

Shoulder & Elbow Service, University of Washington Department of Orthopaedics and Sports Medicine

Ream and Run for Shoulder Arthritis: Conservative Reconstructive Surgery for Selected Individuals Desiring Higher Levels of Activity than Recommended for Traditional Total Shoulder Joint Replacement

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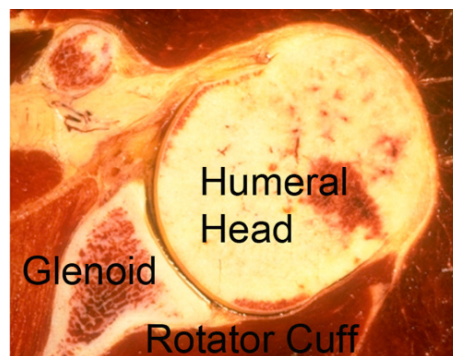
For questions, please email: matsen@uw.edu or warmewj@uw.edu.

Thanks to the patient 'graduates' of the ream and run who helped us with this handout.

The Ream and Run procedure can restore comfort and function to the arthritic shoulder. In this procedure the arthritic ball is replaced by a smooth metal ball fixed to the arm bone (humerus) by a stem that fits within it. The bone of the arthritic socket is reamed to the desired shape and the raw bone surface is allowed to heal while the patient gently exercises the shoulder. During the period of recovery a biological surface forms on this surface. This procedure avoids the possible risks and limitations associated with a plastic socket replacement and with the cement used to fix it in position. Success requires technical excellence of the surgery and a steadfast commitment by the patient to a specified exercise program until a desired range of motion can be maintained comfortably.

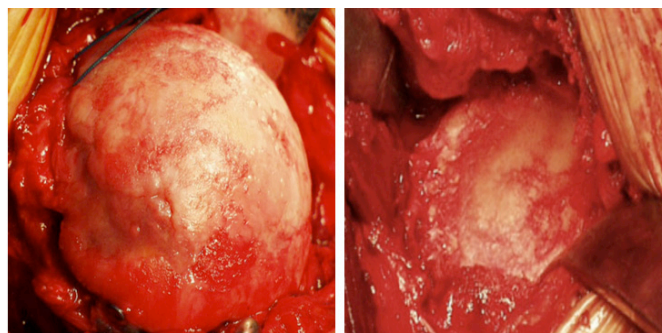
What Are The Key Parts Of The Normal Shoulder Joint?

The ball (humeral head) fits in the socket (glenoid) and is held there by the rotator cuff.



What Is Shoulder Arthritis?

Shoulder arthritis is a condition in which degeneration, injury, inflammation or previous surgery destroys the normally smooth cartilage on the ball (humeral head, on the left) and socket (glenoid, on the right).



How Is Shoulder Arthritis Diagnosed?

Carefully standardized X-rays reveal the loss of space between the humeral head and glenoid that is normally occupied by cartilage, showing bone on bone contact.



What Is A Total Shoulder?

In a total shoulder replacement, the arthritic surface of the ball is replaced with a metal ball with a stem that fits down inside of the arm bone (humerus) and the socket (glenoid) is resurfaced with a high density polyethylene component that is fixed in position on the shoulder blade using cement.



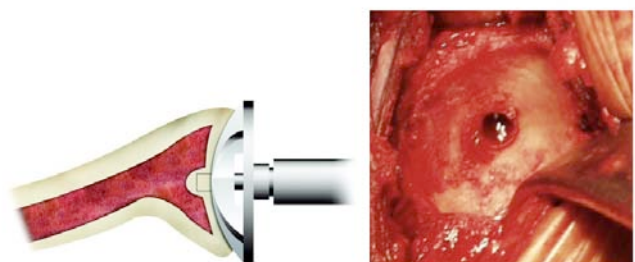
What Are The Possible Risks Associated With Total Shoulder?

While this is a standard treatment for arthritis of the shoulder, it does carry the possible risks that the plastic glenoid component will wear, loosen or even break over time, especially with heavy use. It is not possible to predict how long a plastic socket will last in each case because the use and geometry of each shoulder is different.

