DOWNLOAD PDF IMAGING OF THE SHOULDER

Chapter 1 : Multi-modal imaging of adhesive capsulitis of the shoulder

MRI of the shoulder provides detailed images of structures within the shoulder joint, including bones, tendons, muscles and vessels, from any angle. Magnetic resonance imaging (MRI) is a noninvasive medical test that physicians use to diagnose medical conditions.

The radiologic technique for shoulder imaging and basic shoulder anatomy are first discussed. An outline of common pathologic processes of impingement and instability follows. Then there is a discussion of tenosynovitis, arthritis, neoplasia, and avascular necrosis. Lastly, there is a synoptic discussion of common surgical procedures for impingement and instability along with common operative and postoperative complications of these techniques. A few general comments about conventional and arthrographic MRI protocols will be made. The shoulder in a conventional MRI exam is acquired in partial external rotation in the axial, coronal and sagittal planes. Confirmation of pathology in different planes and sequences increases diagnostic accuracy. The coronal plane is acquired along the long axis of the supraspinatus tendon. The sagittal plane is acquired parallel to the glenoid articular surface and perpendicular to the long axis of the supraspinatus. Other views such as abduction and external rotation ABER in the coronal plane may be obtained as part of a conventional or arthrographic exam. The abduction external rotation view of the shoulder is helpful in demonstrating subtle anterior inferior labral tears, partial articular surface rotator cuff tears, and instability of the shoulder in ABER. Sequences may be tailored according to clinical indication. MRI shoulder protocols typically involve fat-saturated proton density images that are sensitive to internal derangement. T2 star gradient recall echo images are employed in the assessment of the labrum and for detection of substances that produce susceptibility effects such as calcium hydroxyapatite or loose surgical hardware. T1-weighted images are useful for the assessment of bone marrow derangement or rotator cuff atrophy Figure Non-fat-saturated T2-weighted images are useful in characterizing tendon pathology, particularly discerning tendinosis from tear Figure T1-weighted sagittal image optimally depicts advanced muscle atrophy and fatty degeneration around the shoulder including the supraspinatus black arrow. Tendinosis of the supraspinatus tendon. Coronal oblique T2-weighted image shows intermediate signal in the tendon indicating tendinosis. MR arthrography is employed for the detection of subtle rotator cuff tears or labral pathology in patients with a negative conventional MRI, the assessment of the postoperative shoulder, and the demonstration of communication between the joint and extra-articular pathology such as a paralabral cyst. Under fluoroscopic guidance, about 12 cc of a 1: T1 fat-suppressed images in the three conventional planes and ABER view are obtained along with a T2-weighted sequence without fat suppression. The T2-weighted sequence is necessary to distinguish between pathologic fluid collections such as a bursa or cyst and the injected intra-articular contrast. Complications of direct arthrography are rare. These include synovitis, bleeding, infection, or an allergic reaction. Less commonly indirect or intravenous arthrography may be performed with an injection of gadolinium at the standard intravenous dose 10â€”20 minutes prior to imaging. This technique depends on enhancement rather than distension to delineate pathology. It consists of four joints: The shoulder is the most mobile joint in the body. The extraordinary range of the shoulder is due to the shallow osseous glenohumeral articulation. The stability of the shoulder is maintained by static and dynamic stabilizers: The rotator cuff muscles are dynamic stabilizers of the glenohumeral joint. They originate around the scapula and attach to the humeral head. The subscapularis is the anterior rotator cuff muscle. It originates from the subscapular fossa of the scapula and attaches to the lesser tuberosity of the proximal humerus. It internally rotates and adducts the arm. The supraspinatus is the superior rotator cuff muscle. It originates in the supraspinatus fossa superior to the scapular spine and attaches to the most superior aspect of the greater tuberosity. Its principal action is abduction. The infraspinatus and teres minor are posterior rotator cuff muscles. The infraspinatus arises from the infraspinous fossa. The teres minor originates at the lateral border of the scapula inferior to the infraspinatus. The infraspinatus and teres minor also attach to the greater tuberosity, superiorly and inferiorly, respectively. The infra-spinatus externally rotates the arm. The teres minor is an external rotator and adductor of the arm. The subscapularis is innervated by the subscapular nerve. The supraspinatus and infraspinatus are

