed contraindication is not justified (16). The results of another multicenter prospective study evaluating 3,110 consecutive digital and hand surgeries found no instances of digital necrosis. The low concentration of epinephrine used (1:100,000 or less) was not associated with digital tissue loss, and phentolamine reversal of adrenaline vasoconstriction was not required (17). Another compelling review of unintentional digital injection with high-dose epinephrine (1:1,000) identified 59 cases, 32 of which were untreated. Although there were no instances of infarction, prolonged neuropraxia and reperfusion pain were reported. There was no standardized treatment protocol, but phentolamine use was most common. Phentolamine is a reversible non-selective alpha-adrenergic antagonist that decreases the vasoconstriction-induced effects of epinephrine. Fitzcharles-Bowe et al. (18) recommend using phentolamine 1 mg/kg preventatively for patients with digital vascular insufficiency.

To further elucidate the degree and duration of vasoconstriction from epinephrine digital block, 24 patients receiving surgical procedures of the fingers and toes received Doppler ultrasonography to evaluate arterial blood flow. A statistically significant decrease in the rate of blood flow occurred within 10 minutes of epinephrine administration, but this effect was transient, with Doppler measurements returning to baseline between 60 and 90 minutes in all cases (19).

Although these studies discredit the myth prohibiting epinephrine for digital anesthesia, patient-specific circumstances may increase the risk of necrosis. In a case report of a patient with primary Raynaud's phenomenon, a premixed solution of lidocaine and epinephrine for repair of a traumatic laceration rapidly induced progressive gangrene (20). Epinephrine use should be avoided in patients with vasospastic or peripheral vascular insufficiency to avoid such adverse events. Caution should also be taken for patients with cardiac conditions, hyperthyroidism, and pheochromocytoma. The low dose of epinephrine used in dermatology is generally safe with pregnancy, but higher doses should be avoided due to decreased placental perfusion and vasoconstriction of the uterine artery (21).

The current literature provides substantial evidence that epinephrine provides a safe option for digital anesthesia, with decreased pain, bleeding, need for tourniquet use, and volume of anesthesia required (15, 22).

Utility of sterile procedures in surgical dermatology

Myth 4: Sterile gloves provide better outcomes and decrease risk of infection in outpatient dermatologic surgery.
The clinical utility of sterile gloves in procedural dermatology has remained a source of debate for many years with unclear guidelines. Given the magnitude of cutaneous procedures worldwide and increased consciousness of healthcare costs, evidence-based recommendations are needed regarding the utility of sterile and nonsterile gloves. A systematic review conducted by Brewer et al. (23) found no significant difference in the risk of post-operative infection for sterile versus nonsterile gloves in outpatient surgical procedures.

A similar study demonstrated a nearly identical SSI rate with sterile and nonsterile gloves in Mohs micrographic surgery. The cost of sterile gloves was 3.5 times the cost of nonsterile gloves (24). Nonsterile gloves may provide a safe and cost-effective alternative to sterile gloves (25–27).

In addition, the advantage of using sterile gloves in an otherwise nonsterile outpatient clinic may be limited. It would be difficult to determine the specific impact of sterile gloves in an overall nonsterile environment. Sterile gloves used in the context of aseptic operating room conditions would better distinguish the role of sterile conditions in decreasing risk of SSI (28). To that end, a study conducted by Nuzzi et al. (29) evaluated SSI rates for pediatric patients undergoing skin excisions in both outpatient and operating room settings. The incidence of SSI did not vary for different types of excisions, sterile technique, antibiotic usage, or patient age. In contrast, the cost of operating room procedures was twice as much as outpatient procedures. Use of clinic field sterile conditions for simple excisions may decrease costs while maintaining low rates of SSI.

Myth 5: A sterile technique significantly decreases the risk of postoperative wound infections compared to a clean technique in Mohs micrographic surgery.
The majority of surgical specialties follow strict sterilization protocols to decrease the risk of SSI. In contrast, dermatologic procedures are often performed in an ambulatory setting that does not warrant traditional operating room conditions. There is no clear

consensus regarding the sterility needed for dermatologic procedures, leading to notable variability between surgeons. A prospective study of Mohs using a clear surgical technique found the rate of SSI to be only 0.91% in a cohort of 1,000 patients (30). Furthermore, a single set of surgical instruments in excisions maintained low rates of SSI in Mohs procedures (31). These findings underscore the safety of dermatologic surgery in the ambulatory setting, irrespective of sterile conditions (32).

Patient-specific circumstances that increase the risk of complications should be taken into consideration when determining clinical indications that warrant a sterile technique. Immunosuppression is associated with 9.6 times greater odds of postsurgical complications, including SSI and wound dehiscence (33). The majority of Mohs cases have exceedingly low rates of adverse events and undetectable mortality. The relative safety and efficacy of Mohs diminishes the utility of sterile technique in these procedures (32).

Postoperative antibiotic use

Myth 6: Topical antibiotics improve postoperative outcomes and prevent surgical site infection.

Topical antibiotics are commonly used for superficial wounds following dermatologic surgery (34, 35). However, these antibiotics may be unnecessary for healing, cause allergic reaction, and increase bacterial resistance (34). Although dermatologists have decreased the use of postprocedural topical antibiotics over the years, further efforts should increase provider awareness of the inefficacy and potential adverse effects (36).

Reddy et al. (37) investigated the risks and benefits of complementary and alternative medicine (CAM) therapies in dermatologic surgery. A literature review of CAM therapy in dermatologic and surgical settings found evidence for the use of bromelain, honey, propolis, arnica, vitamin C and bioflavonoids, chamomile, aloe vera gel, grape seed extract, zinc, turmeric, calendula, chlorella, lavender oil, and gotu kola. Although there were a few potential side effects, including platelet inhibition and contact dermatitis, certain CAM therapies may provide anti-inflammatory benefits and promote wound healing. However, further studies and risk-benefit analysis of CAM therapies are needed to determine their utility in enhancing patient outcomes.