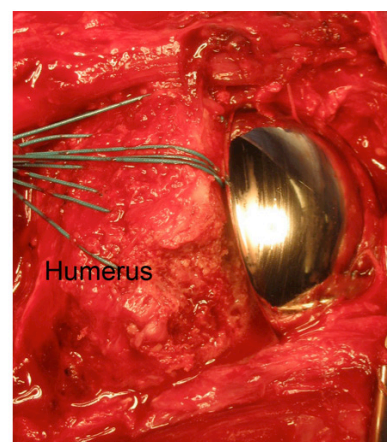


What Is A “Ream And Run” Surgery For Shoulder Arthritis?

In a Ream and Run, instead of implanting a plastic socket, the bone of the socket is shaped with a reamer so that a smooth concavity results.



The arthritic surface of the ball is replaced with a metal ball with a stem that is press fit down the inside of the arm bone (humerus) so that only the smooth surface extends from the bone.

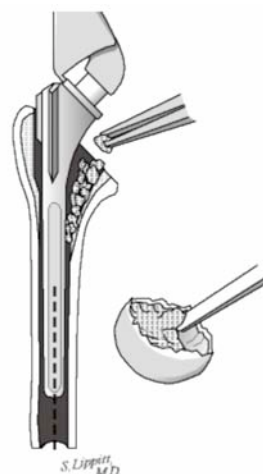


This procedure is performed through an incision between the deltoid and the pectoralis major muscles on the front of the shoulder. It includes release of adhesions and contractures and removal of bone spurs that may limit range of motion. Our team of experienced surgeons, anesthesiologists, and surgical assistants usually perform this procedure in less than two hours.



How Is The Humeral Component Fixed In The Humerus?

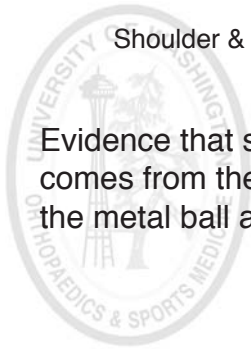
While some surgeons cement the humeral component and others use implants that foster bone in-growth, we find that these approaches (a) stiffen the bone making it more likely to fracture in a fall and (b) greatly complicate any revision surgery that may become necessary in the future. We prefer to fix the component by impaction grafting the inside of the humerus (using bone harvested from the humeral head that has been removed) until a tight press fit of the implant is achieved.



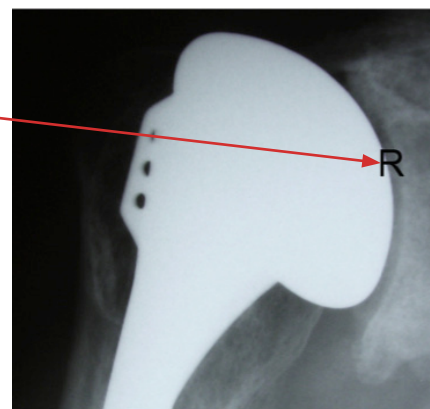
What Happens To The Raw Bone Surface Left After The Reaming Of The Glenoid?

Laboratory studies at the University of Washington have shown that the reamed socket (glenoid) can heal over with a smooth fibrocartilagenous surface. The illustrations to the right show the socket surface just after reaming and six months later.

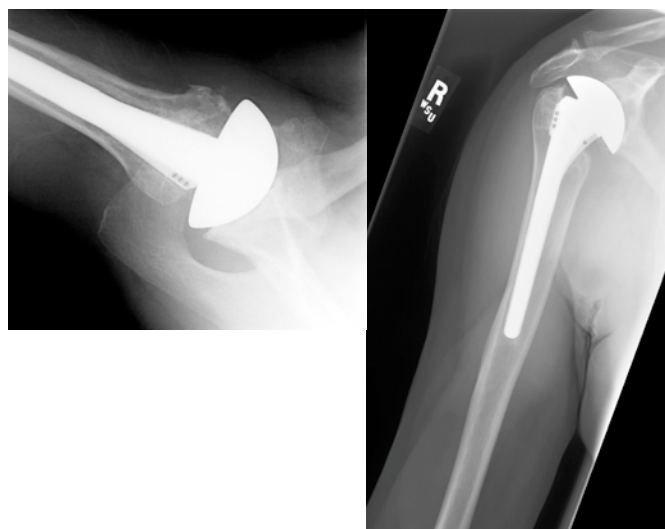




Evidence that similar regeneration occurs in patients comes from the space (R) shown on x-rays between the metal ball and the bony socket.

