Chlorhexidine Burns After Shoulder Arthroscopy

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Abstract

Chlorhexidine is an antiseptic and disinfectant commonly used for surgical site preparation and cleansing. It is active against a broad spectrum of bacteria, viruses, mycobacteria, and fungi.

We report 3 cases of patients with superficial partial thickness burns immediately following shoulder arthroscopic surgery with the use of a Chloraprep 26 mL applicator (2% chlorhexidine gluconate and 70% isopropyl alcohol; CareFusion, Leawood, Kansas). All 3 patients reported pain as the anesthetic waned at a localized area on the anterior arm near the axilla. Erythema and blistering were noticeable. These areas were immediately treated with irrigation and local application of ice, and subsequently with topical triple-antibiotic ointment. All 3 cases were resolved within 3 months of surgery, but noticeable scars remained.

We believe a combination of chlorhexidine skin preparation, local swelling inherent to shoulder arthroscopy, and traction contributed to these postoperative complications.

Chlorhexidine is an antiseptic antimicrobial with US Food and Drug Administration approval for use in treating gingivitis, oral infection prophylaxis, and skin cleansing procedures. Its bactericidal effect is the result of binding of the cationic molecule to negatively charged bacterial cell walls.[1] Its widespread use as a surgical site preparation agent raises the possibility of sensitization in the general population. Allergy, hypersensitivity, and anaphylaxis have been reported with its use.[2] Other antiseptics have been associated with chemical burns, which occur due to a combination of chemical injury, maceration, and pressure effects in an anesthetized patient.

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Chemical burns are defined as first degree (epidermis only), second degree (epidermis and dermis), third degree (subcutaneous tissue), and fourth degree (involvement of muscle, tendon, ligament, bone, nerve, or blood vessel). Second degree burns are further broken down as superficial or deep partial thickness burns based on the amount of involvement of the dermis.

To our knowledge, there is no previous report in the orthopedic literature of superficial partial thickness burns caused by chlorhexadine. All patients provided written informed consent for print and electronic publication of this report.

Case Report

Case 1

A 62-year-old Caucasian male underwent arthroscopic rotator cuff repair and subacromial decompression on his left shoulder. The patient was placed in the lateral decubitus position. There was no preoperative scrubbing or shaving of the site and the skin was dry. The surgical nurse then applied the Chloraprep solution preparation material from the mid-clavicular line distally to the hand of the operative extremity, including the entire axilla. The chlorhexidine was allowed to dry before the skin incision was made. The arm was then placed in traction. As he awoke from anesthesia in the recovery room, he reported localized burning pain on his skin on the anteromedial arm, just superior to the axilla. The site was immediately cleansed with cold water and an ice pack was applied. A superficial area of erythema and blistering was noticeable within minutes. At the 2-week follow-up, a distinct raised lesion consistent with a superficial partial thickness chemical burn was noted, which was treated with Neosporin ointment and dressing by the operative orthopedic surgeon.

Figure 1. Patient 1 scar at 3 months postoperatively.

Figure 2. Patient 2 scar at 6 months postoperatively.

Figure 3. The author's (THS) set up for shoulder arthroscopy.

Three months postoperatively, the burn had diminished, but a distinct scar remained (Figure 1).

Case 2

A 38-year-old Caucasian female underwent arthroscopic repair of a right superior labrum, anterior-posterior lesion with a subacromial decompression. The patient was placed in the lateral decubitus position. Chloraprep was used for surgical site preparation as previously described and the arm was placed in traction. She reported burning pain on the anteromedial portion of the arm, near the axilla, while awaking from anesthesia in the recovery room. The area was cleansed with normal saline, as opposed to water in the previous patient, and an ice pack was applied. An area of superficial erythema was immediately present within minutes. The patient's skin lesion, consistent with a superficial partial thickness chemical burn, was healing well at the 2-week follow-up and was treated with Neosporin and a dressing by the operative orthopedic surgeon. The wound healed without complication, but a distinct raised scar was present at the 6-month follow-up visit (Figure 2).

Case 3

A 71-year-old Caucasian male underwent an arthroscopic biceps slide on his right shoulder. Chloraprep was used for surgical site preparation as previously described, the patient was in the lateral decubitus position, and the arm was placed in traction. While awaking from anesthesia in the recovery room, he reported an area on his anteromedial arm that was causing a burning irritation. The area was noticeably erythematous and irritated, and was cleansed with normal saline, and an ice pack was applied. At the 2-week follow-up appointment, the patient's superficial, partial thickness burn was subsequently treated with Neosporin and dressing by the operative orthopedic surgeon. At 3 months postoperatively, the burn was diminished, but a raised scar remained.

Discussion

As evidenced by the 3 cases presented, chlorhexidine, when used in surgical site preparation in the setting of shoulder arthroscopy with the operative arm in traction and the lateral decubitus position, can be a cause of discrete, superficial partial thickness chemical burns.

During surgical preparation, there was no preoperative scrubbing or shaving of the site done in any of the cases, and the skin was dry prior to the application of the chlorhexidine. The surgical nurse then applied the preparation material from the mid-clavicular line distally to the hand of the operative extremity. The chlorhexidine was allowed to dry before the skin incision was made. No other surgical preparations were used and the surgical wounds were dressed with dry material only. The affected areas were not draped (Figure 3). None of the patients had any previously reported allergy to chlorhexidine or any other contact dermatitis. The burning was relieved with local cleansing of the wound and application of ice, but a distinct, raised scar consistent with a superficial burn was present at follow-up, and a scar remained 3 to 6 months postoperatively.

The use of normal saline (cases 2 and 3) versus cold water (case 1), in combination with ice packs, in the immediate postoperative setting did not appear to make a difference on the long-term appearance of the scar. All three patients in this case report were Caucasian and had fair skin. Their lesions were in similar anatomic locations, near the axilla on the anteromedial portion of the upper arm.

Cases have been reported with the use of povidone-iodine and isopropyl alcohol based solutions.[2] The incidence of skin irritation with the topical use of chlorhexidine is extremely low and there is one previous case report of chlorhexidine induced superficial partial thickness burns after skin preparation for surgery. This occurred in a 4-year-old undergoing urologic surgery.[3] Strong solutions of chlorhexidine may cause irritation of conjunctiva and other sensitive tissues. Anaphylaxis and anaphylactic shock have been reported. Hypersensitivity reactions, including contact dermatitis, fixed drug eruptions, and photosensitivity reactions, have also been reported.[1-6]

We believe multiple factors contributed to the appearance of these burns. The 4.5 to 6.8 kg of traction used for shoulder arthroscopy appears to be relevant, as the operative surgeon reported no cases of skin burns with use of chlorhexidine in either knee arthroscopy, or with open procedures where traction was not used. No chemical burns have occurred since the operative surgeon switched from chlorhexidine based skin preparation to iodine based preparation solutions. The significant swelling encountered around the shoulder after arthroscopy also likely plays a role, as the distended skin would be more susceptible to irritants.

We recommend monitoring all skin areas exposed to chlorhexidine for the possibility of chemical burns, especially in the setting of traction and shoulder arthroscopy. In summary, when used in combination with traction and shoulder arthroscopy, chlorhexidine can cause partial thickness-deep burns.

Authors's Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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