

INSIDE THIS ISSUE

2 Percutaneous Treatment of Varicose Veins Offers Less Invasive, More Effective Options

4 Mayo Clinic Launches Hand Transplant Program

6 Expanding Indications for Reverse Shoulder Arthroplasty

Eosinophilic Esophagitis: Assessing Disease Activity and Response to Medical Management

Eosinophilic esophagitis (EoE) is a chronic inflammatory condition of the esophagus that affects both children and adults. The main symptoms are swallowing difficulties and food impaction, and the diagnosis is established by the presence of more than 15 eosinophils per high-power field in the esophageal epithelium. Corrugations and linear furrows in the esophagus are common endoscopic findings, but are not always present.

The Challenge

Until recently, EoE was often mistaken for gastroesophageal reflux disease (GERD). Although investigators now recognize EoE as a distinct disorder, the complex relationship between EoE and GERD is not well understood. The etiopathogenesis of EoE also remains a mystery. Most researchers think the disease is an immunologic response to environmental allergens, but its natural history, precise etiology, and increasing

Points to Remember

- Eosinophilic esophagitis is an increasingly recognized cause of dysphagia.
- Mayo Clinic investigators are participating in a multinational observational study to develop an eosinophilic esophagitis activity index for adult and pediatric patients to assess the symptoms and biological activity of the disease.

incidence in developed countries over the past few years are not clear. Although some treatment options have been proposed, physicians have not yet determined optimal management of the disorder.

New Research

To shed light on EoE, investigators from all Mayo Clinic campuses are participating in a multinational observational study involving 20 centers in Canada, Switzerland, and the United States. The aim of the study is to develop an EoE activity index for adult and pediatric patients to assess the symptoms and biological activity of the disease.

According to the Mayo Clinic researchers participating in this study, no validated activity index currently exists for determining the efficacy of medical therapy in these patients. Researchers are hopeful that such an index will help guide evaluation and follow-up care for patients in clinical practice and provide direction for future clinical trials.

During phase I of the study, which is now complete, experts at the University of Bern in Switzerland developed 4 domains for the activity



Figure. Endoscopic view of esophageal corrugations seen in EoE. These corrugations are a common endoscopic finding in patients with EoE.

index: clinical symptoms, laboratory markers, endoscopic findings, and histopathologic findings. In phase II of the study, which is currently under way and timed to conclude in December 2012, investigators hope to finalize the first version of the activity index. Enrollment in phase II is expected to include a total of 100 children and 100 adults with known EoE or a high suspicion of the disease.

Each phase II study participant completes a dysphagia questionnaire. The physician completes a questionnaire with clinical symptoms, laboratory markers, and endoscopic findings, and the pathologist completes a histopathology questionnaire. Each patient then receives a global assessment score to grade the severity of the disease.

Scheduled to begin in 2013 and end 2 years later, phase III will enroll 200 adults and 200 children and attempt to further validate and refine the activity index and assess for test-retest reliability.

In addition to the international study, Mayo researchers are poised to begin recruiting participants for a multicenter, randomized, placebo-controlled trial designed to test the safety and tolerability of a novel formulation of topical corticosteroid in children and adults (see sidebar).

Clinical Findings

EoE was previously described in children, but experts now recognize that it also commonly affects adults, especially young men and people

Clinical Trial Seeks Participants

To enroll a patient in any of the studies mentioned above, please contact one of the following physician scientists, based on location:

Scottsdale, Arizona: Shabana F. Pasha, MD, 480-301-6990

Jacksonville, Florida: Sami R. Achem, MD, 904-953-2221

Rochester, Minnesota: For adult patients: Jeffrey A. Alexander, MD, 507-266-9138

For children and adolescents: Rayna M. Grothe, MD, 507-266-7805

with asthma, atopic disorders, and allergies.

Currently, there are no US Food and Drug Administration-approved treatments for EoE. The most common treatment for EoE is the off-label use of swallowed corticosteroids, in either spray or gel form. Because food allergies have been implicated in children with the disease, allergy testing and an elemental or elimination diet are part of pediatric care.