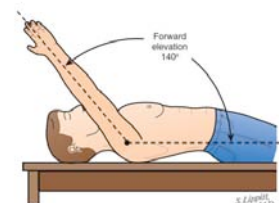
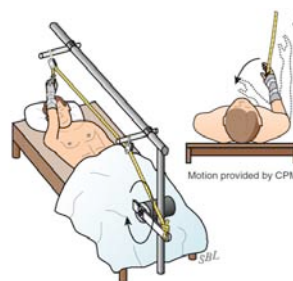


Here are the typical x-rays after a ream and run procedure.



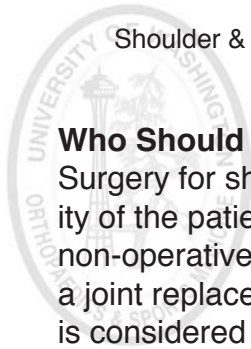
In order for proper healing to occur, the patient must maintain the range of motion achieved at surgery with simple, frequent stretching exercises.

Rehabilitative exercises are started immediately after surgery using continuous passive motion and stretching by the patient.



Attaining and maintaining at least 150 degrees of forward elevation is critical to the success of this procedure. The forward lean and the supine stretch can be helpful in getting there and maintaining this range of motion.





Who Should Consider A Ream And Run?

Surgery for shoulder arthritis should only be considered when the arthritis is limiting the quality of the patient's life and after a trial of physical therapy and mild analgesics to determine if non-operative management is sufficiently helpful. Severe arthritis is usually best managed by a joint replacement, either a total shoulder or a ream and run. The Ream and Run procedure is considered by those who are strongly motivated to put in substantial time and effort in the rehabilitation process to assure that proper healing occurs and who recognize that the pain relief and range of motion achieved with this procedure may not match that of a conventional total shoulder replacement. The ideal patient is healthy, active, and committed to work diligently to achieve a shoulder reconstruction that does not require plastic and bone cement.

A patient who has had a terrific recovery after this procedure states "R&R patients must be very motivated to endure the challenges of the rehab. I don't think that this can be overstated. It is most certainly a tough, painful, and lengthy process, but most definitely worth it. As they say, 'The juice is worth the squeeze,' but patients must prepare themselves mentally for the journey and be willing to put in the work."

Who Should Probably Not Consider A Ream and Run?

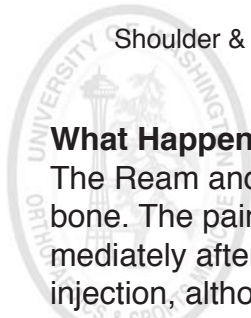
This procedure is less likely to be successful in individuals with rheumatoid arthritis, depression, obesity, diabetes, Parkinson's disease, multiple previous shoulder surgeries, shoulder joint infections, rotator cuff deficiency and severely altered shoulder anatomy. Patients who routinely use narcotic medication or who use tobacco are generally not candidates for this procedure.

What Are The Keys To Success Of A Ream and Run?

Success requires technical excellence of the surgery and a steadfast commitment by the patient to the exercise program until the desired range of motion can be achieved comfortably. Attaining and maintaining at least 150 degrees of forward elevation is critical to the success of this procedure. Patients point out that the recovery is progressive – often the shoulder continues to improve as long as two years after surgery.

How Does A Patient Prepare For The Ream and Run Procedure?

As for all elective surgical procedures, the patient should be in the best possible physical and mental health at the time of the procedure. Any heart, lung, kidney, bladder, tooth, or gum problems should be managed before surgery. Any infection may be a reason to delay the operation. Any skin problem (acne, scratches, rashes, blisters, burns, etc) on the shoulder, armpit, arm, forearm or hand should be resolved before surgery. The shoulder surgeon needs to be aware of all health issues, including allergies as well as the non-prescription and prescription medications being taken. For instance, aspirin and anti-inflammatory medication may affect the way the blood clots. Some medications, such as blood thinners, may need to be modified or stopped before the time of surgery.



What Happens After Surgery?

The Ream and Run is a major surgical procedure that involves cutting of skin, tendons and bone. The pain from this surgery is managed by the anesthetic and by pain medications. Immediately after surgery, strong medications (such as morphine or Demerol) are often given by injection, although minimizing the dosage as much as possible will speed the recovery of the bladder, bowel and balance. A drain is often used to remove blood from around the area of surgery; this is usually removed the day after surgery. An intravenous infusion is used to replace fluids and to give antibiotics. This is usually removed on the second day after surgery. Antibiotics are given just before surgery and stopped on the first day after surgery. We have blood typed and cross-matched in the event that a transfusion is necessary. A urinary catheter may be used if the patient has difficulty voiding.