innervated by the suprascapular nerve that passes through the suprascapular and spinoglenoid notches, common sites of entrapment. The teres minor and deltoid are innervated by the axillary nerve. The axillary nerve passes through the quadrilateral space bound by the two teres muscles, long head of the triceps and humeral shaft. The space between the supraspinatus and subscapularis is the rotator interval that contains the coracohumeral and superior glenohumeral ligaments and long head of the biceps tendon. The rotator interval narrows laterally and ends at the supraspinatus and subscapularis insertion. The long head of the biceps tendon is a dynamic stabilizer of the glenohumeral joint. The tendon has intra-articular and extra-articular components. The long head of the biceps originates at the supraglenoid tubercle and spans the rotator interval and intertubercular groove. In the rotator interval, the long head of the biceps is stabilized by a pulley mechanism consisting of the coracohumeral ligament which also resists posterior inferior translation and superior glenohumeral ligament. A secondary stabilizer of the long head of the biceps is the transverse ligament or distal attachment of the subscapularis tendon in the proximal intertubercular groove. The long head of the biceps prevents anterior superior translation of the humeral head. The short head of the biceps arises along with the coracobrachialis from the coracoid process. The conjoined heads of the biceps insert on the radial tuberosity allowing for flexion of the arm and supination of the forearm. The joint capsule is a static stabilizer of the glenohumeral joint. Thickenings of the joint capsule are described as the superior, middle, and inferior glenohumeral ligaments. The superior glenohumeral ligament as part of the biceps pulley along with the coracohumeral ligament is important in stabilization of the long head of the biceps tendon. It originates anterior to the long head biceps origin and inserts with the coracohumeral ligament to the lesser tuberosity. The middle glenohumeral ligament Figure is most easily appreciated deep to the subscapularis tendon. The inferior glenohumeral ligament is shown along the inferior aspect of the glenohumeral joint. The inferior glenohumeral ligament consists of anterior and posterior bands with an intervening axillary pouch, the most dependent portion of the joint. Normal outpouchings of the joint capsule include the biceps tendon sheath, axillary recess, rotator interval, and subscapularis recess. Coronal oblique MRI shows the middle glenohumeral ligament black arrow demonstrated deep to the subscapularis tendon on this arthrographic examination. The glenoid labrum is a static stabilizer of the glenohumeral joint. It is a fibrocartilaginous structure that deepens the shallow normally anteverted glenoid cavity. The anterior labrum is normally larger than the posterior. Variations in labral attachment and congenital deficiency may be confused with pathology. These include the sublabral recess, sublabral foramen, and the Buford complex. A sublabral recess is a smoothly tapered partial detachment of the superior labrum from the underlying glenoid. A sublabral foramen is a complete detachment of the anterior superior labrum that reattaches anterior inferiorly. The Buford complex is absence or hypoplasia of the anterior superior labrum associated with a thickened middle glenohumeral ligament. Lesions of the labrum may be localized by quadrants or in terms of a clockface position. The coracoacromial arch is a static stabilizer of the anterior superior aspect of the glenohumeral joint. It consists of the coracoid process, coracoacromial ligament, and acromion. The arch stabilizes the humeral head preventing its superior subluxation. Impingement is a clinical diagnosis that may be supported with radiologic findings. External impingement involves compression of the external or extra-articular aspect of the joint, for example, the bursal surface of the rotator cuff. Internal impingement involves compression of the intra-articular aspect of the joint, for example, the labrum or articular surface of the rotator cuff. Secondary impingement is due to instability of the joint. Subacromial and subcoracoid external impingement will be discussed. Then anterior superior and posterior superior internal impingement will be outlined. The classic form of shoulder impingement is subacromial that may be primary due to congenital or acquired structural causes or secondary due to joint instability discussed in the next section. Subacromial impingement is elicited in flexion or abduction. Patients with shoulder impingement typically present with activity-related diffuse pain in the region of the deltoid muscle. The pain is worst at night. Structural causes for subacromial impingement are due to coracoacromial arch abnormalities: The shape of the undersurface of the acromion may be classified according to morphology: Anterior or lateral downsloping of the acromion may narrow the acromiohumeral interval and predispose patients to impingement. Sagittal MRI shows flat undersurface of the anterior lateral acromion consistent with type 1 acromion black arrow. Sagittal MRI shows concave undersurface of the

acromion consistent with type 2 acromion black arrow. Sagittal MRI shows a hook of the anterior lateral acromion black arrow consistent with a type 3 acromion. This acromial morphology has been associated with subacromial impingement. An os acromiale Figure is an unfused acromial ossification center. It may cause clinical impingement that is thought to be due to downward traction of the ossification center with contraction of the deltoid muscle.

Chapter 2 : Shoulder Imaging

Imaging the shoulder is often reliant on multi-modality imaging. The shoulder is a complex ball-and-socket joint that relies on the structural integrity of the glenoid labrum and accompanying shoulder ligaments and rotator cuff muscles to function.

URL of this page: It does not use radiation x-rays. Single MRI images are called slices. The images can be stored on a computer or printed on film. One exam produces dozens or sometimes hundreds of images. MRI How the Test is Performed You may be asked to wear a hospital gown or clothing without metal snaps or zippers such as sweatpants and a t-shirt. Make sure you take off your watch, jewelry, and wallet. Some types of metal can cause blurry images. You will lie on a narrow table, which slides into a large tunnel-like tube. Some exams require a special dye contrast. The dye is usually given before the test through a vein IV in your hand or forearm. The dye can also be injected into the shoulder. The dye helps the radiologist see certain areas more clearly. During the MRI, the person who operates the machine will watch you from another room. The test most often lasts 30 to 60 minutes, but it may take longer. How to Prepare for the Test You may be asked not to eat or drink anything for 4 to 6 hours before the scan. Tell your doctor if you are afraid of close spaces have claustrophobia. You may be given a medicine to help you feel sleepy and less anxious sedative. Your doctor may also suggest an "open" MRI, in which the machine is not as close to the body. Before the test, tell your health care provider if you have: Brain aneurysm clips Certain types of artificial heart valves Heart defibrillator or pacemaker Kidney disease or dialysis you may not be able to receive contrast Recently placed artificial joints Certain types of vascular stents Worked with sheet metal in the past you may need tests to check for metal pieces in your eyes Because the MRI contains strong magnets, metal objects are not allowed in the room with the MRI scanner: Pens, pocketknives, and eyeglasses may fly across the room. Items such as jewelry, watches, credit cards, and hearing aids can be damaged. Pins, hairpins, metal zippers, and similar metallic items can distort the images. Removable dental work should be taken out just before the scan. You will need to lie still. Too much movement can cause errors. The table may be hard or cold, but you can request a blanket or pillow. The machine produces loud thumping and humming noises when turned on. You can wear ear plugs to help reduce the noise. An intercom in the room lets you speak to someone at any time. Some MRIs have televisions and special headphones to help you pass the time. There is no recovery time, unless you received medicine to relax. After an MRI scan, you can go back to your normal diet, activity, and medicines. It can provide clear pictures of parts of the shoulder such as soft tissues that are hard to see clearly on CT scans. Your provider may order this test if you have: A mass that can be felt during a physical exam An abnormal finding on an x-ray or bone scan Shoulder pain and fever Decreased motion of the shoulder joint Fluid buildup in the shoulder joint Redness or swelling of the shoulder joint Shoulder instability Shoulder pain and a history of cancer Shoulder pain that does not get better with treatment Normal Results A normal result means no problems were seen in your shoulder and surrounding tissue in the images. What Abnormal Results Mean Some possible causes of abnormal results may be: Abscess Broken or fractured shoulder bone Bursitis in the shoulder area Biceps tear.

