METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS EPIDURAL ABSCESS AFTER TRANSFORAMINAL EPIDURAL STEROID INJECTION

Abdallah Kabbara, MD, Samuel K Rosenberg, MD, and Carlos Untal, MD

Transforaminal epidural steroid injections are provided frequently for patients with lumbar radiculopathy, having demonstrated efficacy and safety. We present a patient who developed methicillin-resistant *Staphylococcus aureus* epidural abscess 11 days after a transforaminal epidural steroid injection. The abscess required surgical intervention and intravenous vancomycin. Fortunately, the patient made a full recovery, and continues to do well one year later. The incidence, etiology and treatment of epidural injection-related infections are reviewed.

**Keywords:** Infection, epidural abscess, transforaminal epidural, methicillin-resistant *staphylococcus aureus*

**CASE DESCRIPTION**

A 44 year-old man with a history of previous lumbar laminectomy at L4-L5 presented with intractable back and radiculopathic pain, for which transforaminal epidural steroid injections were performed under fluoroscopy, over the course of 8 weeks. One transforaminal injection was done at the L4 level and 2 injections at the L5 level. The injections where done in the operating room with aseptic technique, prepping with 10% aqueous povidone iodine and using sterile drapes, mask and gloves. The first two injections provided excellent pain relief for two to three weeks, with each injection. A day after the third epidural injection, he noted worsening of back pain, without leg pain. He called the office 6 days later, did not report fever or chill, but continued to have back pain. Hydrocodone/acetaminophen were prescribed for pain. Four days later he went to see his family physician, who in turn called the pain service resident after finding a fever of 102°F, with redness and swelling at the epidural injection site. The patient was immediately transferred to the hospital where an emergency MRI of the lumbar spine identified the previous laminectomy and revealed a paraspinal abscess at the L4-L5 level, with extension to the epidural space (Figs. 1 and 2).

The patient underwent emergency debridement of the abscess and the infectious disease service was consulted; cefazolin was administered until cultures and sensitivities revealed methicillin-resistant *Staphylococcus aureus*. The organism was sensitive to vancomycin and one day after starting vancomycin, the infection defervesced. Unfortunately, the infection did not clear, and subsequent surgery was required to fully drain the infection. The patient was discharged home with a peripherally inserted central catheter line and vancomycin was continued for six weeks. Postoperative pain control was treated with hydrocodone/acetaminophen as needed.

The patient made an uneventful recovery and had no neurologic sequelae. He did not have additional epidural steroid injections. He was doing well at the one-year follow-up, and the MRI, except for demonstrating previous surgery, was normal.

From Cleveland Veterans Administration Medical Center, Cleveland, Ohio, University Hospitals of Cleveland, Cleveland, Ohio, and University Anesthesiologists Inc, Cleveland, Ohio. Address Correspondence: Abdallah Kabbara, MD, Cleveland Veterans Administration Medical Center, Cleveland, Ohio 44106 E-mail: draikabbara@yahoo.com Support: There was no external funding in preparation of this manuscript Conflict of Interest: None
DISCUSSION

We present an unusual complication of a commonly performed procedure done for lumbar radiculopathy and spinal stenosis. There did not appear to be a break in sterile technique in this case, and it is assumed that the source of infection was inadequate bactericidal effect of the povidone-iodine preparation. The site of infection, with apparent spread from paraspinal muscle to the epidural space, and the identification of the organism as *Staphylococcus aureus* confirm the impression that this infection was due to introduction of skin flora during the epidural injection. However, it remains unclear if the infection was nosocomial or due to the possibility that the patient’s skin was colonized with MRSA. The patient did not have any risk factors for nosocomial infections, other than the three epidural injections. However, he worked cleaning sewers and septic systems, which may have put him at risk for colonization.

The incidence of infection after spinal or epidural procedures varies. In a Swedish Patient Injury Claims Department review, the incidence of epidural abscess was reported to be 1 in 60,000 cases after epidural anesthesia. There were 1 in 40,000 cases of meningitis after spinal anesthesia (21). Other studies have reported an incidence of 0.2-2.8 per 10,000 cases of epidural abscesses after spinal interventions (22).

The most commonly detected organism on the human skin is *Staphylococcus epidermidis* (65-69%), whereas *Staphylococcus aureus* is present in only 1-2% of individuals, but is the most common pathogen identified in epidural abscesses (22, 23). Other organisms include *E. coli*, other gram-negative bacteria and anaerobic streptococci.

*Staphylococcus aureus* is a common human pathogen that frequently colonizes neonates and adults at different sites, such as the nasopharynx, occasionally the skin, and rarely the vagina (24). This gram-positive organism has developed resistance to methicillin in some cases, hence the term MRSA (methicillin resistant *Staphylococcus aureus*). In addition, povidone-iodine is not as effective in preventing infections with MRSA (25).

MRSA is commonly linked to nosocomial infections. In our case, the patient did not have any risk factors for nosocomial infections, although his occupation...
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may have put him at risk for colonization. Other populations at higher risk for carrier states include physicians, nurses, and other hospital workers, diabetics and patients on dialysis, immunocompromised patients, including those with HIV and intravenous drug abusers. Infection after colonization requires penetration of skin or mucosa (24-26).