Although symptoms in children and adults generally improve with treatment, recurrence is common when therapy is discontinued. Mayo researchers are hopeful that information derived from the new research will help guide response to therapy and future management of the disorder.

Percutaneous Treatment of Varicose Veins Offers Less Invasive, More Effective Options

The Challenge

Varicose veins occur when the vessel walls weaken and dilate, preventing coaptation of the valves that prevent backflow. Alternatively, the valves themselves may become damaged from blood clots, resulting in backflow of blood. If untreated, patients may experience edema, pain, inflammation, and ulcer formation. Chronic venous insufficiency affects almost 27% of the US population. There are 25 million patients with varicose veins and between 2 million and 6 million with advanced chronic venous insufficiency. More than 500,000 patients have venous ulcers that cost more than \$1 billion annually.

Although lower extremity varicosities cannot be cured, various treatment modalities offer patients more (and more effective) options in treatment of this common condition. Many of

these newer percutaneous procedures can be done in the outpatient setting under local anesthesia, reducing the patient's risk for anesthesia and affording quick recovery, and outcomes are quite comparable to surgical vein stripping.

Background and Causes

Veins found in the lower extremities include the superficial veins, which lie just beneath the surface of the skin; the deep veins, which carry most of the blood back from the periphery; and the communicating (or perforating) veins, which connect the two (Figure 1). The cause of varicose veins is unknown. More women than men are affected, and there is a genetic predisposition. Injury to the legs, sometimes remote, may contribute to the development of varicosities. Occupations requiring long periods of standing

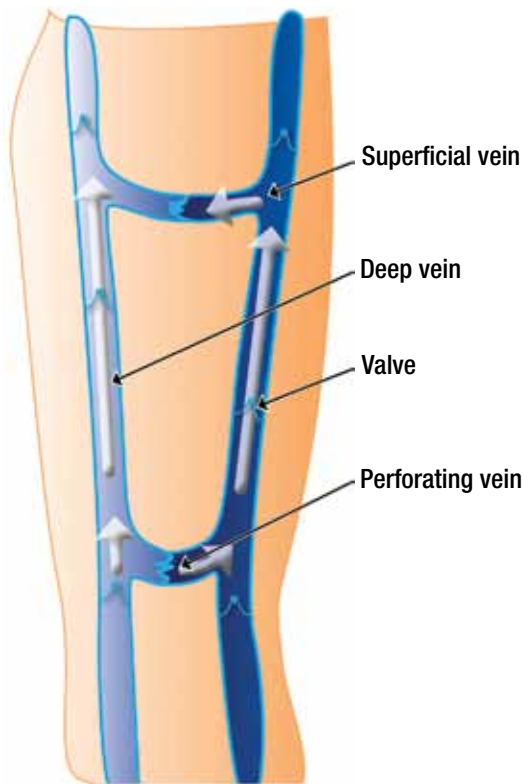


Figure 1. The relationship among deep, perforating, and superficial veins in the leg.

(as opposed to walking) and hormonal factors such as the use of oral contraceptives, pregnancy, or menopause appear to be factors. Pregnancy, obesity, right heart failure, and tricuspid regurgitation may increase lower extremity venous pressure that may contribute to the formation of varicosities.

Diagnosis

Diagnosis can usually be made by clinical examination and noninvasive physiologic and anatomic testing. Spider veins or telangiectasias are small, superficial veins that are typically red and purple, near the surface of skin, and mostly on thighs, ankles, or feet. Although they usually do not cause serious health problems, they may cause leg aching and tenderness. Varicosities that are bulging, ropy, and more than 5 mm in diameter may cause skin ulcers, stasis dermatitis, thrombosis, bleeding, swelling, and pain. Noninvasive testing has largely replaced the use of venograms and includes venous Doppler and duplex imaging and plethysmography. The location of valvular incompetence and the presence of thrombus can be determined reliably with noninvasive testing.

Treatment Options

Self-care, including a walking program, weight loss, and compression stockings, is recommended,

Points to Remember

- Chronic venous insufficiency affects almost 27% of the US population.
- Diagnosis can usually be made by clinical examination and noninvasive physiologic and anatomic testing.
- Treatment options include self-care, outpatient sclerotherapy, surgical vein stripping, coil embolization, and endovascular ablation. Radiofrequency ablation and thermal ablation have nearly replaced surgical vein stripping in the treatment of varicosities.

and patients should elevate their legs whenever possible. Although invasive procedures address established varicosities, they do not prevent new varicose veins from forming.