Within a day or so, oral pain medications (such as hydrocodone or Tylenol with codeine) are usually sufficient. We ask that our patients avoid anti-inflammatory medication (Ibuprofen, Aleve, Motrin) after the Ream and Run because they may impair the healing and remodeling of the joint and the fixation of the humeral prosthesis in the arm bone (humerus). It is best that these anti-inflammatory medications be avoided for 3 months after the procedure and after that used only occasionally.

The shoulder rehabilitation program is started on the day of surgery. The patient is encouraged to be up and out of bed soon after surgery and to progressively reduce their use of pain medications. Hospital discharge usually takes place on the second or third day after surgery. Patients are to avoid lifting more than one pound, pushing and pulling for six weeks after surgery.

What Is The Rehabilitation Program After Ream and Run?

Arthritic shoulders are stiff. Although a major goal of the surgery is to relieve this stiffness by release of scar tissue, it may recur during the recovery process. To prevent stiffness, rehabilitative exercises are started by our experienced shoulder therapists immediately after surgery using continuous passive motion and stretching by the patient. In order for proper healing to occur, the patient must attain and maintain the 150 degree range of forward elevation achieved at surgery. Achieving this range of motion within the first few days of the procedure is critical to the success of this procedure. For the first 6 weeks of the recovery phase, the focus of rehabilitation is on maintaining this range of flexion. We avoid stretching in other directions so as to avoid disrupting the soft tissue healing.

Thirty to sixty minutes of aerobic exercise a day (stair climber, treadmill, brisk walking, stationary bike, etc.) has proven a very helpful part of the recovery process.

Pictured below are three of the exercises that will help the shoulder achieve the goal of 150 degrees of forward elevation, the supine stretch (with assistance from other arm), the forward lean and the pulley.



Strengthening exercises are avoided during the first 6 weeks so as not to stress the tendon repair or the healing bone surface before it heals back to the bone. Once the shoulder is comfortable and flexible, strengthening exercises and additional activities are started. Some patients prefer to carry out the rehabilitation program themselves. Others prefer to work with a physical therapist that understands the program for the Ream and Run.

What If My Arm Or Hand Swells After Surgery?

Swelling is not uncommon after the Ream and Run, with the removal of bone spurs and reaming of the socket, a substantial amount of bare bone is exposed. Swelling is best managed by using a squeeze ball and, by keeping the arm elevated on a pillow whenever possible. If the swelling gets to the point where the arm feels tight, be sure to let your surgeon know.

What If My Shoulder Clicks Or Pops While Doing The Exercises?