Chapter 3 : Shoulder MRI | Radiology Key

Shoulder pain is very common. Should we obtain an MRI on everyone with shoulder pain? The quick and obvious answer is no but let's explore why. The rotator cuff is the most common source of pain in patients over the age of Rotator cuff tears are very common in people over The.

To date, there have been no documented side effects from the radio waves and magnets used in the scan. Still, people with certain conditions do face some risks. Metal implants If you have implants containing metal, it can cause problems with an MRI scan. The magnets used can interfere with pacemakers or cause implanted screws or pins to shift in your body. Be sure to tell your doctor if you have any of the following implants: This depends on your type of pacemaker. Dye allergy Some people can have an allergic reaction to the contrast dye. Contrast dye helps provide a clearer image of the blood vessels. The most common type of contrast dye is gadolinium. According to the Radiological Society of North America , these allergic reactions are often mild and easily controlled with medication. They need to wait for the dye to leave their bodies. How to prepare for a shoulder MRI scan Tell your doctor if you have any metal in your body from previous procedures or injuries. Your doctor may prescribe antianxiety medication to help with your discomfort. In some cases, you may also be sedated during the test. How a shoulder MRI scan is performed If your test requires the use of contrast dye, a nurse or doctor injects it into your bloodstream through an intravenous line. You may need to wait for the dye to circulate through your body before beginning the test. An MRI machine is a giant white tube with a sliding bench attached to it. You lie on your back on the table and slide into the machine. A technician places small coils around your shoulder to improve the quality of the scan images. The technician controls the movement of the bench using a remote control from another room. They can communicate with you via a microphone. The machine makes loud whirring and thumping noises as the images are being recorded. Many hospitals offer earplugs. Others have televisions or headphones to help you pass the time. As the pictures are being taken, the technician will ask you to hold your breath for a few seconds. A typical shoulder MRI scan takes 45 minutes to an hour to complete. If you were given a sedative, you need to wait until the medication has fully worn off before driving. Or you can arrange for a ride home after the test. If your MRI images were projected onto film, it might take a few hours for the film to develop. It will also take some time for your doctor to review the images and interpret the results. More modern machines display images on a computer, so your doctor can view them quickly. The initial results from an MRI scan may arrive within a few days, but comprehensive results can take up to a week or more. When the results are available, your doctor will call you in to review and explain them. More tests may be necessary to make a diagnosis.

Chapter 4 : Shoulder Imaging - Shoulder & Elbow - Orthobullets

A shoulder MRI helps your doctor diagnose potential problems found in other imaging tests, such as X-rays. It also helps your doctor diagnose unexplained pain in the area or better understand the.

What are the limitations of MRI of the shoulder? What is MRI of the shoulder? MRI of the shoulder provides detailed images of structures within the shoulder joint, including bones, tendons, muscles and vessels, from any angle. Magnetic resonance imaging MRI is a noninvasive medical test that physicians use to diagnose medical conditions. MRI uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs, soft tissues, bone and virtually all other internal body structures. MRI does not use ionizing radiation x-rays. Detailed MR images allow physicians to evaluate various parts of the body and determine the presence of certain diseases. The images can then be examined on a computer monitor, transmitted electronically, printed or copied to a CD or uploaded to a digital cloud server. MRI is an excellent choice for examining the shoulder joint. MRI gives clear views of rotator cuff tears, injuries to the biceps tendon and damage to the glenoid labrum , the soft fibrous tissue rim that helps stabilize the joint. MR imaging of the shoulder is typically performed to diagnose or evaluate: You may be asked to wear a gown during the exam or you may be allowed to wear your own clothing if it is loose-fitting and has no metal fasteners. Guidelines about eating and drinking before an MRI exam vary with the specific exam and with the imaging facility. Unless you are told otherwise, you may follow your regular daily routine and take food and medications as usual. Some MRI examinations may require you to receive an injection of contrast material into the bloodstream. The radiologist , technologist or a nurse may ask if you have allergies of any kind, such as an allergy to iodine or x-ray contrast material, drugs, food, or the environment, or if you have asthma. The contrast material most commonly used for an MRI exam contains a metal called gadolinium. Gadolinium can be used in patients with iodine contrast allergy. It is far less common for a patient to have an allergy to a gadolinium-based contrast agent used for MRI than the iodine-containing contrast for CT. However, even if it is known that the patient has an allergy to the gadolinium contrast, it may still be possible to use it after appropriate pre-medication. Patient consent will be requested in this instance. For more information on adverse reactions to gadolinium-based contrast agents, please consult the ACR Manual on Contrast Media. You should also let the radiologist know if you have any serious health problems, or if you have had any recent surgeries. Some conditions, such as severe kidney disease, may prevent you from being given gadolinium contrast for an MRI. If you have a history of kidney disease or liver transplant, it will be necessary to perform a blood test to determine whether the kidneys are functioning adequately. Women should always inform their physician or technologist if there is any possibility that they are pregnant. MRI has been used for scanning patients since the s with no reports of any ill effects on pregnant women or their unborn babies. However, because the unborn baby will be in a strong magnetic field, pregnant women should not have this exam in the first three to four months of pregnancy unless the potential benefit from the MRI exam is assumed to outweigh the potential risks. Pregnant women should not receive injections of gadolinium contrast material except when absolutely necessary for medical treatment. If you have claustrophobia fear of enclosed spaces or anxiety, you may want to ask your physician for a prescription for a mild sedative prior to your scheduled examination. Infants and young children usually require sedation or anesthesia to complete an MRI exam without moving. Moderate and conscious sedation can be provided at many facilities. You will be given special instructions for how to prepare your child for the sedation or anesthesia. Alternatively, certain pediatric facilities have child life personnel who can work with younger children to help avoid the need for sedation or anesthesia. They prepare the children for MRI by showing them a dummy scanner, play the noises that the child might hear during the MRI exam, answer any questions and explain the procedure to relieve their anxiety. Some pediatric facilities also provide goggles or headsets so that the child can watch a movie while the scan is being performed. Thus, the child remains motionless allowing for good quality images. Jewelry and other accessories should be left at home, if possible, or removed prior to the MRI scan. Because they can interfere with the magnetic field of the MRI unit, metal and electronic items are not allowed in the exam room.