Outpatient sclerotherapy is frequently used in the treatment of spider veins and reticular veins, which are bluish, subdermal veins up to 3 mm in diameter that are visible but not palpable. Most patients need more than 1 session. Repeat sessions are performed about a month apart. After each session, compression stockings are worn for 10 days. There are no activity restrictions, and patients can resume work the same day. The telangiectasias usually disappear in 6 to 8 weeks, and the closure rate is between 80% and 90%. Potential complications include hyperpigmentation, arterial injury, and cutaneous ulcers. Foam sclerotherapy is used for large varicosities or saphenous veins, with a closure rate of 81% for the greater saphenous vein and an overall closure rate of 96%. Cutaneous Nd:YAG laser therapy has the advantage of treating varicosities without needles or sclerosant; however, sclerosing therapy has demonstrated superior clinical results in comparative trials.

Phlebectomy or surgical vein stripping involves surgically removing the large varicosities. Frequently, it is done in conjunction with thermal ablation to treat large varicosities. Surgical stripping of the great saphenous vein is performed under general anesthesia. Limited procedures involving 1 or 2 veins may be done on an outpatient basis with local anesthesia; more extensive procedures require general anesthesia.

Coil embolization is one approach to treating medium and large veins. Under ultrasound guidance, a catheter is inserted percutaneously and an embolization coil is deployed. Alcohol is then



Figure 2. Endovascular coil at the saphenofemoral junction. As the delivery catheter is withdrawn, an alcohol solution is released, closing the rest of the vein to the level of the knee.

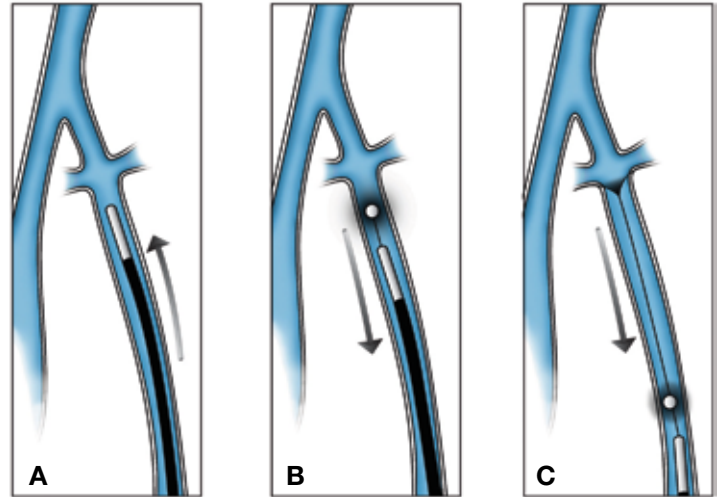


Figure 3. Endovenous thermal ablation. A, The catheter is percutaneously inserted into the vein. B, The tip is heated and the catheter is slowly withdrawn. C, Vein walls initially swell, then scar, obliterating the vein.

injected into the vein to complete obliteration of the vein (Figure 2).

Endovascular delivery of radiofrequency or laser ablation to the vein wall results in fibrous occlusion of the vein (Figure 3). These novel techniques have nearly replaced surgical vein stripping in the treatment of varicosities. Tumescent anesthesia reduces the risk of skin burns and paresthesias, helps with vein compression and analgesia, and reduces the need for general

anesthesia. Successful vein occlusion with absence of reflux is more than 90%. Patients note earlier return to work, less postoperative pain, better quality-of-life scores, and quicker recovery.

Mayo Clinic offers comprehensive diagnostic evaluation of all peripheral vascular disease. Radiologists, surgeons, and vascular medicine specialists integrate their respective areas of expertise to develop patient-specific treatment recommendations.