Honey dressings may provide greater efficacy in the prevention and treatment of SSIs compared to silver sulfadiazine (38, 39). Although previous trials offer inconsistent recommendations regarding the wound-healing properties of these dressings, larger studies should conclusively evaluate the proposed benefit of honey and silver-sulfadiazine dressings in SSI management (38, 40).

There is insufficient evidence supporting the use of topical antibiotics for SSI prevention in dermatologic surgery (34, 35). Topical emollients and petroleum offer equal efficacy for wound infection prophylaxis and should be used instead of topical antibiotics for these procedures (41).

Wounds outcomes and scarring

Myth 7: Elliptical excisions for skin tumors optimize wound outcomes and minimize risk of dog-ears.

Although elliptical excision with a 3:1 length-to-width ratio is widely practiced in surgical practice, this technique may lead to unnecessary waste of normal tissue and longer scars (42). A prospective analysis of 41 patients undergoing elliptical and round excisions closed with dog ear repairs found that the overall wound length was 14% shorter for round excisions, most notably in the trunk, scalp, and other areas with thick skin (43). These findings are supported by additional reports of decreased scar length in punch compared to elliptical excisions (44, 45).

Staged excisions with alternative techniques may also reduce scar length compared to elliptical excisions. Alternate methods include: i) the "doughnut," with excision of the central aspect of the lesion that is later sutured to the center; ii) central excision with purse-string closure using a large-caliber suture to cinch along the outer rim; and iii) compressed design to transpose ellipses or half ellipses excised from the lesion. Additional modifications of these techniques may further reduce the final scar length and identify procedural variants that provide better wound outcomes (42).

Although traditional elliptical excisions allow for primary closure with minimal risk for dog-ear deformity, the overall tissue loss and final scar length are suboptimal (42). Several other techniques, including round, punch, and staged excisions, may decrease the scar length while maintaining a low risk of dog-ear deformity (42–45).

Myth 8: Linear wound closures heal with minimal scarring and enhanced cosmetic outcomes.

Round and oval skin wounds are often sutured linearly for closure, a technique that may lead to significant scars that are unaesthetically pleasing. Intradermal purse-string sutures may facilitate the repair of small, circular wounds after skin excisions and enhance cosmetic outcomes with minimal scarring (46). However, purse string sutures that heal by secondary intention may lead to similar cosmetic outcomes and scar sizes (47).

A randomized controlled, multicenter trial compared Patient and Observer Scar Assessment Scale (POSAS) scores and complication rates for simple interrupted versus running subcuticular sutures in facial surgery. Although both techniques resulted in the same POSAS score, running subcuticular sutures were often associated with hyper- or hypoesthesia (48).

Sklar et al. (49) investigated wound outcomes and aesthetics in 56 patients with fusiform wounds > 3 cm localized to the head or neck to compare running cutaneous sutures spaced at 2 and 5 mm apart. Patient and observer POSAS scores found no statistical significance between POSAS or mean scar width for sutures at 2 or 5 mm intervals. Based on these findings, one may infer that the additional time spent placing closer sutures may not improve aesthetics or final outcomes.

Myth 9: Wound eversion provides superior cosmetic outcomes after cutaneous surgery.

Wound edge eversion has been postulated to improve aesthetic outcomes after closure, but minimal evidence supports this assertion. Kappel et al. (50) conducted a prospective, randomized, split-scar intervention using half eversion and half planar closure. No significant difference was identified in patient or observer assessment scores between everted and planar sides at 3- and 6-month follow-up visits. There was also no statistical difference between the closure methods in terms of scar height or width. These findings suggest that wound eversion may not significantly improve overall scar outcomes compared to planar repair. In contrast, Wang et al. (51) compared set-back (absorbable dermal suturing technique) and buried vertical mattress sutures (BVMS) to evaluate wound eversion and cosmetic outcomes. Set-back sutures re-

sulted in superior cosmetic outcomes compared to BVMS.

Cosmetic outcomes were similar regardless of wound eversion in a randomized trial comparing wound eversion and planar repair. Contradictory information was reported in a randomized trial comparing set-back versus BVMS techniques, suggesting that wound eversion enhances cosmetic outcomes. The distribution of treatment areas may explain the discrepancies observed, with greater concern for cosmesis on facial sites (52).

Myth 10: Patients receiving systemic retinoids should avoid procedures due to risk of delayed wound healing and atypical scarring.

It is a common misconception that systemic isotretinoin taken within 6 to 12 months of cutaneous surgery leads to abnormal scarring and delayed wound healing. Evidence supporting this claim is limited to a few case series from the mid-1980s of delayed healing and scar formation with systemic retinoids (53). In 1986, Rubenstein et al. (54) noted atypical keloids in six patients receiving dermabrasion and isotretinoin. In 1988, another case reported delayed healing and keloids after argon laser treatment or dermabrasion while taking isotretinoin (55).

A systematic review of nearly 1,500 procedures found inadequate evidence to delay manual dermabrasion, chemical peels, dermatologic surgery, laser hair removal, and fractional or non-ablative laser procedures. However, the risk with mechanical dermabrasion and fully ablative laser could not be fully dismissed (53).

Despite the packaging insert recommendation to discontinue isotretinoin for 6 months prior to most dermatologic procedures, numerous studies and task forces found insufficient evidence supporting this claim (56–58). Delayed intervention for moderate-to-severe inflammatory acne conflicts with the current treatment paradigm for early scar intervention. Patients would benefit from open discussions regarding the safety and efficacy of isotretinoin and cutaneous procedural outcomes (59).

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