People with the following implants cannot be scanned and should not enter the MRI scanning area: These objects may interfere with the exam or potentially pose a risk, depending on their nature and the strength of the MRI magnet. Many implanted devices will have a pamphlet explaining the MRI risks for that particular device. If you have the pamphlet, it is useful to bring that to the attention of the scheduler before the exam and bring it to your exam in case the radiologist or technologist has any questions. Some implanted devices require a short period of time after placement usually six weeks before being safe for MRI examinations. Examples include but are not limited to: In general, metal objects used in orthopedic surgery pose no risk during MRI. However, a recently placed artificial joint may require the use of another imaging procedure. Patients who might have metal objects in certain parts of their bodies may also require an x-ray prior to an MRI. You should notify the technologist or radiologist of any shrapnel, bullets, or other pieces of metal that may be present in your body due to prior accidents. Foreign bodies near and especially lodged in the eyes are particularly important because they may move during the scan, possibly causing blindness. Dyes used in tattoos may contain iron and could heat up during an MRI scan, but this is rare. Tooth fillings and braces usually are not affected by the magnetic field, but they may distort images of the facial area or brain, so you should let the radiologist know about them. Parents or family members who accompany patients into the scanning room also need to remove metal objects and notify the technologist of any medical or electronic devices they may have. The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a moveable examination table that slides into the center of the magnet. Some MRI units, called short-bore systems , are designed so that the magnet does not completely surround you. Some newer MRI machines have a larger diameter bore which can be more comfortable for larger size patients or patients with claustrophobia. Open units are especially helpful for examining larger patients or those with claustrophobia. Newer open MRI units provide very high quality images for many types of exams. Older open MRI units may not provide this same image quality. Certain types of exams cannot be performed using open MRI. For more information, consult your radiologist. The computer workstation that processes the imaging information is located in a separate room from the scanner. Unlike conventional x-ray examinations and computed tomography CT scans, MRI does not utilize ionizing radiation. Instead, radiofrequency pulses re-align hydrogen atoms that naturally exist within the body. This does not cause any chemical changes in the tissues. As the hydrogen atoms return to their usual alignment, they emit different amounts of energy depending on the type of body tissue they are in. The MR scanner captures this energy and creates a picture of the tissues scanned based on this information. The magnetic field is produced by passing an electric current through wire coils in most MRI units. Other coils, located in the machine and in some cases, placed around the part of the body being imaged, send and receive radio waves, producing signals that are detected by the coils. The electric current does not come in contact with the patient. A computer then processes the signals and generates a series of images, each of which shows a thin slice of the body. The images can then be studied from different angles by the interpreting radiologist. Frequently, the differentiation of abnormal diseased tissue from normal tissues is better with MRI than with other imaging modalities such as x-ray, CT and ultrasound. How is the procedure performed? MRI examinations may be performed on outpatients or inpatients. You will be positioned on the moveable examination table. Straps and bolsters may be used to help you stay still and maintain the correct position during imaging. Small devices that contain coils capable of sending and receiving radio waves may be placed around your shoulder to improve image quality. If a contrast material will be used in the MRI exam, a physician, nurse or technologist will insert an intravenous IV catheter, also known as an IV line, into a vein in your hand or arm. A saline solution may be used to inject the contrast material. The solution will drip through the IV to prevent blockage of the IV catheter until the contrast material is injected. You will be placed into the magnet of the MRI unit and the radiologist and technologist will perform the examination while working at a computer outside of the room. If a contrast material is used during the examination, it will be injected into the intravenous line IV after an initial series of scans. Additional series of images will be taken during or following the injection. When the examination is complete, you may be asked to wait until the technologist or radiologist checks the images in case additional images are needed. Your intravenous line will be removed. MRI exams generally include multiple runs

sequences , some of which may last several minutes. Depending on the type of exam and the equipment used, the entire exam is usually completed in 15 to 45 minutes. If your child requires sedation to complete the MRI, you may be asked to come early for the exam in order for your child to be evaluated prior to sedation. Sedation may add 15 to 30 minutes to the procedure. Your child may need to stay additional time to be monitored as the sedation wears off. In selected patients, arthrography will be performed first. During that procedure, contrast material may be injected into the shoulder joint before MRI in order to image the joint structures in more detail. Arthrography may require imaging guidance to place a needle into the shoulder joint. See the Conventional Arthrography page for more information. Most MRI exams are painless. However, some patients find it uncomfortable to remain still during MR imaging. Others experience a sense of being closed-in claustrophobia while in the MRI scanner.

Chapter 5 : Shoulder CT scan: MedlinePlus Medical Encyclopedia

Resources. If you are interested in learning more about diagnostic imaging take a look at these resources for the shoulder Diagnostic Imaging Pathways - Shoulder (Pain or Instability).