Mayo Clinic Launches Hand Transplant Program

The Challenge

There is a growing population of US military veterans with missing limbs, many of whom lost limbs in the wars in Iraq and Afghanistan. While body armor saves lives, it does not protect the extremities, and many servicemen and -women have sustained severe extremity injuries. Until recently, people with severed or severely damaged limbs received a prosthesis or had tissue moved from another area of the body to the hand to restore function.

Hand Transplantation—A New Solution

Mayo Clinic's new hand transplant program in Rochester, Minnesota, is aimed at improving

Points to Remember

- Hand transplantation can restore both function and sensation and provides patients with the opportunity to return to a state of wholeness.
- Candidates for hand transplantation at Mayo Clinic include people aged 25 to 65 years, with severe or mutilating injuries to both hands or, in special cases, to a single hand.

the quality of life for people with severe hand injuries or amputation of both hands. Hand transplantation can restore both function and sensation, and it gives patients the opportunity to return to a state of wholeness.

The hand transplantation procedure is highly complex (Figures 1 and 2), and it has only recently become possible. Mayo Clinic has extensive experience in heart, lung, liver, kidney, and pancreas transplantation and in surgical procedures to reimplant or reattach severed arms and hands. This experience, coupled with one of the strongest rehabilitation programs in the country, makes hand transplantation a logical next step for Mayo Clinic.

Candidates for hand transplantation at Mayo Clinic include people aged 25 to 65 years, with severe or mutilating injuries to both hands or, in special cases, to a single hand. After screening is completed, the wait begins for the right donor.

During surgery, a team of surgeons works simultaneously to attach the hand. Attachments are made in the following order: bones, arteries, veins, tendons, muscles, and nerves. The bones are attached using standard 3.5-mm plates. Following osteosynthesis of the forearm bones, the blood vessels are repaired using standard microsurgical technique. After reestablishing blood flow, surgeons repair the muscle tendon units and the nerves. After all structures have

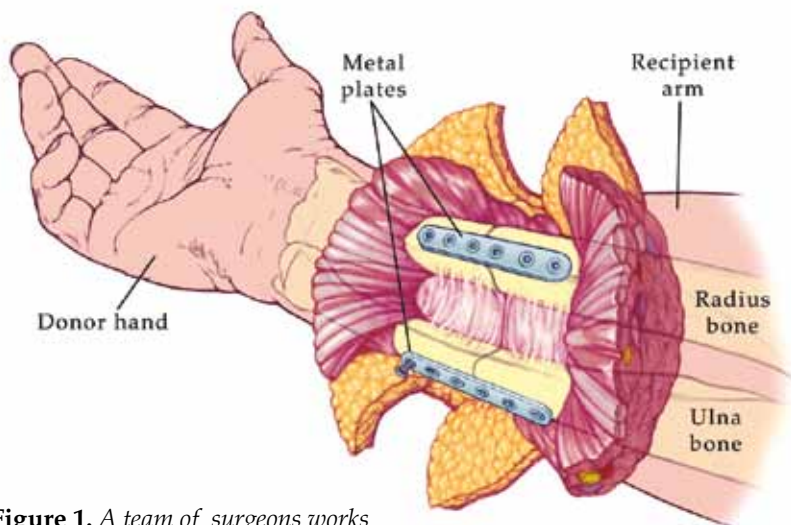


Figure 1. A team of surgeons works simultaneously to attach the hand. Attachments are made in the following order: bones, arteries, veins, tendons, muscles, and nerves. The bones are attached using standard 3.5-mm plates.

been repaired, the skin is closed.

After surgery, the care team will carefully monitor blood flow, infection, rejection, muscle strength, and nerve regeneration. Like all transplant recipients, patients who receive a hand transplant must take immunosuppressants every day for the rest of their lives to prevent their bodies from rejecting their new hands.

The Rehabilitation Process

Intensive rehabilitation and regular follow-up clinic visits are necessary to ensure long-term success of the transplant. Physiatrists and physical and occupational therapists are critical members of the rehabilitation team. While the procedure promises the return of sensation in the hands and fingers, daily physical or occupational therapy is required, and feeling in the fingers may not occur for up to a year. Patients must be highly motivated to do the exercises because there is a risk that motion and function in the transplant will fail. Mayo Clinic rehabilitation specialists play a key role in restoring function after these complex surgical procedures.

