

Introduction and Methods 1 and 2

Introduction

Stabilizing a nonunion in the presence of a bone infection is a challenge. Traditional treatment has used antibiotic beads to treat the infection followed by a second procedure to provide bone stability.¹⁻⁴ The nonunion can be bridged with external fixation to provide stability; however, many patients are not ideal candidates for external fixation.

Antibiotic cement-coated intramedullary rods are able to treat the infection with high doses of local antibiotics while providing bone stability.⁵ The technique allows for immediate weight bearing and prevents complications that might occur during external fixation, such as pin tract infections and joint stiffness. This novel approach to infected nonunions was developed to minimize the number of additional surgical procedures for infection control and bone union. We present our series of 52 cases in which antibiotic cement-coated intramedullary rods were inserted for treatment of infected nonunions and segmental bone defects.

Methods

Two methods have been used to create the antibiotic-coated intramedullary rods. Initially, rods were made using a mold technique, which is called Method 1. The second generation of intramedullary rods was made with Method 2, which uses silicone tubing to create the rod.

Intraoperative rod preparation time for Method 2 is approximately 10 minutes, which is substantially less than the time it took to prepare a rod using Method 1 (1 hour). Additional advantages of Method 2 include the uniformity and improved reliability of the coating. No insertional debondings have occurred with rods using Method 2.

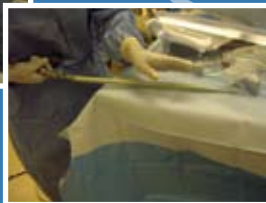
All rods were made with the same antibiotic recipe of 3.6 g of tobramycin and 1 g of vancomycin per 40-g package of cement. If a patient had a vancomycin allergy (two patients), only tobramycin was used. Extra monomer was necessary for mixing the large quantity of antibiotics with the cement.



Method 2



1. After mixing cement as in Method 1, use the cement gun to insert cement into the 12.5-mm inner diameter silicone tubing.



2. Carefully insert the rod into the silicone tubing. Inspect rod and roll carefully in the tubing to ensure uniform coating.

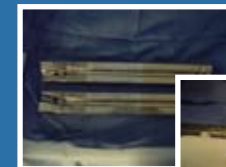


3. Cut and peel off silicone tubing.



4. After tip is filed, rod is ready to be inserted.

Method 1



1. Coat mold with sterile ultrasound gel.



2. Sprinkle dry cement powder.



3. Shake off excess powder.



4. Mix all powdered antibiotics with cement.



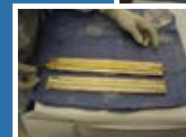
5. Add to cement gun with monomer and mix cement until homogeneous.



6. Using the cement gun, place cement into both sides of the mold.



7. Then place the rod into one side.



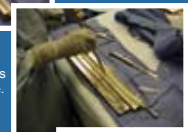
8. Close the mold carefully and make sure the rod is still centered in the mold. Keep the insertion threads of the proximal rod free of cement.



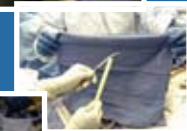
9. Carefully open mold.



10. Begin to remove excess cement with osteotome.



11. File tip to bullet shape for ease of insertion.



12. The rod is ready to be inserted.