Published online Apr Abstract Abstract Adhesive capsulitis of the shoulder is a clinical condition characterized by progressive limitation of active and passive mobility of the glenohumeral joint, generally associated with high levels of pain. Although the diagnosis of adhesive capsulitis is based mainly on clinical examination, different imaging modalities including arthrography, ultrasound, magnetic resonance, and magnetic resonance arthrography may help to confirm the diagnosis, detecting a number of findings such as capsular and coracohumeral ligament thickening, poor capsular distension, extracapsular contrast leakage, and synovial hypertrophy and scar tissue formation at the rotator interval. Ultrasound can also be used to guide intra- and periarticular procedures for treating patients with adhesive capsulitis. Shoulder, Adhesive capsulitis, Ultrasound, Arthrography, Magnetic resonance Introduction Adhesive capsulitis AC of the shoulder is a clinical condition characterized by progressive limitation of active and passive mobility of the glenohumeral joint, generally associated with high levels of pain [1]. Although the diagnosis of AC is based mainly on clinical examination, various imaging modalities, including arthrography, ultrasound, magnetic resonance imaging MRI , and MR arthrography MRA , may help to confirm the diagnosis and to detect the presence of associated characteristics such as rotator cuff abnormalities or intra-articular pathology [2]. In this paper, we review the major clinical and imaging findings encountered in patients with AC. Contralateral shoulder involvement is uncommon [4]. Several predisposing factors have been reported, including trauma, hemiplegia, cerebral haemorrhage, hyperthyroidism, cervical discopathy, diabetes, hypercholesterolemia, and inflammatory lipoproteinemia [5]. The pathogenesis and macroscopic abnormalities of AC were first reported in by Neviaser et al. The authors also noted the adhesion of the capsule to the humeral head, thus introducing the concept of AC. More recent studies have noted abnormalities of the rotator cuff interval, and in particular, the coracohumeral ligament [6]. Some years later, proliferative synovitis was associated with AC, often involving the sheath of the long head of the biceps tendon, and chronic inflammatory involvement of the supraspinatus tendon was also reported. Macnab suggested that autoimmunity might be responsible for the condition as a whole [8]. At any rate, the exact etiology of the condition is still unknown. Various classifications of AC have been proposed. The most widely used is that of Lundberg et al. However, other classifications based on degree of capsular retraction, degree of movement, and arthrographic findings have been reported. Clinical findings and treatment The most typical features of AC are pain associated with progressive stiffness and loss of external rotation movements of the shoulder [9]. The loss of other motion may also be present, depending on the area of the capsule most affected. Pain may be reported anteriorly or posteriorly, occasionally extending over the biceps tendon, especially while resting in bed; however, in most cases, pain cannot be localized reliably [4]. Generally, three separate phases can be identified: The main symptom is pain, especially during the night, with little response to oral administration of non-steroidal anti-inflammatory drugs. In this phase, the range of motion begins to narrow. Pain gradually diminishes while stiffness persists, with an almost complete loss of external rotation movement. In this phase, stiffness gradually disappears and range of motion is gradually recovered. The aim of treatment is to reduce pain and restore the range of motion, and should be tailored to the severity of symptoms and disease duration. Several treatment options have been reported for AC, but the evidence is still poor, whether these options are used alone or in various combinations [12]. Physiotherapy is typically the first therapeutic approach, with the immediate goal of preventing further limitation of movement and then restoring the range of motion [13]. Steroids are commonly used to treat AC, administered both orally and intra-articularly. These are usually accompanied by physiotherapy, and thus discerning the advantages treatment or another is difficult. Some studies have reported a rebound of symptoms at the end of steroid treatment; thus, the pros and cons should be carefully evaluated in every patient [14 â€” 16]. Hydrodilation of the glenohumeral joint capsule is another practicable option [17 , 18]. A systematic review of this treatment found the procedure to be effective, but

there is little evidence of superiority to other treatments [19]. Suprascapular nerve block can be used to reduce pain sensitivity and to improve range of motion, and can be easily performed under ultrasound guidance [16]. Randomized studies [20] have demonstrated pain reduction and improved range of motion in treated patients compared to control groups. Other treatment options are available, including glenohumeral joint mobilization under sedation and arthroscopic or open capsular release [21]. However, all invasive procedures should be reserved for cases that do not resolve spontaneously or respond to conservative therapies. Imaging The diagnosis of AC is usually clinical. Imaging is most helpful in cases with less severe clinical symptoms that might be misdiagnosed as rotator cuff tears, bursitis, or other conditions. Plain radiography In patients with AC, plain films are usually unremarkable. However, plain radiography may be useful for detecting the presence of associated features, such as osteophytes, loose bodies, or periarticular calcifications. Conventional arthrography Conventional arthrography has historically played an important role in the evaluation of patients with AC, having been used for both diagnostic and therapeutic purposes [22]. The process consists in the intra-articular injection of diluted iodinated contrast, after which standard and supplementary shoulder projections are obtained. A number of findings on conventional arthrograms suggest a diagnosis of AC. These include reduced capsular distension with irregular internal profile and internal septa, which is associated with medial leakage of contrast, lack of distension of the subscapular bursa, and atypical contrast leakage in the sheath of the biceps [23] Fig. Although reduced capsular volume is a common finding, no clear data exist regarding its quantification on conventional arthrography.

Chapter 6 : What is MRI of the Shoulder?

Your doctor has recommended you for an MRI of your shoulder. Magnetic resonance imaging (MRI) uses a magnetic field, radio waves and a computer to create detailed image slices (cross sections) of the shoulder.