Several dozen successful hand transplants have been performed over the past decade, but Mayo Clinic's program is the first clinically approved hand transplant program in the United States. The transplant and rehabilitation team traveled to Paris in 2011 to learn more from the innovators of hand and face transplantation. With several patients currently going through the extensive screening process, the team hopes to complete its first hand transplant sometime in 2012.

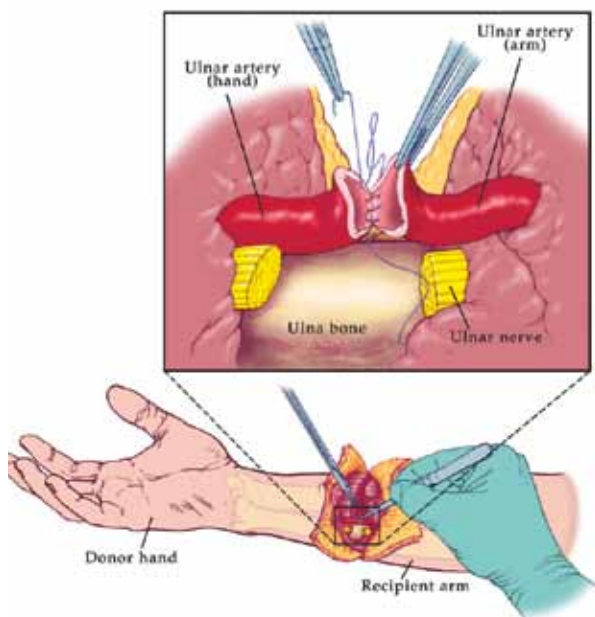


Figure 2. Following osteosynthesis of the forearm bones, the blood vessels are repaired using standard microsurgical technique. Once blood flow has been reestablished, the muscle tendon units are repaired, followed by nerve repair. After all structures have been repaired, the skin is closed.

Expanding Indications for Reverse Shoulder Arthroplasty

The Challenge

The arthritic rotator cuff-deficient shoulder has long been a substantial clinical problem due to lack of successful treatment options for this painful and disabling condition. This situation is rapidly changing, with the evolution of implant technology and surgical technique. Since the reverse shoulder arthroplasty (RSA) implant was originally developed nearly 25 years ago in Europe to treat rotator cuff tear arthropathy, it has dramatically improved the treatment of rotator cuff conditions (Figure). Approved in 2004 by the US Food and Drug Administration, it has also engendered controversy related to possible overuse, because indications are expanding beyond rotator cuff tear arthropathy to include a number of shoulder pathologies.

Optimizing Pain Relief and Function

RSA has provided an innovative and effective way to relieve pain and restore function in many patients with rotator cuff deficiencies. In 1 large outcome study of 80 patients, with a mean follow-up of 3.6 years, 96% of patients ranked the pain relief as good. After 8 years' experience with RSA at Mayo Clinic, outcomes have been consistently encouraging in terms of pain relief, improved range of motion, and functional outcomes. Mayo surgeons have focused on improving surgical technique, ensuring component fixation, and determining the optimal soft-tissue tension for each patient.

Rationale, Advantages, Disadvantages

RSA reverses the natural anatomy of the ball-and-socket joint by implanting a concave socket plate into the humeral head and a convex spherical glenoid component into the glenoid fossa. RSA also treats arthritis by resurfacing the glenohumeral joint. The goal is to reduce pain and restore function by overcoming vulnerabilities of traditional shoulder replacements in which the absence of a stabilizing rotator cuff can lead to poor function, instability, and persistent pain.

In the absence of a rotator cuff, attempted arm elevation results in superior migration of the humeral head, with no real fulcrum and poor motion. By reversing the anatomy, RSA improves deltoid tension and provides a stable fulcrum that compensates for loss of rotator cuff performance. With RSA, the constrained nature of the implant provides a fulcrum that is particularly advantageous for a better-tensioned deltoid. Disadvantages range from a highly variable complication rate to overuse (Table 1).

