

A post-operative reaction to povidone-iodine in a postpartum woman: A case report

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ABSTRACT

Introduction: High infection rates after cesarean section are a major concern in the United States. A majority of antiseptics have irritant properties if they are not used as specified in companies' guidelines. Allergic contact dermatitis caused by povidone-iodine is infrequent and is misdiagnosed by clinicians who fail to differentiate allergy from irritation. This case report describes an allergic reaction to povidone-iodine after cesarean section. **Case Presentation:** A 28-year-old underwent a repeat low transverse cesarean-section at 39 weeks of gestation. The patient informed the medical team that she had no known allergies and no significant past medical history. The new hospital protocol included cleaning the skin over the planned incision site multiple times with povidone-iodine 7.5% scrub followed by povidone-iodine 10% paint. The surrounding skin was prepped with chlorhexidine. The patient complained of an allergic reaction on her skin the night after the procedure, with severe itching, and stated that it got progressively worse. The patient was started on an oral regimen of steroids and hydroxyzine. The itching slowly improved and at discharge the patient was continued on hydroxyzine and steroids were discontinued. By the patient's six-week postpartum visit, skin hypopigmentation had completely resolved.

Conclusion: This case illustrates a reaction to povidone-iodine after cesarean section. This allergic reaction could not be attributed to any other portions of the procedure.

1. Introduction

In modern obstetrics and gynecology, cesarean section (C-section) is the most common operation done at the hospital. Preoperative skin-cleaning techniques, including aseptic techniques, are proven to lower the risk of surgical site infections (SSI). There are a variety of options for preoperative skin preparation, including chlorhexidine and povidone-iodine [1]. The mechanisms of action for povidone-iodine and chlorhexidine are poorly understood. They are both broad-spectrum antimicrobial agents, but chlorhexidine is faster acting and offers greater protection with prolonged activity.

Almost all antiseptics shown irritant capabilities, especially when they are not used as indicated. Povidone-iodine has an exceptional profile in terms of reduced allergenicity. Allergic contact dermatitis caused by povidone-iodine is infrequent and is sometimes misdiagnosed by healthcare providers who fail to differentiate allergy from irritation [2].

In our case, povidone-iodine was used as an antiseptic abdominal

preparation in a 28-year-old woman for a C-section. The case report describes an allergic reaction to povidone-iodine after cesarean section in a young woman.

2. Case Presentation

A 28-year-old woman, G2P1, underwent a scheduled repeat low transverse C-section at 39 weeks of gestation. The patient informed the medical team that she had no known allergies and no significant past medical history. She had received chlorhexidine skin preparation with her first C-section without any issues. However, the asepsis protocol had since changed, and she received povidone-iodine skin preparation for the repeat C-section. The new protocol included scrubbing the skin over the planned incision site multiple times with povidone-iodine 7.5% scrub, followed by povidone-iodine 10% paint. The surrounding skin area was then prepped with chlorhexidine. The pregnancy was uneventful and the procedure was uncomplicated. The C-section was performed in the usual fashion as per the obstetrician's protocol. The

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surgical incision was closed with subcuticular 4-0 Vicryl, and Steri-Strips were applied only over the closed incision. The incision was dressed in usual fashion with sterile gauze and tape. The povidone-iodine was not cleaned off prior to dressing the incision site, as an additional means of infection prophylaxis.

Less than 24 h after the procedure, the patient began to complain of severe itching, which was progressively worsening. This presentation prompted the early removal of the incision cover. The patient's skin was erythematous and hot to the touch and was overall smooth, although the nurse reported noting some small vesicular blisters in the area. A picture of the reaction was obtained (Fig. 1) and the remaining povidone-iodine was removed from the site.

The patient was prescribed an oral regimen of steroids and hydroxyzine. The itching slowly improved over the course of 3–4 days and at time of discharge the patient was continued on hydroxyzine while the steroid treatment was discontinued. At the patient's two-week post-operative visit, all symptoms had resolved but residual skin hypopigmentation remained. By the patient's six-week postpartum visit, the skin hypopigmentation had completely resolved. Although the patient did not have any infection following the procedure, the allergic reaction led to delayed wound healing.

3. Discussion

Chlorhexidine and povidone-iodine are among various disinfectants used for surgical procedures. A common practice is to use chlorhexidine skin preparation for scheduled and non-emergent cesareans and to use povidone-iodine for emergent cases. This is due to chlorhexidine needing at least two minutes of drying time prior to draping the patient, in order to avoid fire risk in the operating room since chlorhexidine is flammable when wet. Povidone-iodine is used in emergent cases because the patient can be draped immediately after application and the surgery can begin prior to the povidone-iodine becoming dry. Furthermore, the increased drying time of povidone-iodine could affect the adhesion of surgical drapes. Adhesion of surgical drapes is an important asepsis measure as good adhesion prevents unprepped skin areas from becoming exposed during the surgery.

