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JAMES W. PRITCHETT, M. D.

THE CSL (COLLARED SELF-LOCKING) HUMERAL PROSTHESIS

TEN STEP SURGICAL PROTOCOL

Prosthetic replacement of the shoulder has been as effective as total hip replacement, but is done 5% as frequently. The usual indications are certain fracture dislocations, osteonecrosis, rheumatoid arthritis, and occasionally advanced osteoarthritis. Replacement reconstruction of the shoulder must include restoration of soft tissue balance about the joint.

The glenoid is quite shallow and there is little inherent geometric stability of the shoulder. Also, the shoulder has a greater range of motion than most joints and stability is much more of a problem. Rehabilitation of the shoulder is more difficult than for the hip or the knee. Important muscles may be injured or damaged by disease. There may be disease of the rotator cuff, acromioclavicular joint, or subacromial space that requires concomitant treatment.

The shoulder is more prone to adhesions and stiffness is much more common in the shoulder than in the hip or knee. The glenoid has a narrow neck and lends itself poorly to prosthetic replacement. Glenoid prosthesis loosening has been reported at an unacceptably high rate. It remains controversial whether in most situations glenoid replacement is helpful and we avoid using a glenoid prosthesis and prefer debridement.



Just as the glenoid differs from the acetabulum, the humerus differs from the femur. Proximally the medullary canal is very wide with a thin cortex. The canal narrows distally and disappears entirely at the olecranon fossa. There is no isthmus for firm medullary fixation.

The cancellous bone beneath the humeral head is the strongest in the humerus and the greater and lesser of the tuberosities are very important. To maintain correct muscle balance the humeral prosthesis must not subside. It is important to load the humerus on the subchondral bone to restore the mechanics of the shoulder joint. The CSL (Collared Self Locking) implant provides a full collar to cap the subchondral bone. The fin for greater tuberosity fixation and the ribbed stem with proximal porous coating self lock the implant into the humerus and maintains the critically important rotation.

The diameter of the humeral shaft varies much less between individuals than the diameter of the femur. The head size, however, is highly variable. A modular prosthesis is therefore needed. The modular head must be placed on a platform collar to avoid disassembly that has been sometimes reported with collarless modular implants for the humerus. The kinematics of shoulder movement provide for different stresses on the humeral implant than are present at the hip. If too small a humeral head implant is placed ^{or} ~~and~~ subsidence of the humeral stem occurs, instability and ~~possible~~ dislocation are a possibility. If too large a humeral head prosthesis is used or if the implant is not fully seated relative to the tuberosities, overstuffing of the joint will occur with poor motion and pain.



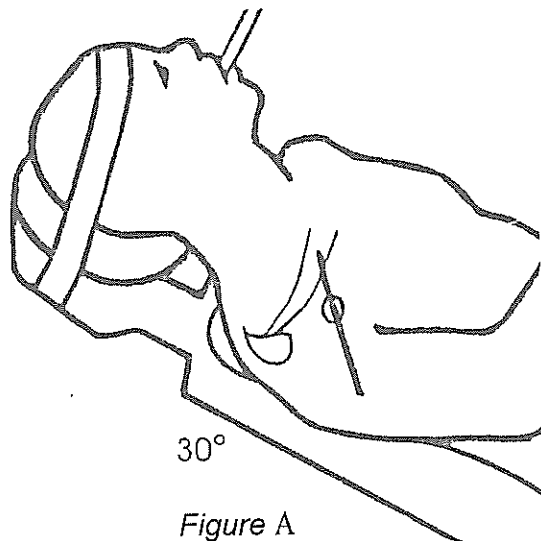
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SURGICAL TECHNIQUE

The patient receives intravenous broad spectrum antibiotics and is anesthetized with either a scalene block or general Anesthesia. We have often used ketorolac to discourage heterotopic ossification.

The patient is positioned in a 30 degree beach chair position and the arm is prepped and draped free (Figure A).



