

Contact Dermatitis After Hip Arthroscopic Surgery

Andrew M. Kalthoff,^{*†} DO, and Anil K. Gupta,[‡] MD, MBA

Investigation performed at Mercy St Vincent Medical Center, Toledo, Ohio, USA

Keywords: hip arthroscopic surgery; femoroacetabular impingement; contact dermatitis; surgical skin site preparation

Effective skin preparation is essential to decrease the incidence of surgical site infections (SSIs). Several agents utilizing both chlorhexidine and iodophors are in use today. Specifically, orthopaedic surgery has seen increasing use of chlorhexidine in surgical site preparation, with evidence that it provides superior antiseptic capabilities compared with other agents.^{3,5,8} There is little knowledge of the adverse effects of chlorhexidine.

The purpose of this case report was to describe contact dermatitis that occurred in a patient after the use of chlorhexidine for surgical site preparation. The patient was initially thought to have a skin infection. After accurately diagnosing the reaction with the assistance of a dermatologist, the patient was successfully treated. To our knowledge, this is the only described case report of such a reaction in the orthopaedic literature.

CASE REPORT

A 39-year-old male physician assistant underwent hip arthroscopic surgery for femoroacetabular impingement. During preparation, 2% chlorhexidine gluconate (CHG) (ChlorPrep; BD) in 70% isopropyl alcohol was utilized for surgical site preparation and allowed to dry before draping. The case proceeded uneventfully. At the conclusion of the procedure, the preparation agent was not cleaned off of the surgical site. Three days

postoperatively, the patient reported an itchy rash that had developed over the operative hip, abdomen, and thigh (Figure 1). The rash had progressively worsened over 24 hours and was minimally responsive to oral anti-inflammatory drugs and diphenhydramine. His pain was minimal, and he did not have fever, chills, or drainage from his incisions.

On physical examination, there was a large, raised erythematous maculopapular rash that extended from the operative site proximally to the level of the iliac crest. There was concern for low-grade cellulitis or a potential fungal rash, and the patient was started on cephalexin and fluconazole. There was no response to treatment over the next 24 hours, and the rash worsened. A dermatology consultation was performed because of the unique nature of the rash and its failure to respond to antibiotic and antifungal treatment. The dermatologist suspected allergic contact dermatitis based on the unique findings of the raised maculopapular rash and its failure to respond to treatment. Thus, the patient was diagnosed, based on the above clinical findings, with allergic contact dermatitis and started on prednisone 50 mg for 5 days as well as a daily application of topical triamcinolone 0.1%. The rash resolved within 1 week. The patient had an excellent clinical outcome at long-term follow-up, with no further complications.

DISCUSSION

Our patient presented with an itchy, warm erythematous rash 3 days after hip arthroscopic surgery. Because of the concern for infection, the patient was prophylactically given antimicrobial and antifungal agents. Although he did not suffer consequences from these drugs, such medications are not without adverse effects. These could have been avoided had we been able to recognize the condition as allergic contact dermatitis and used steroids earlier in his treatment.

A popular surgical preparation mixture contains 2% CHG in 70% isopropyl alcohol. CHG is a water-soluble topical antiseptic with broad-spectrum coverage against multiple microorganisms. Alcohol also has broad-spectrum

*Address correspondence to Andrew M. Kalthoff, DO, Mercy St Vincent Medical Center, 2213 Cherry St, Toledo, OH 43608, USA (email: kalthoffa1@gmail.com).

†Mercy St Vincent Medical Center, Toledo, Ohio, USA.

‡Toledo Orthopaedic Surgeons, Toledo, Ohio, USA.

One or more of the authors has declared the following potential conflict of interest or source of funding: A.K.G. is a paid speaker/presenter for Ossur and has received hospitality payments from Smith & Nephew, Stryker, CDC Medical, and Arthrex. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.