Last Updated by Howard J. Luks, MD Shoulder pain is very common. Should we obtain an MRI on everyone with shoulder pain? The rotator cuff is the most common source of pain in patients over the age of Rotator cuff tears are very common in people over The majority of rotator cuff issues are due to degeneration or attrition of the rotator cuff. Many degenerative or attritional rotator cuff tears do not need surgery and your pain will improve with physical therapy. In my everyday life I see two types of people, those with shoulder pain and those who will have have shoulder pain. For most of you, your shoulder pain will subside spontaneously. Many of you will need to see a doctor because your shoulder pain will keep you up at night or make it difficult for you to continue with your daily activities. What should your doctor do? Today we continue with our Expert Series where 4 Orthopedic Surgery experts in the area of shoulder surgery will continue answering a number of questions about the rotator cuff. For me, the exam is then next most important. After that the response or failure to treatments if appropriate for nonoperative care and finally, imaging studies, including MRIs. In younger patients, MRIs are only fair in their ability to accurately identify the common shoulder problems this age group suffers. These are incidentally identified and often do not require any treatment. As a result, in most cases I try to develop a diagnosis from the history and exam. I use MRIs with shoulder problems in the following situations: Website , Twitter MRI is currently the best way to image the rotator cuff tendons. Not every shoulder pain patient needs an MRI. A good history and physical exam will usually lead to a reasonable diagnosis without advanced imaging. Deciding to obtain a MRI depends on many factors including the time course and severity of the problem, patient age and activity level, and patient desires. Many painful conditions of the shoulder will respond well to non-surgical treatment. If it seems like there is a serious problem that may require surgery or longstanding pain is continuing and increasing despite good care, a MRI may be appropriate. Website , Twitter , Facebook When I first see a patient over 40 with shoulder pain, my first treatment is anti-inflammatories, physical therapy, and frequently a subacromial steroid injection. I will then see the patients back weeks later. If they are much better, there is no need for any further treatment. I usually do not order an MRI the first time I see them because, even if they do have a small rotator cuff tear, I would like to see if non-operative treatment would help them. They may have avoided a surgery. However, if I have a patient with a long history of shoulder pain and weakness and they are very weak on examination, I sometimes do order an MRI after the first office visit. If the patient had a violent trauma with a lot of shoulder dysfunction, I might get an MRI in that setting, as acute rotator cuff repair for a complete tear would be reasonable. Likewise, if the patient is an overhead athlete with months of shoulder pain before I see them, I might get an MRI or even an MRI arthrogram where dye is injected into the joint , to look for a SLAP tear tear of the labral cartilage , which can occur with internal impingement. As our experts discussed, we may choose to MRI your shoulder if: Your diagnosis is in doubt You have not responded to physical therapy and we want to assess the quality of your rotator cuff You have suffered a severe injury and present with weakness Next time you visit an Orthopedist for shoulder pain do not be upset if they do not order an MRI. They are rarely necessary to successfully treat the majority of people with shoulder pain. Some links on this page may be affiliate links. Read the full disclaimer.

Chapter 7 : Diagnostic Imaging of the Shoulder - Physiopedia

OVERVIEW. This chapter is an outline of the basic principles of magnetic resonance imaging (MRI) of the shoulder with an emphasis on the clinical issues related to the imaging findings of shoulder pathology.

Diagnostic Imaging can be a useful resource for shoulder conditions and where used appropriately can be an invaluable tool for physiotherapists. Unnecessary imaging will not only potentially squander financial resources, increase the failure rate of conservative physiotherapy and and increase potential for premature surgery, so it is key to understand and recognise when imaging is appropriate. Cuff and Littlewood [10] highlight a wide range of factors that influence patient beliefs about the cause of their shoulder pain, but suggest the information they receive from healthcare professionals has the strongest influence, hence, the language and terminology we use is key to achieving good clinical outcomes. Successful physiotherapy management of shoulder pain is often impacted by the patients expectations about how effective they believe physiotherapy to be and has been shown to be the strongest predictor of future surgical intervention in people with shoulder pain and associated rotator cuff tear. Currently magnetic resonance imaging MRI and ultrasound are the most commonly used cross-sectional imaging modalities in the diagnostic work-up of shoulder pain. As such shoulder examination and development of adequate differential diagnosis is therefore key to establish if advanced imaging is required. Direct access to physical therapy evaluation and intervention has the potential to reduce costs and improve outcomes in musculoskeletal medicine. The results of multiple studies show that direct access to physical therapy is associated with improved patient outcomes and decreased costs, with minimal risk of harm to the patient. Additionally, numerous case reports describe the appropriate identification of patients whose pathology lies outside the scope of physical therapy by physical therapists operating in a direct-access setting.. There are many different types of imaging and each type is used for a specific purpose. For shoulder related problems the main forms of imaging include X-rays Plain Radiography , Ultrasound, computed tomography CT and MRI Scans although direct access to these types of testing vary dramatically worldwide, and even within countries Imaging Options X-Ray Pain Radiography Plain X-rays can be important in the diagnosis of some shoulder conditions, with a good overview provided by routine views which should include a true Antero-Posterior view in the scapular plane Grashey View with the arm in maximal internal-rotation, with the arm in External Rotation and Axillary View and Y View less important. Currently there are many debates surrounding the use of MRI with many studies questioning the clinical relevance of the findings seen on MRI, which have been shown to not always correlate well with surgical findings. MRI can also be used to evaluate bony injuries in detail, as yet it is still unclear whether MRI is more accurate at detecting shoulder related disorders compared with Ultrasound, specifically in relation to Rotator Cuff or Subacromial Related Shoulder Pain, but both have been shown to be equally effective in the detection of partial or full thickness rotator cuff tears [23]. Onward referral to a specialist rather than requesting a MRI may often be a much better management strategy due to the cost implications for shoulder MRI. Imaging findings such as tendon tears and bursal thickening, often diagnosed as bursitis, are as common in individuals with no shoulder pain, as they are in those with shoulder pain. Cadogan et al [15] suggest that problems associated with the pathoanatomic approach to the clinical diagnosis of shoulder pain often utilised in primary care can lead the practitioner to inaccurate diagnosis, often resulting in inappropriate treatment interventions that may adversely affect patient outcome and result in inappropriate use of healthcare resources, and higher incidences of failed conservative treatment. Ultrasound on the other hand, can be slightly more challenging to perform and is operator dependent, requiring a skilled individual. Ultrasound is indicated also if the patient has a pacemaker, has a non-MRI-compatible metal implant, or is claustrophobic. The following pathway provides guidance on the imaging of adult patients with new onset traumatic and non-traumatic shoulder pain or instability. Resources If you are interested in learning more about diagnostic imaging take a look at these resources for the shoulder Diagnostic Imaging Pathways - Shoulder Pain or Instability The Diagnostic Imaging Pathways website is an evidence-based and consensus-based education and decision support tool for clinicians. It guides the choice of the most appropriate diagnostic examinations in the correct sequence in a