STEP
1



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A long deltopectoral incision is made (Figure B). No deltoid muscle is detached. If necessary, part of the conjoined tendon is opened and the joint is entered through the tendon of the subscapularis after placing stay sutures (Figure C). We then pay attention to determining if any surgery is necessary for the rotator cuff, the acromioclavicular joint, or subacromial space.

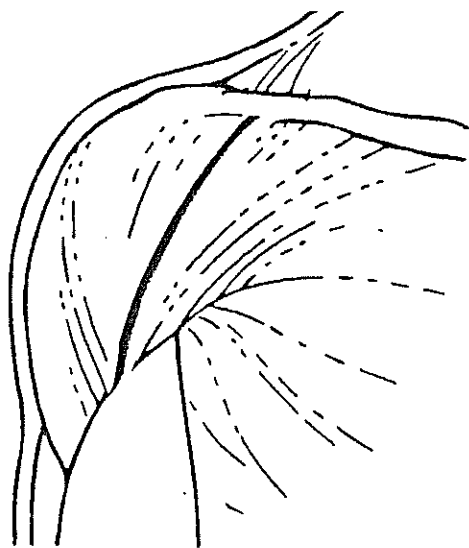


Figure B

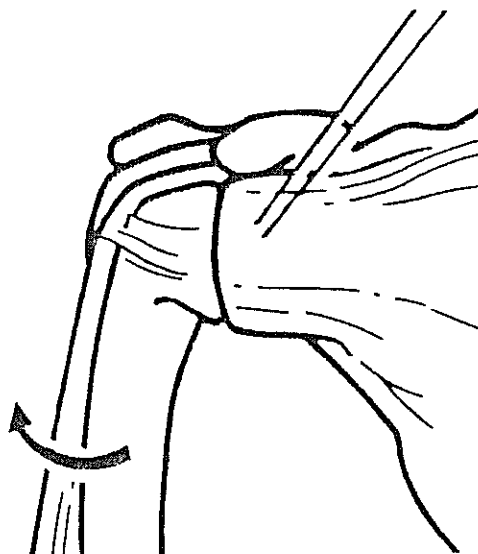


Figure C

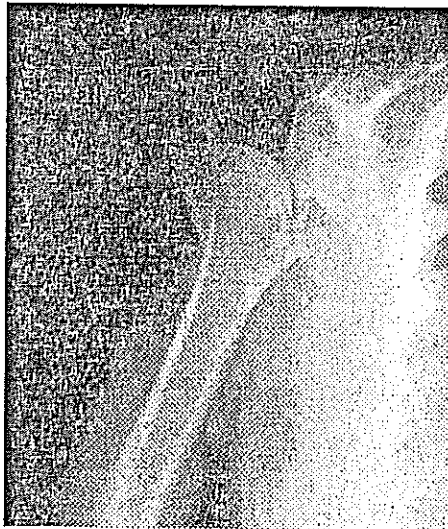
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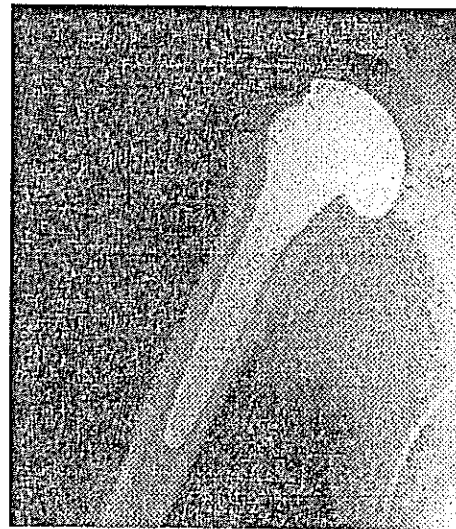
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If surgery is being performed for a fracture (X-ray 1), the head is removed and the tuberosities are prepared for reattachment (X-ray 2). Number two nonabsorbable sutures are placed through drill holes in the tuberosities and these sutures will later be tied around the stem beneath the collar (Figure D).