Figure 1. Patient's right hip on postoperative day 3 after hip arthroscopic surgery, demonstrating a maculopapular rash.

coverage, especially in concentrations over 70%. CHG, combined with alcohol, has a synergistic effect on antimicrobial activity. CHG can exert its antimicrobial activity for up to 6 hours after its application on the skin.²

There is a growing body of literature demonstrating the effectiveness of CHG in decreasing SSIs. A 2005 prospective study by Ostrander et al³ found that 2% CHG in 70% isopropyl alcohol was more effective for eliminating bacteria in foot and ankle surgery compared with 0.7% iodine/74% isopropyl alcohol (prep 2) and 3.0% chloroxylenol (prep 3). A 2009 prospective study by Saltzman et al⁴ further found that CHG was more effective than prep 2 in eliminating shoulder bacteria, including coagulase-negative *Staphylococcus*. In 2010, a prospective, randomized trial by Darouiche et al¹ found increased efficacy of CHG over povidone-iodine in the prevention of SSIs in nonorthopaedic surgical cases. With strong evidence supporting its use, we suspect the utilization of CHG will rise. As such, the incidence of adverse reactions related to CHG can also be expected to rise.

Toholka and Nixon⁶ described a case series of nurses and nursing students with positive patch test results for sensitivity to chlorhexidine. The results were then compared with an institutional patch test performed on patients and health care workers over a 20-year period. The findings

demonstrated a 0.2% (19/7890) incidence of chlorhexidine sensitivity in patients and a 1.8% (10/549) incidence in health care workers. The authors reported a likely underestimation of the true incidence in patients, as chlorhexidine patch testing was only performed on patients with a history of exposure.

Watts et al⁷ published a case report of an operating room nurse who presented with chronic allergic contact dermatitis to the hands. Patch testing revealed sensitivity to chlorhexidine digluconate, and her symptoms resolved after 3 weeks of avoiding chlorhexidine compounds. The report did note that the development of allergic sensitivity to chlorhexidine could occur from repeated exposure, as is the case with health care workers. The development of sensitivity to chlorhexidine in health care workers may describe why our patient, who was a physician assistant, presented with contact dermatitis.

CONCLUSION

Allergic contact dermatitis is a rare but possible adverse effect related to the use of chlorhexidine surgical preparation solutions for orthopaedic procedures. Understanding this potential reaction can help clinicians formulate a definitive diagnosis and initiate appropriate treatment early in

its presentation, thus avoiding improper treatment that can lead to additional patient morbidity.

ACKNOWLEDGMENT

The authors thank the patient for his permission and participation in the report.

REFERENCES

1. Darouiche RO, Wall MJ Jr, Itani KM, et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. *N Engl J Med*. 2010;362:18-26.
2. Kutzscher L. Management of irritant contact dermatitis and peripherally inserted central catheters. *Clin J Oncol Nurs*. 2012;16:e48-e55.
3. Ostrander RV, Botte MJ, Brage ME. Efficacy of surgical preparation solutions in foot and ankle surgery. *J Bone Joint Surg Am*. 2005;87:980-985.
4. Saltzman MD, Nuber GW, Gryzlo SM, Marecek GS, Koh JL. Efficacy of surgical preparation solutions in shoulder surgery. *J Bone Joint Surg Am*. 2009;91(8):1949-1953.
5. Smock E, Demertzi E, Abdolrasouli A, Azadian B, Williams G. Antiseptic efficacy of povidone iodine and chlorhexidine gluconate skin preparation solutions used in burns surgery. *J Burn Care Res*. 2018;39(3):440-444.
6. Toholka R, Nixon R. Allergic contact dermatitis to chlorhexidine. *Australas J Dermatol*. 2013;54(4):303-306.
7. Watts TJ, Li PH, Ue KL, Haque R. Chronic allergic contact dermatitis due to chlorhexidine. *J Allergy Clin Immunol Pract*. 2018;6(1):254-255.
8. Yammine K, Harvey A. Efficacy of preparation solutions and cleansing techniques on contamination of the skin in foot and ankle surgery. *Bone Joint J*. 2013;95(4):498-503.