Points to Remember

- In experienced hands, reverse shoulder arthroplasty (RSA) has provided an innovative and effective way to relieve pain and restore function in many patients with so-called cuff tear arthropathy and other situations with severe rotator cuff deficiency.
- RSA reverses the natural anatomy of the ball-and-socket joint by implanting a concave socket plate into the humeral head and a convex spherical glenoid component into the glenoid fossa.
- RSA improves deltoid tension and provides a stable fulcrum that compensates for loss of rotator cuff performance.

Indications and Contraindications

In experienced hands, RSA has the potential to successfully compensate for rotator cuff insufficiency across a broad spectrum of shoulder pathologies. At Mayo Clinic, indications for use of RSA range from the relatively simple to the highly complex, from rotator cuff tear arthropathy and chronic pseudoparalysis to revision of other failed implants (Table 2).

Complications and Long-term Results

As use of RSA has increased, highly variable complication rates (some up to 50%) have been

Table 1. RSA Advantages and Disadvantages

RSA Advantages

- More consistent pain relief due to replacing both sides of the joint, an advantage over hemiarthroplasty
- Restoration of active elevation
- Improved shoulder stability

RSA Disadvantages

- Wide range of complication rates, reflecting rapid adoption of a technically challenging procedure
- Subject to overuse—too easily seen as a solution for all previously untreatable shoulder pathologies
- Challenging surgical technique requiring extensive training and experience limits availability

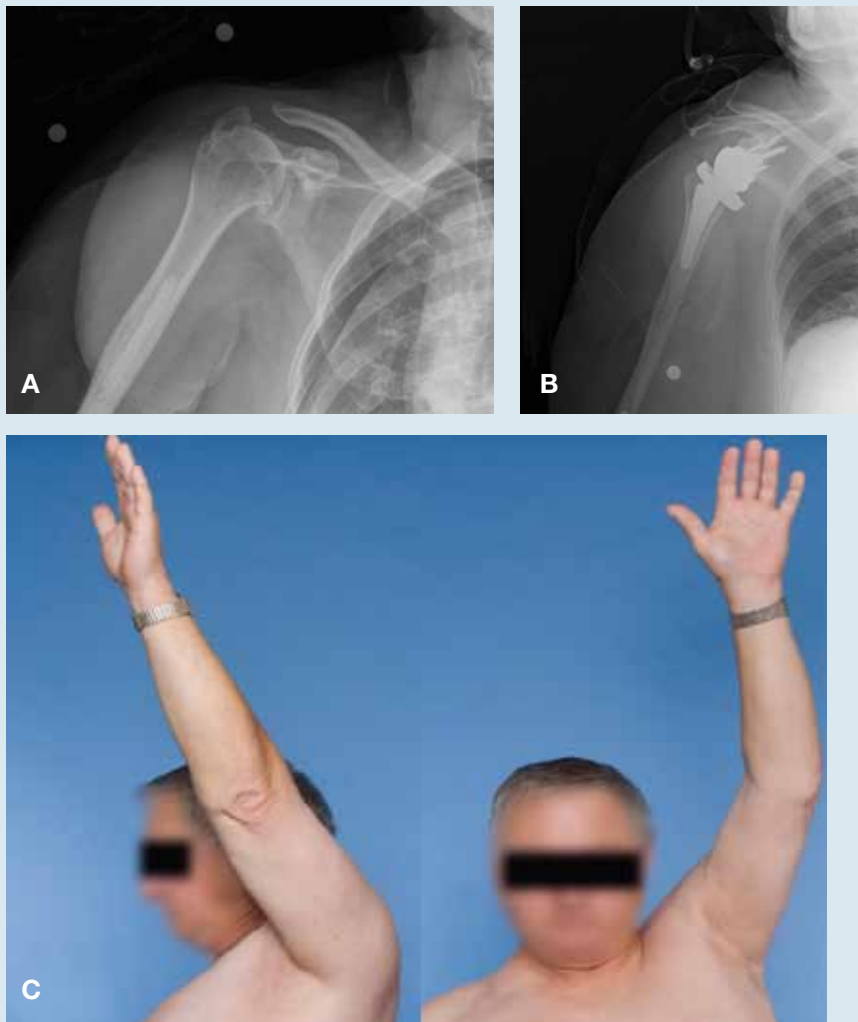


Figure. A, Preoperative radiograph of rotator cuff arthropathy. B, RSA reconstruction. C, Patient demonstrates pain-free mobility and recovered range of motion.

reported in the literature. This can be explained in part by the fact that RSA is commonly used as a salvage technique for a failed prosthesis and often in older patients with poor bone quality. Complications include dislocation, infection, intraoperative fractures, brachial plexopathy, acromial stress fractures, glenoid notching, and multiple modes of mechanical failure.