STEP
3



x-ray 1



x-ray 2

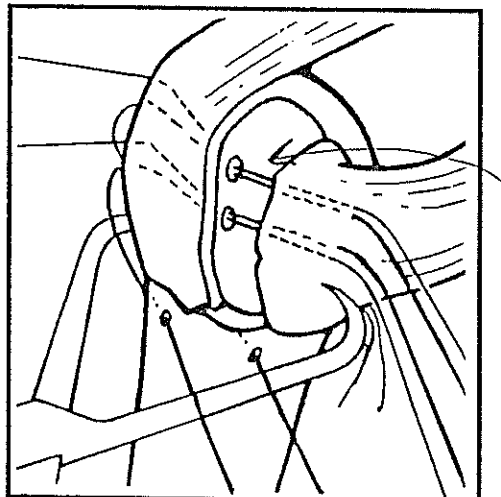


Figure D

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The rotator cuff is protected and the shoulder is dislocated with the external rotation (Figure E). Osteophytes are debrided and osteotomy in line with the sulcus of a normal humeral head is performed (Figure F). Be sure to retain adequate bone medially above the lesser tuberosity.

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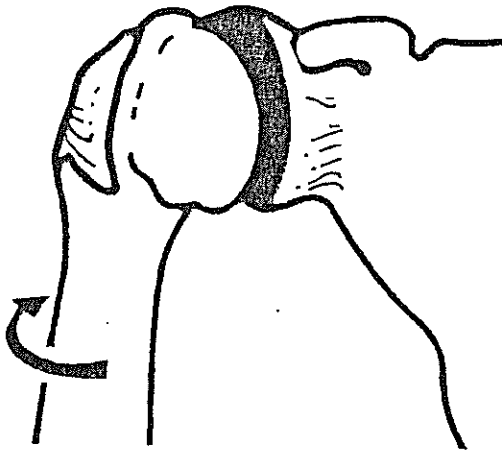


Figure E

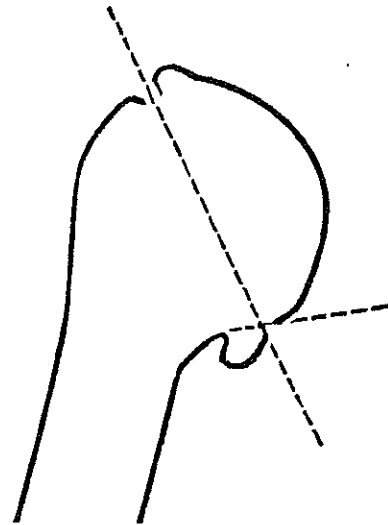


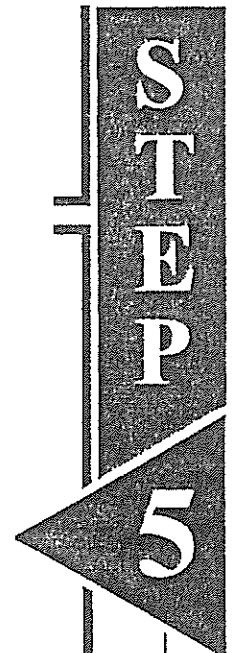
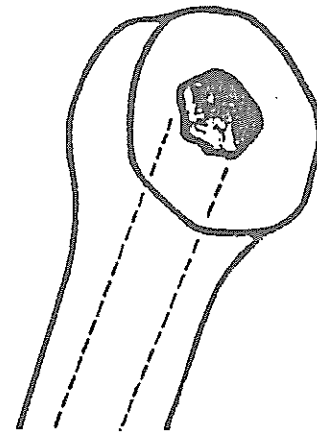
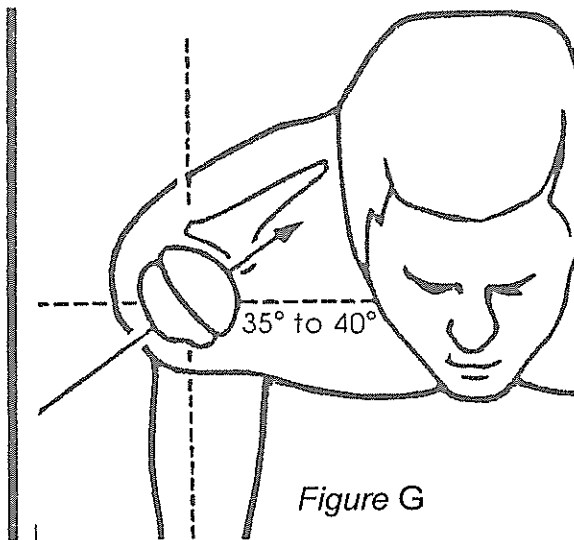
Figure F