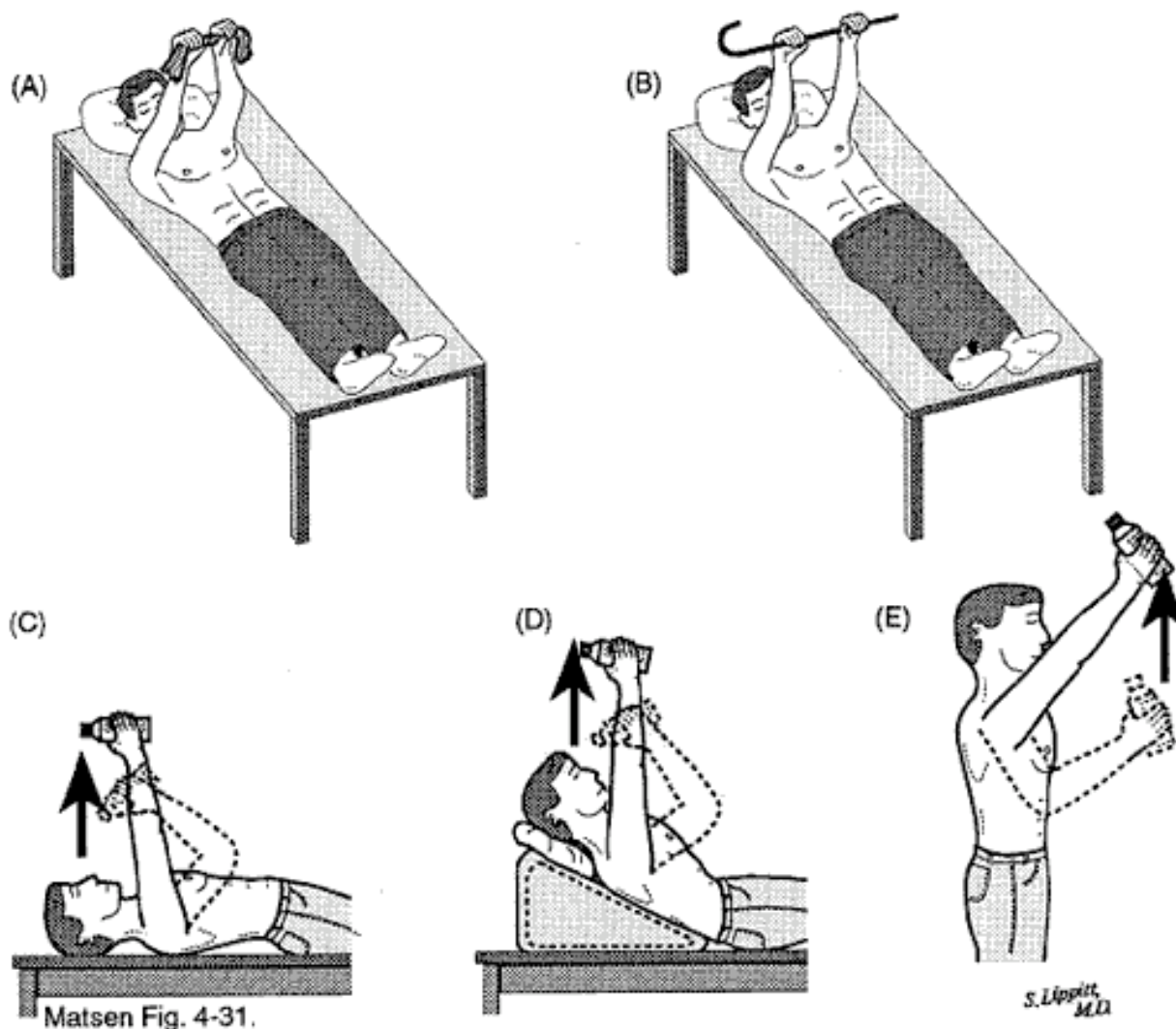
It is not uncommon for the shoulder to make some noise when it is moved during the period of healing. If this happens, we try slightly modifying the position of the arm (turning it more in or outward) to see if this avoids the sensation. If the sensation persists, the surgeon should be notified.

When Can Ordinary Daily Activities Be Resumed?

In general, patients are able to perform gentle activities of daily living using the operated arm from two to six weeks after surgery. Walking is strongly encouraged. Driving should wait until the patient can perform the necessary functions comfortably and confidently. We recommend waiting to drive for six weeks if the surgery has been performed on the right shoulder, because of the increased demands on the right shoulder for shifting gears. Driving is recommended only after the shoulder has regained comfort and the necessary motion and strength. Thus the patient needs to be prepared to have less arm function for the first month or so after surgery than immediately before surgery. Patients often require some assistance with self-care, activities of daily living, shopping and driving for approximately six weeks after surgery. Management of these limitations requires advance planning to accomplish the activities of daily living during the period of recovery.

How Do I Strengthen My Shoulder After I Have The Full 150 Degrees Of Flexion?

Maximal effort is needed to maintain at least 150 degrees of flexion five times a day until this is easy and comfortable. After this range is comfortably achieved and after 6 weeks, gradually increasing load can be applied in the two-hand supine press series shown below. We start with two hands together on a washcloth, pushing both hands to the ceiling while lying flat. Then we move to two hands on a cane or yardstick about two feet apart, performing the same movement. Next the same movement is performed with the one hand alone holding a very light weight. The weight is gradually increased as is the angle of sitting up, until the hand can lift



one pound overhead. The rule is that the shoulder needs to be able to do 20 repetitions comfortably at one level before graduating to the next step. It is CRITICAL however, that no strengthening exercise cause discomfort that last more than a few minutes after its completion. Some individuals in their enthusiasm have pushed so hard that the healing process is disrupted.

What Other Exercises Have Patients Found To Be Helpful?