Staphylococcus aureus infections after surgery typically present with fever, prostration, edema, erythema, and pain around the point of entry. Serious complications of untreated infection include septicemia, endocarditis, osteomyelitis, meningitis and pneumonia. In about a third of cases of septicemia, no apparent foci of infection can be identified (24).

Povidone iodine is a commonly used antiseptic solution for interventional procedures, including surgery. It also remains the most popular antiseptic agent used to prevent catheter-related infections. However, a recent meta-analysis showed that the use of chlorhexidine compared to povidone iodine reduced the incidence of bloodstream infections by 49%, in patients undergoing central line placements. In addition, it is estimated that for every 1000 catheter sites disinfected with chlorhexidine gluconate rather than povidone-iodine, 71 catheter colonizations, and 11 bloodstream infections can be prevented (27).

A recent comparison of povidone iodine and iodophor in isopropyl alcohol (Duraprep®, 3M, St. Paul, MN) (28) used for skin disinfections prior to epidural catheter insertion in parturient showed a marked decrease in the number of positive skin cultures after disinfections with Duraprep (30% vs. 3%), as well as a decrease in bacterial regrowth and colonization of epidural catheters. Alcohol speeds drying and organism killing, and the preparation forms a water-insoluble film that may resist contamination.

In another study, Birnbach et al (29) demonstrated that the frequency of bacterial contamination in previously open bottles of povidone iodine was 40% at the inside of the bottle cap, but none was found in unopened bottles. Also, the antibacterial activity of previously opened bottles of povidone appeared to be decreased. The loss of antimicrobial activity, seen in previous studies (29, 30), may be due to partitioning of the iodine between the micelle structure of the surface-active agent and the water phase.

Chlorhexidine in alcohol was compared to aqueous povidone iodine for cutaneous antisepsis before epidural catheter insertion in 96 children (25). Epidural catheters were kept in place for an average of 50 hours. Those patients who were prepped with chlorhexidine/iodophor were one sixth as likely to be colonized with microorganisms than the povidone group. In this study, coagulase-negative staphylococci were the only microorganisms recovered.

The superior results of alcoholic chlorhexidine may be explained by its more potent bactericidal activity and its high permeability into hair follicles. In addition, its antimicrobial activity persists for hours after topical application, and in contrast to povidone, is not neutralized by proteaceous solutions, and it does not induce allergic reactions. Bacterial resistance to chlorhexidine is rare (25).

Bacterial contamination can occur even following strict aseptic guidelines. Readler et al (31) reported that bacterial contamination occurred in 18% of needles after epidural or subarachnoid block, even after strict antisepsis was followed.

The addition of alcohol to chlorhexidine has been shown to improve its antibacterial activity against MRSA. Sakuragi et al (23) compared 10% povidone, 0.5% chlorhexidine gluconate and 0.5% chlorhexidine gluconate in 80% ethanol, against four strains of methicillin-resistant, and two strains of methicillin-susceptible Staphylococcus aureus. The pathogens were exposed to each disinfectant for 15, 30, 60, 120, and 240 seconds. All six strains grew colonies after 60 seconds in the povidone group, five of six grew colonies after 60 seconds of exposure in the chlorhexidine group, and no bacteria grew after 15 seconds of exposure to the 0.5% chlorhexidine ethanol preparation.

This case illustrates the need for prompt recognition of infection after a transforaminal epidural steroid injection, even one performed in a sterile operating room with good sterile technique. In fact, there did not appear to be a break in sterile technique in this case, although it is assumed that the source of infection was inadequate bactericidal effect of the povidone-iodine preparation. In any case, prompt diagnosis, surgical drainage and the correct antibiotic management were necessary to completely cure the infection. Although the incidence of spinal infection following injections is rare (less than 1 in 10,000 injections), the physician should be constantly alert to that possibility. A busy practice may see several thousand patients per year, so the chance of seeing a patient with a spinal infection may not be so small. Indeed, one must also be alert to the possibility that a new patient may present with an undiagnosed infection that can manifest shortly after an injection. The incidence of spontaneous spinal infection is about 1 in 20,000 hospital admissions (32). In such cases, cultures will guide therapy and may provide a clue as to the origin of the infection. For example, gram-negative infections may result from hematogenous spread from the gastrointestinal or urinary tract. A Streptococcus viridans infection would suggest hematogenous spread from a dental abscess.

**CONCLUSION**

Skin flora are the most common organisms implicated in spinal infections after spinal injections. Povidone iodine may not be as effective as other antiseptic agents in preventing this complication. Chlorhexidine gluconate/iodophor and iodophor/ alcohol have been shown in several studies to be superior to povidone alone in preventing infections after interventional procedures. Full bactericidal effect requires that the preparations dry completely, which may take several minutes; the alcohol also must be allowed to dry fully to eliminate the risk of fire hazard. When back pain or fever develops following spinal injections, the physician should consider the possibility of spinal infection.

**Author Affiliation:**

Abdallah Kabbara, MD
Cleveland Veterans Administration Medical Center
Cleveland, Ohio 44106
E-mail: draikabbara@yahoo.com

Samuel K. Rosenberg, MD
University Anesthesiologists, Inc
11100 Euclid Avenue
Cleveland, Ohio 44106
E-mail:sammyrosenberg@yahoo.com

Carlos Untal, MD
Resident in anesthesiology
University Hospitals of Cleveland
Cleveland, Ohio 44106
E-mail: carlos.untal@uhhs.com
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