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The removed head is measured and a modular head is Selected. Available head sizes are 42 mm, 45 mm, 48 mm, 51 mm., 53 mm. Ascertain the correct orientation of 25° to 35° of retroversion by palpation of the epicondyles reproducing the anatomy found. Open the medullary canal with the 10 mm. broach (Figure H).



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The fin on the broach goes into the greater tuberosity and sets the rotation. Broach the canal to 12 mm. and then 14 mm., if needed. Select the appropriate diameter of the stem. If the 14 mm. prosthesis is not completely snug, plan on adding a small amount of methylmethacrylate proximally around the stem. Do not plug the humerus and pressurize the cement, which will create undesirable distal fixation. Do not cement the porous coated stems.

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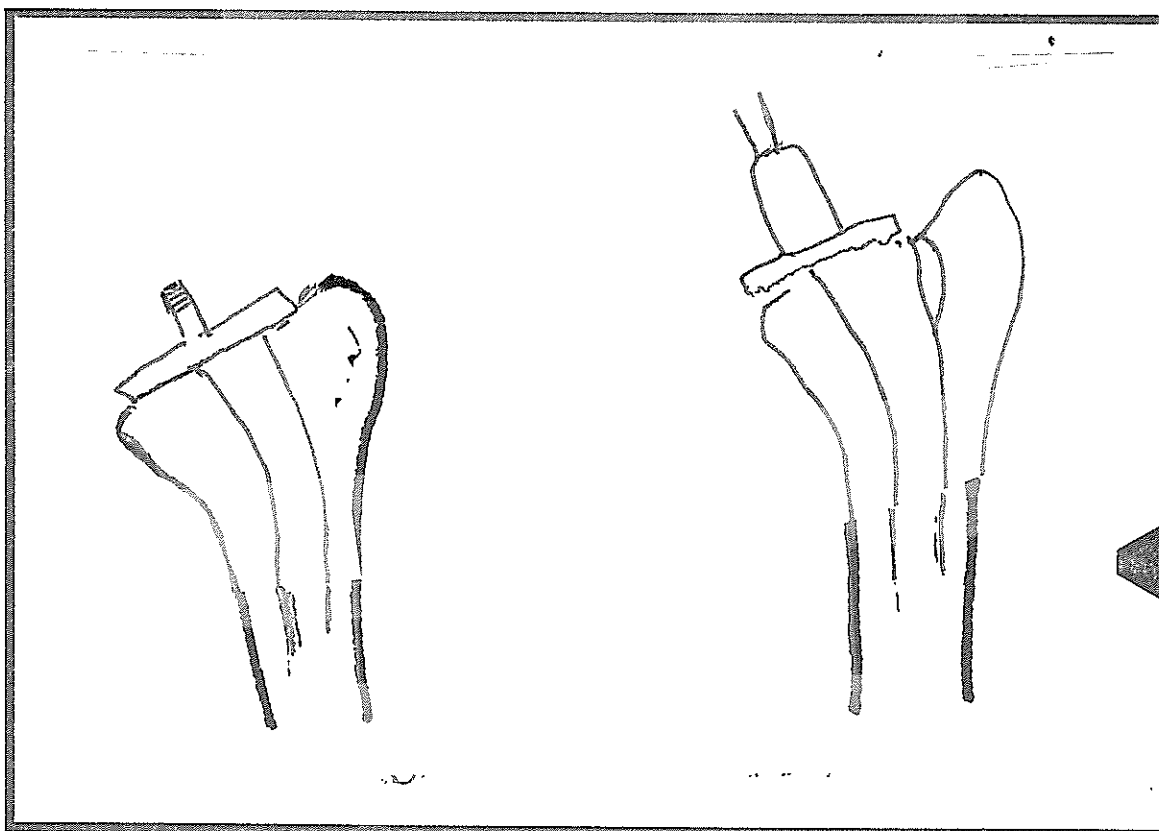
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With the correct broach in place, seated just below the lesser tuberosity, the planer is then applied over the broach and the humeral subcondral bone is smoothed to accept the collared prosthesis (Figure I).



