

Simplified Method for Treating Osteomyelitis of the Sternoclavicular Joint

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Osteomyelitis of the sternoclavicular joint is a rare yet challenging problem. It is commonly treated by resection and a muscle flap. We report a case that was treated with single-stage resection of both the sternoclavicular joint and part of the sternum followed by implantation of calcium sulfate beads impregnated with antibiotics and primary closure without a muscle flap. A single-stage

debridement with resection for osteomyelitis of the sternoclavicular joint and primary closure with calcium sulfate beads impregnated with antibiotics may be an option when dealing with this difficult clinical problem.

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Bacterial septic arthritis of the sternoclavicular joint is, fortunately, rare, comprising a small percentage of all infectious arthritis cases [1–7]. However, cases can be difficult to treat and may involve several different specialties including thoracic, orthopedic, and plastic surgeons. Although patients can be treated conservatively with antibiotics alone [2, 4], surgical management is often required. Standard surgical techniques include one-stage resection with closure over drains [1, 3], single-stage resection with immediate muscle flap and closure [4–7], and resection with an open wound and aggressive wound care management followed by a staged muscle flap closure at a later date [7]. We report the success of a surgical technique involving single-stage resection followed by implantation of calcium sulfate beads impregnated with antibiotics and primary closure without a muscle flap.

Technique

Our patient was a 57-year-old man with longstanding diabetes mellitus who had peripheral vascular disease and diabetic wounds infected with methicillin-resistant *Staphylococcus aureus* to both lower extremities, resulting in bilateral below-knee amputations in the past. One year after his last below-knee amputation, he was hospitalized with acute renal failure complicated by congestive heart failure. He required insertion of a dialysis catheter into his right internal jugular vein for hemodialysis. After two sessions of hemodialysis his renal function improved, and the catheter was removed 17 days after insertion. Approximately 2 weeks after discharge, swelling was detected in his right sternoclavicular area near the site of his prior hemodialysis catheter. The patient had a

leukocytosis of 14,100/ μ L and displayed obvious swelling and fluctuance of the right sternoclavicular area. A computed tomography scan showed destruction of the bone in the right sternoclavicular joint, and he was admitted to the hospital and given intravenous vancomycin.

Two days after the patient's admission, radical debridement of the right sternoclavicular joint through a 13-cm incision was performed. Eight centimeters of the medial clavicle was resected in addition to portions of the manubrium and sternum. A large amount of pus was present under the medial clavicle and clavicular head. After getting down to healthy tissue, calcium sulfate (Biocomposites, Ltd, Staffordshire, England) was mixed with vancomycin and gentamicin and allowed to set on a mold to form beads, which were then implanted into the wound. These calcium sulfate beads filled the defect nicely, and the wound was closed primarily without a drain (Fig 1). For a few days after surgery, the patient had serous drainage, which resolved. He was maintained on intravenous antibiotics for another 12 days and then was discharged home on trimethoprim-sulfamethoxazole by mouth for 2 weeks. Intraoperative cultures grew methicillin-resistant *S aureus*.

The patient continued to improve, and his kidney function remained stable. He had no functional limitations and was working out with weights in a gym 3 months after surgery, with no pain in his shoulder. He has had no evidence of recurrent infection in 18 months.

Comment

Bacterial septic arthritis of the sternoclavicular joint accounts for less than 1% of septic arthritis in reported

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Fig 1. Intraoperative photograph of antibiotic beads placed before closing the incision after right sternoclavicular joint resection.

cases [1]. Involvement of the clavicle, manubrium, and sternum requires aggressive surgical management, and intravenous antibiotics alone will not result in resolution. The various management scenarios include simple aspiration, incision with drainage [3], aggressive resection with immediate muscle flap closure [4-7], and initial resection with aggressive wound care, including the use of negative pressure wound therapy with a staged muscle flap closure [7].

Laboratory-synthesized 100% pure calcium sulfate is cleared by the Food and Drug Administration for use in infected locations and is an excellent “dead space filler.”

It has been documented that implantation of antibiotic-loaded beads achieves high local antibiotic levels. The beads are completely resorbed and therefore do not have to be removed. That lends itself well to the management of sternoclavicular joint infections due to the dead space created by the resection. Elution of the antibiotics locally can last for weeks. Resorption of the beads with elution of antibiotic levels does not result in detectable serum levels of the antibiotics. A number of antibiotics and combinations as well as antifungal agents have been reconstituted with the purified calcium sulfate. Increases in serum calcium levels have not been noted. We have not seen this treatment used with sternal wound infections.

We conclude that a single resection with primary closure over calcium sulfate beads impregnated with antibiotics and limited systemic antibiotic therapy appears to provide significant cost savings and can result in an excellent clinical response. This is another option in the treatment of a rare but difficult clinical problem.

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