At Mayo Clinic and other advanced orthopedic centers, complication rates are less than 10%. While these centers have promising functional outcome data, the procedure is new enough in the United States that further investigation via large-sample, long-term studies is still needed.

Mayo Clinic orthopedic surgeons remain committed to studying RSA from both clinical and basic science perspectives. They proceed with expanded indications on an individualized basis, grounded in a comprehensive understanding of the biomechanics of shoulder pathophysiology.

Table 2. Indications and Contraindications for RSA

Indications

- Rotator cuff tear arthropathy
- Massive irreparable cuff tears with pseudo-paralysis
- Complex revision surgeries, including those requiring allograft prosthetic composites
- Proximal humerus fractures or nonunions
- Reconstruction after tumor removal

Contraindications

- Absence of a functioning deltoid to compensate for the rotator cuff
- Presence of considerable elevation abilities, even with irreparable rotator cuff tear, and absence of glenohumeral joint arthritis
- Active infection

Mayo Clinic Clinical Update

Medical Editor:
Scott C. Litin, MD

Editorial Board:
Robert P. Shannon, MD
Douglas M. Peterson, MD

Clinical Update is written for physicians and should be relied upon for medical education purposes only. It does not provide a complete overview of the topics covered and should not replace the independent judgment of a physician about the appropriateness or risks of a procedure for a given patient.

Contact Us

Mayo Clinic welcomes inquires and referrals, and a request to a specific physician is not required to refer a patient.

Arizona
866-629-6362

Florida
800-634-1417

Minnesota
800-533-1564

Resources

mayoclinic.org/medicalprofs

- Clinical trials
- CME
- Grand Rounds
- Scientific videos
- Online referrals

Education Opportunities

Internal Medicine Board Review: Certification and Maintenance of Certification

July 9-14, 2012, Rochester, MN

This intensive course is designed to help candidates apply the “finishing touch” to their preparations for the 2012 American Board of Internal Medicine Certification and Maintenance of Certification Examinations. The course also provides a comprehensive overview of all areas in internal medicine for practicing physicians.

Neurology in Clinical Practice

July 19-21, 2012, Chicago, IL

Neurology in Clinical Practice is a comprehensive course directed at practitioners who see patients with a broad range of neurologic disorders. The course is intended to provide a review of neurology with an emphasis on case-based presentations, recent advances, and evidence-based approaches.

Mini-Fellowship in Primary Pediatric Psychopharmacology

August 16-18, 2012, San Diego, CA

This dynamic 3-day interactive program is designed to identify specific training needs and build skills and confidence in diagnosing and treating pediatric behavioral health problems. Six months following this course, there will be a follow-up, clinical case-based, distance-learning program. Using group teleconferences to consult with nationally known pediatric psychopharmacology and pediatric experts on a biweekly basis, participants engage in case-based clinical rounds that help address problems and questions encountered in daily practice. There is also a comprehensive toolkit and a set of Web-based learning tools designed specifically for this training.

For additional information or to register, phone 800-323-2688, e-mail cme@mayo.edu, or visit www.mayo.edu/cme.

Physician Update



An e-mail newsletter and a physician video blog. Visit www.mayoclinic.org/medicalprofs for more details.

MAYO CLINIC | mayoclinic.org

4500 San Pablo Road | 200 First Street SW | 13400 East Shea Boulevard
Jacksonville, FL 32224 | Rochester, MN 55905 | Scottsdale, AZ 85259

©2012 Mayo Foundation for Medical Education and Research. All rights reserved.
MAYO, MAYO CLINIC and the triple-shield Mayo logo are trademarks and service marks of MFMER.

MC2024-0512