STEP

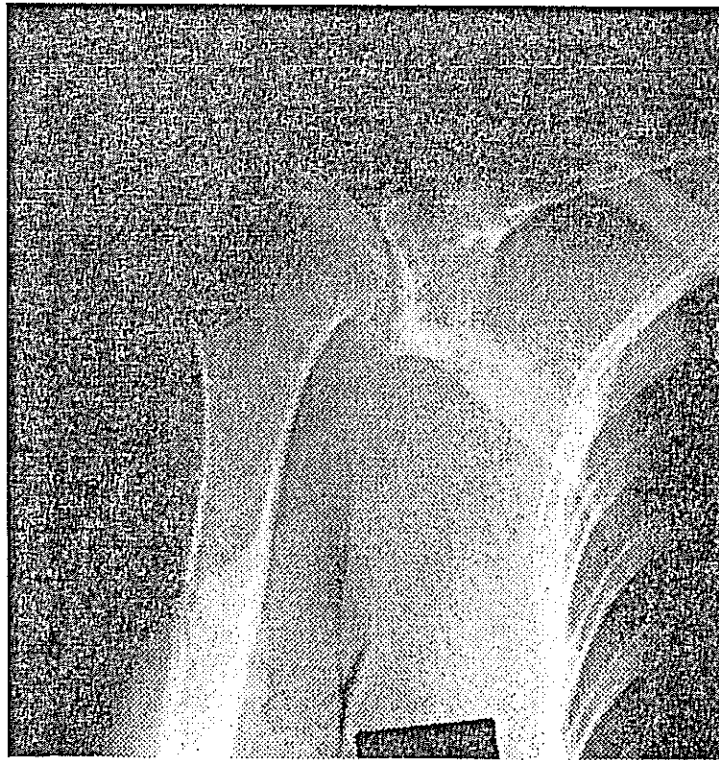
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The glenoid is debrided of osteophytes and any loose fragments
(X-ray 3).



X-ray 3

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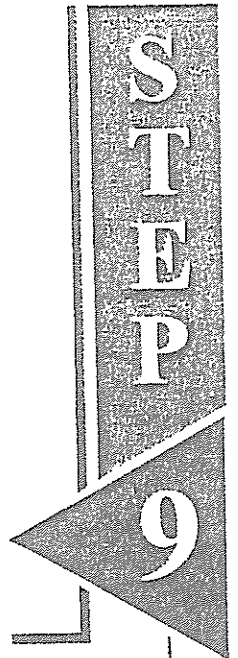
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The humeral prosthesis is then firmly seated in the correct orientation. The previously chosen modular head is attached to the stem via the reverse Morse taper. The shoulder is reduced and stability is assessed (X-ray 4).



X-ray 4



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STEP 10: An individualized rehabilitation plan is initiated.