wide range of clinical scenarios. Guidance is summarised in flow charts diagnostic algorithms and these are supported by appropriate documentation and links to other sources of information and evidence where possible. Each pathway is designed to assist clinicians in situations when faced with a large array of possible diagnostic tests and examinations. However, it is recognised that diagnostic practice may differ from a particular pathway depending on local availability of equipment and expertise, as well as the experience of individual clinicians. Therefore each pathway is neither a rigid set of rules, nor a substitute for clinical assessment, and individual patient circumstances should always be considered. Norwich Image Interpretation Course: It is anticipated that by reading through each module and referring to the associated images provided, the user will become more accurate in their interpretation skills. You also have an option at the end of each module there is an online self-test which is designed to assess the concepts taught. They also have a pathology image gallery which can aid with reviewing image interpretation skills when viewing pathologies. These pathologies may arise incidentally when looking at trauma radiographs, or may be encountered when reviewing images from GP or Rheumatology referrers. International journal of sports physical therapy. Quality of primary care guidelines for acute low back pain. The clinical utility of ultrasonography for rotator cuff disease, shoulder impingement syndrome and subacromial bursitis. Managing shoulder pain in general practiceâ€"assessment, imaging and referral. Journal of General Internal Medicine. The Journal of orthopaedic and sports physical therapy. Accessed March 16, Diagnoses and imaging utilization for common shoulder disorders by referring physicians in British Columbia. How would you like to die?. Subacromial Impingement Syndrome - What does this mean to and for the Patient? Musculoskeletal Science and Practice. Elsevier Ltd; Oct 17;: Imaging of the shoulder: Current sports medicine reports. Imaging of the Unstable Shoulder. Diagnostic imaging guideline for musculoskeletal complaints in adultsâ€"an evidence-based approachâ€"part 2: Journal of manipulative and physiological therapeutics. Approach to the diagnosis of shoulder pain using physical exam and ultrasound: Diagnostic accuracy of ultrasonography, MRI and MR arthrography in the characterisation of rotator cuff disorders: A systematic review and meta-analysis. British Journal of Sports Medicine, 49 20 , â€" The accuracy of diagnostic ultrasound imaging for musculoskeletal soft tissue pathology of the extremities: Accuracy of diagnostic ultrasound in patients with suspected subacromial disorders: Arch Phys Med Rehabil. Sonography of the painful shoulder: Magnetic resonance imaging assessment of the rotator cuff. Is it really accurate? Comparison of magnetic reso- nance imaging and arthroscopy in the evaluation of shoulder pathology. J Shoulder Elbow Surg ;8: Overutilization of shoulder magnetic resonance imaging as a diagnostic screening tool in patients with chronic shoulder pain. Journal of shoulder and elbow surgery. Current imaging of the rotator cuff. Sports Medicine and Arthroscopy Review, 19 3 , â€" Common Sports-related Shoulder Injuries.

Chapter 8 : Shoulder: MRI, radiographical, and illustrated anatomical atlas

A shoulder MRI (magnetic resonance imaging) scan is an imaging test that uses energy from powerful magnets and to create pictures of the shoulder area. It does not use radiation (x-rays). Single MRI images are called slices.

The tendon of the subscapularis muscle attaches both to the lesser tubercle aswell as to the greater tubercle giving support to the long head of the biceps in the bicipital groove. Dislocation of the long head of the biceps will inevitably result in rupture of part of the subscapularis tendon. The rotator cuff is made of the tendons of subscapularis, supraspinatus, infraspinatus and teres minor muscle. Posterior graphic of the shoulder. The supraspinatus, infraspinatus and teres minor muscles and tendons are shown. They all attach to the greater tuberosity. The rotator cuff muscles and tendons act to stabilize the shoulderjoint during movements. Without the rotator cuff, the humeral head would ride up partially out of the glenoid fossa, lessening the efficiency of the deltoid muscle. Large tears of the rotator cuff may allow the humeral head to migrate upwards resulting in a high riding humeral head. Normal anatomy Axial anatomy and checklist Look for an os acromiale. Notice that the supraspinatus tendon is parallel to the axis of the muscle. This is not always the case. The insertion has a variable range. Notice superior labrum and attachment of the superior glenohumeral ligament. At this level look for SLAP-lesions and variants like sublabral foramen. At this level also look for Hill-Sachs lesion on the posterolateral margin of the humeral head. The fibers of the subscapularis tendon hold the biceps tendon within its groove. At this level study the middle GHL and the anterior labrum. Look for variants like the Buford complex. The concavity at the posterolateral margin of the humeral head should not be mistaken for a Hill Sachs, because this is the normal contour at this level. Hill Sachs lesions are only seen at the level of the coracoid. This is where the Bankart lesion and variants are seen. Notice the fibers of the inferior GHL. At this level also look for Bankart lesions. Axis of supraspinous tendon The supraspinatus tendon is the most important structure of the rotator cuff and subject to tendinopathy and tears. Tears of the supraspinatus tendon are best seen on coronal oblique and ABER-series. In many cases the axis of the supraspinatus tendon arrowheads is rotated more anteriorly compared to the axis of the muscle yellow arrow. When you plan the coronal oblique series, it is best to focus on the axis of the supraspinatus tendon. Coronal anatomy and checklist Notice coracoclavicular ligament and short head of the biceps. Notice suprascapular nerve and vessels. Look for supraspinatus-impingement by AC-joint spurs or a thickened coracoacromial ligament Study the superior biceps-labrum complex and look for sublabral recess or SLAP-tear. Look for excessive fluid in the subacromial bursa and for tears of the supraspinatus tendon. Look for rim-rent tears of the supraspinatus tendon at the insertion of the anterior fibers. Study the attachment of the IGHL at the humerus. Study the inferior labral-ligamentary complex. Look for HAGL-lesion humeral avulsion of the glenohumeral ligament. Look for tears of the infraspinatus tendon. Notice small Hill-Sachs lesion. Sagittal anatomy and checklist Notice rotator cuff muscles and look for atrophy Notice MGHL, which has an oblique course through the joint and study the relation to the subscapularis tendon. Study the biceps anchor. Notice shape of the acromion Look for impingement by the AC-joint. Notice the rotator cuff interval with coracohumeral ligament. Look for supraspinatus tears. In the ABER position the inferior glenohumeral ligament is stretched resulting in tension on the anteroinferior labrum, allowing intra-articular contrast to get between the labral tear and the glenoid. Rotator cuff tears The ABER view is also very useful for both partial- and full-thickness tears of the rotator cuff. The abduction and external rotation of the arm releases tension on the cuff relative to the normal coronal view obtained with the arm in adduction. As a result, subtle articular-sided partial thickness tears will not lie apposed to the adjacent intact fibers of the remaining rotator cuff nor be effaced against the humeral head, and intra-articular contrast can enhance visualization of the tear 3. Perthes lesion arrow Images in the ABER position are obtained in an axial way 45 degrees off the coronal plane figure. Notice red arrow indicating a small Perthes-lesion, which was not seen on the standard axial views. ABER - anatomy Notice the biceps anchor. The undersurface of the supraspinatus tendon should be smooth. Look for supraspinatus irregularities. Due to the tension by the anterior band of the inferior GHL labral teras will be easier to detect. Notice smooth undersurface of infraspinatus tendon and normal anterior labrum. Labral variants There are many labral