Darouiche et al. emphasized the increased surgical site antiseptic activity of chlorhexidine in comparison with povidone-iodine, decreasing both superficial and deep incision infections. For abdominal surgery, the rate of infection with chlorhexidine was 12.5% compared with 20.5% in the povidone-iodine group [3]. When examining the differences in chlorhexidine and povidone-iodine with cesarean sections specifically, the results and conclusions vary. However, a 2020 meta-analysis by Hadiati et al. looked at over 4000 cases and found that surgical site infection was decreased in patients who received chlorhexidine skin preparation for their cesarean section in comparison with patients who received povidone-iodine skin preparation [4].

There have been few studies on the incidence of allergic reactions among various methods of perioperative skin preparation. Allergic contact dermatitis with chlorhexidine has been well documented, with the overall rate of sensitization believed to be 2%, mainly following repeated applications [2]. Povidone-iodine has been demonstrated to be a skin irritant rather than a cause of allergic contact dermatitis, although the reactions are often misdiagnosed by the practitioners [2]. Lachapelle found that although 2.8% of participants had a reaction to povidone-iodine skin patch testing, upon repeat testing only 0.4% of participants had a repeat reaction indicating allergic contact dermatitis [5].

4. Conclusion

In this case, the patient was exposed to two potentially allergic skin preparations. While she reacted to only one, the reaction was to the less allergenic skin preparation povidone-iodine. The choice of skin preparation should be individualized to each patient based on history, allergies, and the scheduled versus emergent nature of surgeries.

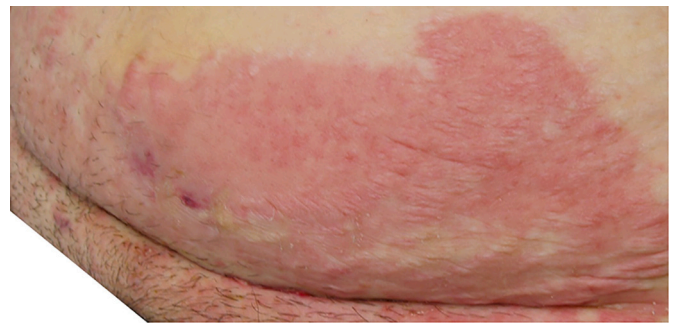


Fig. 1. An allergic reaction to povidone-iodine.

An allergic reaction near the abdominal area of the patient after using povidone-iodine as an anti-septic for skin prep prior to cesarean-section.

Chlorhexidine and povidone-iodine have their own risks and benefits. However, using a combination of the two not only increases the time and cost of the procedure, but also exposes the patient to two potentially allergenic agents rather than one. Our patient recovered well post-operatively, but adverse reactions to skin preparations can potentially contribute to post-operative infections and poor wound healing.

Contributors

Sanjana Rao contributed to the writing, designing, and editing of the case report.

Traci Bartkus contributed to the writing, designing, and editing of the case report.

Kushal Gandhi contributed to the writing, designing, and editing of the case report.

Alex Gibson contributed to the writing, designing, and editing of the case report.

Gary Ventolini consulted the patient, is the lead author and is responsible for the design of the case report, and critical revision for vital intellectual content.

All authors approved the final version of the case report.

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Patient consent

Patient consent to the publication of the report and any accompanying images has been given.

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Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

References

- [1] D.R. Hadiati, M. Hakimi, D.S. Nurdhati, E. Ota, Skin preparation for preventing infection following caesarean section, *Cochrane Database Syst. Rev.* (9) (2014) CD007462.
- [2] J.M. Lachapelle, A comparison of the irritant and allergenic properties of antiseptics, *Eur. J. Dermatol.* 24 (1) (2014) 3–9.
- [3] R.O. Darouiche, M.J. Wall Jr., K.M. Itani, M.F. Otterson, A.L. Webb, M.M. Carrick, et al., Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis, *N. Engl. J. Med.* 362 (1) (2010) 18–26.
- [4] D.R. Hadiati, M. Hakimi, D.S. Nurdhati, Y. Masuzawa, Lopes K. da Silva, E. Ota, Skin preparation for preventing infection following caesarean section, *Cochrane Database Syst. Rev.* (6) (2020) CD007462.
- [5] J.M. Lachapelle, Allergic contact dermatitis from povidone-iodine: a re-evaluation study, *Contact Dermatitis* 52 (1) (2005) 9–10.