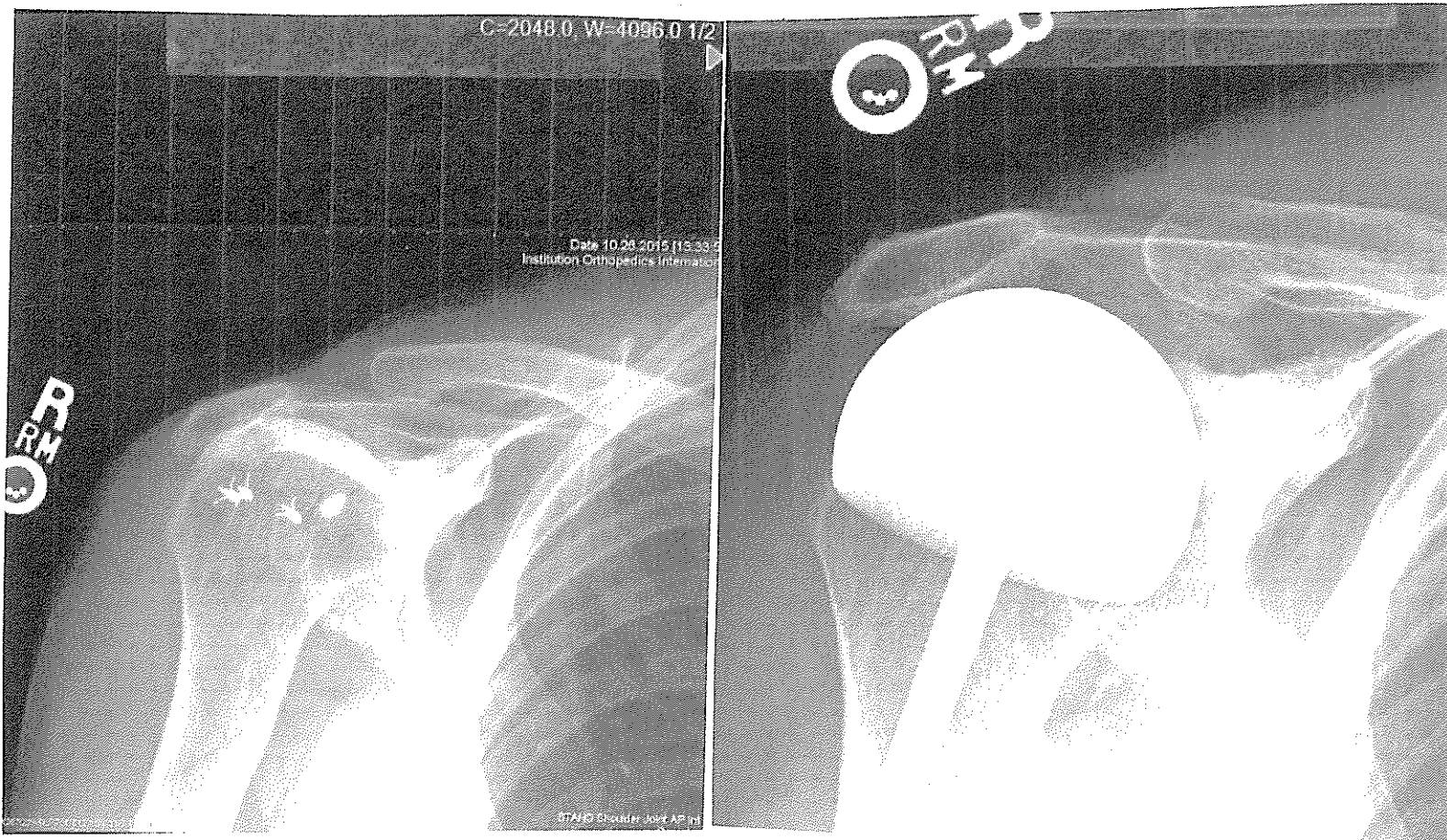
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Use a femoral resurfacing prosthesis if there is no rotator cuff



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JAMES W. PRITCHETT, M. D. Dr. Townley's last case

This custom was used to revise a failed reverse total shoulder.