variants. It is important to recognise these variants, because they can mimick a SLAP tear. In type I there is no recess between the glenoid cartilage and the labrum. In type II there is a small recess. In type III there is a large sublabral recess. This sublabral recess can be difficult to distinguish from a SLAP-tear or a sublabral foramen. These images illustrate the differences between an sublabral recess and a SLAP-tear. A recess more than mm is always abnormal and should be regarded as a SLAP-tear. Sublabral recess The image shows the typical findings of a sublabral recess. On a MR-arthtrogram a sublabral foramen should not be confused with a sublabral recess or SLAP-tear, which are also located in this region. Notice the smooth borders unlike the margins of a SLAP-tear. Buford complex A Buford complex is a congenital labral variant. It is present in approximately 1. On these axial images a Buford complex can be identified. The thickened middle GHL should not be confused with a displaced labrum. It should always be possible to trace the middle GHL upwards to the glenoid rim and downwards to the humerus. Video of Buford complex Os Acromiale Failure of one of the acromial ossification centers to fuse will result in an os acromiale. Usually it is an incidental finding and regarded as a normal variant. The os acromiale may cause impingement because if it is unstable, it may be pulled inferiorly during abduction by the deltoid, which attaches here. On MR an os acromiale is best seen on superior axial images. An os acromiale must be mentioned in the report, because in patients who are considered for subacromial decompression, the removal of the acromion distal to the synchondrosis may further destabilize the synchondrosis and allow for even greater mobility of the os acromiale after surgery and worsening of the impingement 4. The axial MR-images show an os acromiale with degenerative changes, i. Iyengar, MD; Keith R. Burnett, MD; Wesley M. MRI of the shoulder second edition by Michael Zlatkin.

Chapter 9 : IMAGING OF THE SHOULDER | Radiology Key

MR is the best imaging modality to examen patients with shoulder pain and instability. In Shoulder MR-Part I we will focus on the normal anatomy and the many anatomical variants that may simulate pathology.

URL of this page: How the Test is Performed You will be asked to lie on a narrow table that slides into the center of the CT scanner. Modern "spiral" scanners can perform the exam without stopping. A computer creates separate images of the shoulder area. These are called slices. These images can be stored, viewed on a monitor, or printed on film. Three-dimensional models of the shoulder area can be created by adding the slices together. You must be still during the exam, because movement causes blurred images. You may be told to hold your breath for short periods of time. The scan should take only 10 to 15 minutes. How to Prepare for the Test Certain exams require a special dye, called contrast, to be delivered into the body before the test starts. Contrast helps certain areas show up better on the x-rays. Contrast can be given through a vein IV in your hand or forearm. If contrast is used, you may also be asked not to eat or drink anything for 4 to 6 hours before the test. Let your health care provider know if you have ever had a reaction to contrast. You may need to take medicines before the test in order to safely receive this substance. If you weigh more than pounds kilograms , find out if the CT machine has a weight limit. You will be asked to remove jewelry and wear a hospital gown during the study. How the Test will Feel Some people may have discomfort from lying on the hard table. Contrast given through an IV may cause a slight burning sensation, a metallic taste in the mouth, and a warm flushing of the body. These sensations are normal and most often go away within a few seconds. Why the Test is Performed CT rapidly creates detailed pictures of the shoulder. The test may help diagnose or detect: A dislocation , fracture , or other shoulder injury Evaluate the soft tissue such as rotator cuff tendons The cause of pain or other problems in the shoulder joint when MRI cannot be done Masses and tumors, including cancer Healing problems or scar tissue following surgery This test may also help guide a surgeon to the right area during a biopsy in the shoulder area. Normal Results Results are considered normal if the shoulder being examined is normal in appearance. What Abnormal Results Mean Abnormal results may be due to: Abscess collection of pus.