Preoperative Site Marking in Dermatosurgery

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Abstract

Dermatosurgery is a growing subspeciality due to increasing numbers of skin cancer and aesthetic procedures. Patient safety is a major issue in dermatosurgery. Quality management, education, and organization are the backbone of patient safety. A simple measure to support patient's safety and to avoid wrong site surgery is preoperative skin marking. Permanent skin markers offer a painless and cost-effective option. To ensure optimal results, the following problems need careful consideration: good viability after disinfection, sterility of the operation field, no sensitization, or toxic effects of the ink. These issues are discussed in detail to allow a safe and successful procedure.

Keywords: Dermatosurgery, hygiene, patient's safety, skin marking, viability

Introduction

Implementation of surgery safety protocols is of major importance to prevent wrong-site surgery (WSS). In a recent study from California, all cases that have been reported to the Department of Public Health between 2007 and 2014 were analyzed. The most common erroneous procedure was WSS (60 cases) that made up 62% of all reports.[1]

Preoperative skin site marking is a simple but effective measure to prevent WSS, a "never event."[2,3]

Skin Marking

There are three possible problems arising with skin marking, which need consideration.

Visibility after disinfection

Skin marking must be visible after disinfection of the surgical field. Masud *et al.*[4] investigated this aspect in a prospective study covering 500 surgeries. The results showed that 59% of markings were visible in theater after sterile draping, 40.4% markings were not visible, and 0.6% (3/500) were not marked. They recommended to use an arrow with an indelible marker pen for skin marking. Appropriate marker pens were used on 88% of patients. Skin marking must be sufficiently permanent to remain visible after completion of the skin preparation. To improve correct site surgery, skin markings should be recognizable and understood by all members of the staff in the unit.[4]

In a review about surgical skin marking, Edding® 400 (3 mm diameter) and Edding® 3000 (1.5 mm) have been recommended, because they can withstand disinfection procedures (Edding, Ahrensburg, Germany). Alternatives are Pentel® (Pentel GmbH, Hamburg, Germany) and Paper Mate® (Sanford, Ontario, Canada). Viscot® (Viscot Medical, LLC, East Hanover, NJ) with blue ink is an alternative to mark dark skin.[5]

In another study, marked skin sites were prepared with chlorhexidine followed by chlorhexidine, Betadine followed by chlorhexidine, and Betadine followed by Betadine in five volunteers. The visibility of the marks was rated after disinfection. In this trial, Sharpie® W10 black (Newell Rubbermaid, Dandy Springs, GA), Dual Tip (Purple Surgical), and Easimark modern regular tip (Leonhard Lang, now Skintact, Fannin, Ireland) were the best those with best visibility across all skin types.[6]

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Visibility of skin markings depends also on the disinfectant. In a study with 20 patients, who had a primary total hip arthroplasty, chlorhexidine-based solution for skin preparation resulted in significantly greater erasure of the surgical site marking than did the use of the iodine-based solution.[7] As chlorhexidine solution is superior to iodine-based solutions for the prevention of surgical site infections, chlorhexidine-resistant pens have been developed such as Viscot 1450XL-200 Mini XL presurgical skin marker, fine tip, and Viscot 1449XL-50 XL presurgical skin marker, bold tip (Viscot Medical, LLC, East Hanover, NJ).[8]

Sterility

Skin marking and sterility should not exclude each other. In a study with volunteers, surgical site marking with a non-sterile surgical marking pen did not contaminate the surgical site. The marking was performed both forearms. Microbiology swabs were taken before, and after, skin sterilization with 10% povidone-iodine. After sterilization, no bacterial growth was observed in culture on marked arm and controls.[9,10]

However, marker pens have to be considered as vehicles for nosocomial infection. An experimental study with 26 permanent skin markers demonstrated that ethanol-based ink in permanent marker pens is bactericidal against methicillin-resistant *Staphylococcus aureus* (MRSA) that starts within seconds, and they are likely to be safe to use with a gap of at least 2 min between patients. On the other hand, old or dried out marker pens may harbor pathogens and should be discarded. Disposable markers are recommended for immunocompromised patients and patients with a positive MRSA status.[11] Another study in the operation theater demonstrated that skin site marking does not increase the risk of operative field contamination.[12]

In contrast, skin marking with alcohol-based solvent surgical marking pens (Devon Surgical Skin Marker, Regular Tip; Covidien, Dublin, Ireland) for anterior cruciate ligament reconstruction in orthopedic surgery showed contamination of 15% of pens with *Staphylococcus* spp.[13]

Sensitization

Ingredients of inks may have a sensitizing potential. This is known from permanent inks used in cosmetics and tattooing.[14,15] Azo pigments and quinacridones, such as Violet 19, Red 122, and Pigment Red 181 (CI 73360), have been identified as substances responsible for hypersensitivity reactions.[16,17] Azo dyes have been identified in inks of permanent markers for the general use.[18] Allergic contact dermatitis has been reported after skin marking with henna containing p-phenylenediamine.[19]

Conclusions

Patient safety is a major issue during dermatosurgery. WSS is the most common thread. Preoperative skin marking is a useful tool to increase patient's safety and to avoid WSS. Permanent skin markers provide a painless and cost-effective option. The markers should provide good viability after disinfection and ensure sterility of the operation field, and the inks should be non-sensitizing. Skin marking is a safety measure in dermatosurgery.

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Conflicts of interest

There are no conflicts of interest.

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