Patients inform us that three exercises known as the 'Traction 3' can help the shoulder regain range and coordination.

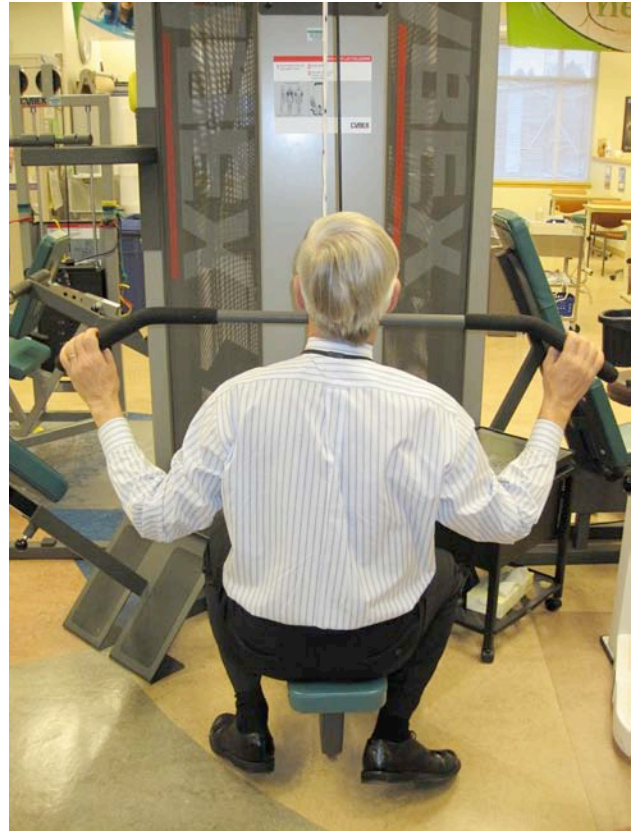
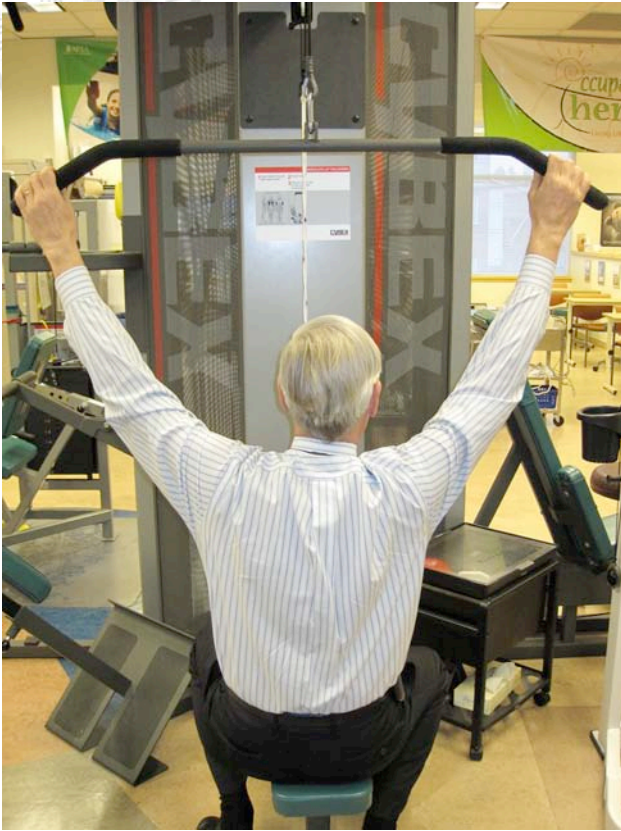
The first is the gravity swing in which a light weight held in the hand is allowed to swing gently while the patient bends over at the waist.



The second is the row, where slow relaxed pulls on a rowing machine stretch out the shoulder.



Finally there is the lat-pull, where, again, light resistance is allowed to stretch out the shoulder.



Each of these should be done only as much as comfort allows, starting with minimal resistance. Gentle swimming, starting with the breast stroke also seems helpful at this phase.

Once A Shoulder With Ream and Run Procedure Has Successfully Completed The Rehabilitation Program, What Activities Are Permissible?

Once the shoulder has a nearly full range of motion, strength and comfort, we impose no limitation on the activities it can perform. While there are no strict limitations on participation, those activities that involve impact (chopping wood, contact sports) and those that involve heavy loads (weightlifting) should be resumed gradually to allow the rotator cuff tendons, muscles and joint surface to regain their strength and flexibility.

