Clinical Tip: Extraction of a difficult to remove intramedullary antibiotic rod in the ankle

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The purpose of this clinical tip is to describe a technique which can facilitate extraction of an antibiotic impregnated polymethylmethacrylate (PMMA) spacer from the intramedullary canal of the hindfoot, ankle and distal tibia. This method employs the Revision Moreland instrumentation system which was originally designed for total hip revision surgery.

Key words: Antibiotic rod, antibiotic spacers, bone cement, Moreland extractor

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The use of polymethylmethacrylate antibiotic spacers is commonly used in the management of osteomyelitis of the hip, knee, and ankle joint. This method permits a local delivery of concentrated antibiotics while avoiding elevated systemic levels.¹ After removal of internal hardware and debridement of necrotic tissue and/or bone, the dead space needs to be managed. Spacers made of antibiotic impregnated cement were designed to prevent soft tissue contraction and maintain extremity alignment while awaiting prosthetic implantation or arthrodesis type procedures.

Typically, these spacers are shaped according to the size and shape of the defect. In the ankle joint, intramedullary spacers are constructed in the shape of a cylinder with the use of a ball tipped pin, polymethylmethacrylate (PMMA) cement, and heat stable antibiotics.

It may be a challenge to remove the intramedullary spacer in some patients. Several methods and instrumentation have been described for the extraction of bone cement in revision hip and knee arthroplasties.² Dr. Moreland designed instrumentation to facilitate revisional hip and knee surgery. The Moreland revision instruments contain cement extractors which aid in the removal of previously placed prosthesis and bone cement.

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Figure 1  AP radiograph demonstrates an intramedullary placed antibiotic impregnated polymethylmethacrylate rod in the distal tibia.

Description of Technique

The patient is placed in the supine position and an incision is made on the plantar aspect of the foot. If the antibiotic rod cannot be extracted easily from the inferior aspect of the calcaneus, a cement extractor from the revision Moreland system is then obtained and inserted in a retrograde fashion. If necessary, a small window can be made in the tibia proximal to the antibiotic rod or at the level of the ankle joint to grasp the intramedullary spacer with bone forceps. (Fig.1) This will prevent proximal migration of the antibiotic rod during extraction. The extractor is then inserted into the canal from the plantar entry site until the triangular hook lies proximal to the rod.

Figure 2  Extraction of the broken intramedullary antibiotic rod with the use of a Moreland revision extractor.

C-arm visualization helps to ensure proper placement and prevent proximal migration of the rod.

The hook is then rotated in a clockwise or counterclockwise manner to gain purchase on the superior edge of the spacer. (Fig. 2)
A slap hammer is used to extract the antibiotic rod in an anterograde fashion. Once the rod is removed proper joint debridement and biopsy is obtained. (Fig. 3)

At the time of implantation of an intramedullary spacer we also recommend placing a bulb tipped guidewire or a long Steinman pin that is hooked at the proximal end through the middle of the polymethylmethacrylate spacer. The distal end of guidewire or Steinman should be left proud in the soft tissues to facilitate extraction.

In summary, removal of cemented rods may be a challenge to the operating foot and ankle surgeon. However, the revision Moreland instrumentation can be useful. (Fig. 4) Several companies have cement removal hand tools with reverse hooks which are similar in design to the one reported in this study. Another method of cement removal not discussed here is with ultrasonically driven cement removal instruments. They are used to assist with the removal of polymethylmethacrylate (PMMA) bone cement during arthroplasty revision. The potential advantages of using the hand tools versus the ultrasonic instrumentation is the avoidance of cell death at the endosteal bone surface, hazardous fumes from the melting of the PMMA bone cement, and soft tissue damage from heat or friction burns.
 References