What Problems Can Complicate A Ream and Run?

Like all types of shoulder joint replacement, the Ream and Run operation can be complicated by infection, pain, weakness, stiffness, nerve or blood vessel injury, fracture, instability, component loosening, and anesthetic complications including death. The most common cause of failure is a patient's inability to maintain the range of motion achieved at surgery during the healing period, which can last up to six months after surgery. In our experience to date with over 300 of these procedures, a few shoulders have required repeat surgery for either (a) partial tear of the subscapularis tendon, (b) stiffness, (c) loosening of the prosthesis, (d) infection, and (e) failure to achieve the desired level of comfort leading them to request the insertion of a plastic socket.

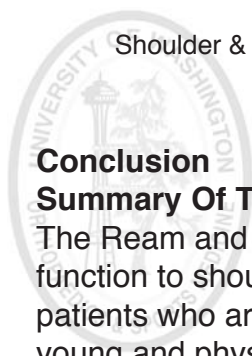
How Many Ream and Run Surgeries Are Done At The University Of Washington?

We currently perform 40-50 of these procedures each year on carefully selected patients from across the United States.

What If The Patient Lives A Long Way Away From Seattle?

Patients often come to Seattle from a long distance for this procedure. You can begin the process by contacting the Shoulder and Elbow Clinic at (206) 598-4288 and asking a staff member to guide your next steps. Alternatively you can email Dr. Matsen at matsen@uw.edu. If you wish, we can make a tentative 'one stop' plan in which we consider performing the evaluation and the surgery in the same week, if all systems are go. We are available by appointment in the Shoulder and Elbow Clinic, 4245 Roosevelt Way N.E. Seattle, on Mondays and Fridays to evaluate individuals with shoulder arthritis to discuss the procedures that might be most ideally suited for them. We perform surgery on Tuesdays and Wednesdays at the University of Washington Medical Center, 1959 NE Pacific St, Seattle, Washington, 206 598-4288.

Patients having a Ream and Run procedure are usually able to be discharged from the medical center/hospital in two days and return home in three to four days after the procedure able to return home three to four days after the procedure, assuming they have mastered their exercises and have reasonable comfort on reasonable medications. The staples used to close the skin can be removed by a nurse or physician near the patient's home. Ideally, we like to see patients back at six weeks after surgery to assure that satisfactory progress is being made. We request that patients complete questionnaires at 3, 6, 12, 18 and 24 months after surgery so we can track their progress and that the patient obtain and send to us X-rays at 12 and 24 months after surgery if they are unable to return to Seattle for the annual follow-ups. All patients have our personal email and the clinic contact phone numbers to use in contacting us at any time questions arise.



Conclusion

Summary Of The Ream and Run Procedure For Arthritis Of The Shoulder

The Ream and Run procedure is a technically exacting procedure that can restore comfort and function to shoulders damaged by degenerative joint disease and osteoarthritis to selected patients who are strongly motivated. This procedure provides an approach to treating arthritis in young and physically demanding patients whose arthritis has advanced to the point of surgical treatment. By reshaping, reorienting and smoothing the bony socket, this procedure removes the risks associated with wear, loosening and fracture of the plastic socket.

Pre-planning and persistent rehabilitation efforts will help assure the best possible result for the patient. Again, please check out the Ream and Run website www.orthop.washington.edu/reamandrun. If you have questions now or any time in the future, please feel free to send us an email at matsen@uw.edu or warmewj@uw.edu.

Shoulder Surgeons
University of Washington
Department of Orthopaedics and Sports Medicine

Peer-reviewed articles authored by our team:

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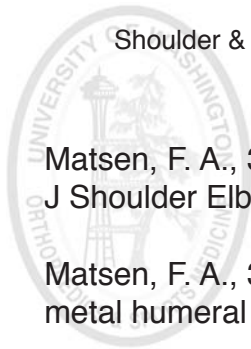
Clinton, J.M., Warne, W.J., Lynch, J.R., Lippitt, S.B., Matsen, F.A. III. Shoulder Hemiarthroplasty with Nonprosthetic Glenoid Arthroplasty: The Ream and Run. *Techniques in Shoulder and Elbow Surgery*, 10(1):43-52, March 2009.

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