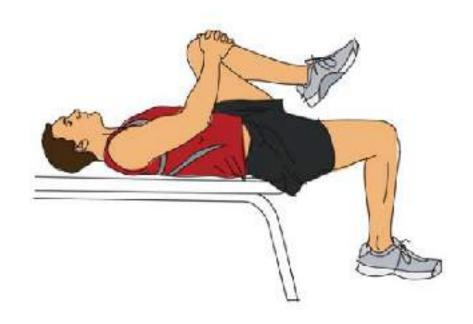
Hip Dysfunction

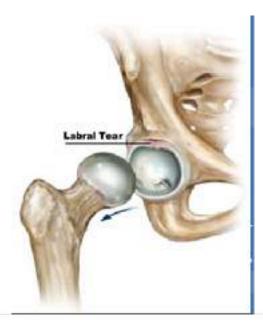
- Common types of hip pain for NAT Hip
- 1. Arthritis, Post-operative stiffness
- 2. Labral tears & Femoral Acetabular Impingement
- 3. Groin Strain
- 4. Osteitis Pubis
- 5. Bursitis & Tendonitis
- 6. Snapping Hip Syndrome



Thomas Test



- Labral tears typically result from an underlying problem.
- They are actually pretty common with a prominent cadaver study (McCarthy et al) demonstrating at least one labral tear in 53or 54 specimens. Byers et al found the labrum was attached from the articular surface of the acetabulum in 88% of people over the age of 40.



- 1) Bony
- a. Static Overload from femoral antiversion, acetabular dysplasia (ant/lat) or valgus of femoral neck positioning
- b. Dynamic impingement CAM impingement, Pincer Impingement, Femoral retroversion
- 2) Soft Tissue Laxity (hypermobility -Ehers Danloss Trait), PSAOS impingement
- 3) Traumatic Dislocation, Subluxation



Normal HIP Anatomy



People with FAI usually present with pain (or sometimes a dull ache) in the inguinal/ groin area and sometimes more toward the outside of the hip. Sharp stabbing pain may occur with turning, twisting, and squatting.

Lesions that occur with impingement



There are three types of FAI mechanism.

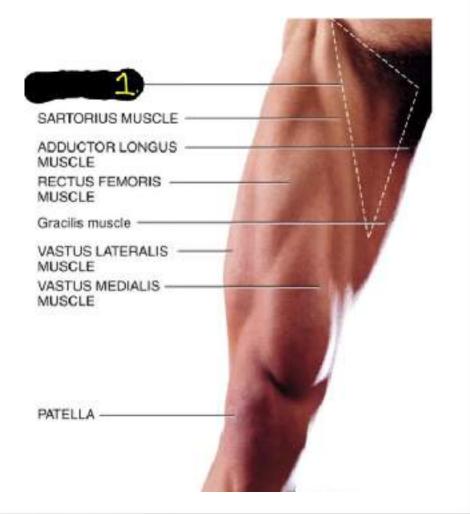
- 1) Cam deformity An excess of bone along the neck of the proximal femur
- 2) Pincer deformity Due an excessively deep socket or an abnormal tilt of the acetabular socket
- 3) A mixture of the preceding two forms (most common scenario).



Groin Strain

2-5% of all sports injury

- Adductor strains and osteitis pubis are the most common musculoskeletal causes of groin pain (in athletes).
- Most common in athletes that play sports like hockey, ice hockey, fencing, handball, cross court skiing, hurdling & high jump; it may comprise 5-7% of all soccer related injuries (Westlin 1997). The diagnosis is complicated and may remain unclear in 30% of cases (Ross 1997).





Osteiitis Pubis

Osteiitis Pubis Presenting Symptom Area	
Adductor pain	80 percent
Pubic symphysis	40 percent
Lower abdominal pain	30 percent
Hip pain	12 percent
Referred scrotal pain *American Family Physician October 15, 200	8 percent 1, Vol 64, No 8

- Characterized by symphysis pain and joint disruption.
- It may be difficult to distinguish from adductor strains, and the two conditions may occur concomitantly in the same patient.
- Factors, such as limitation of internal rotation of the hips or fixation of the sacroiliac joint, also place excessive stresses on the joint. Leg length discrepancy and valgus or varus of the hip or knee may also play a factor as well as abnormal Q-angles.
- Clinically, the patient reports exercise-induced pain in the lower abdomen and medial thigh. Symptoms are gradual in onset, slowly increasing in severity if activities are not stopped



PREDISPOSING FACTORS TO THE NAT HIP/ARI HIP

- FRUSTRATION: current model of dealing with hip dysfunction especially overwhelming gluteal hypertonicity and global restriction of ROM.
- 2 types of athlete straight line or random movement (hockey)
- SUPER TRIGGER POINTS IN CLOSE PROXIMTY TO ILIOFEMORAL JOINT CREATING A CHANGE IN RECIPROCAL INHIBITION RELATIONSHIPS.
- ENDUARANCE THRESHOLDS gradual changes in athletes, load management. Problems when push through
- ADAPTATION Neuroplasticity
- ALTERED MOVEMENT PATTERNS is the outcome then we apply sequence



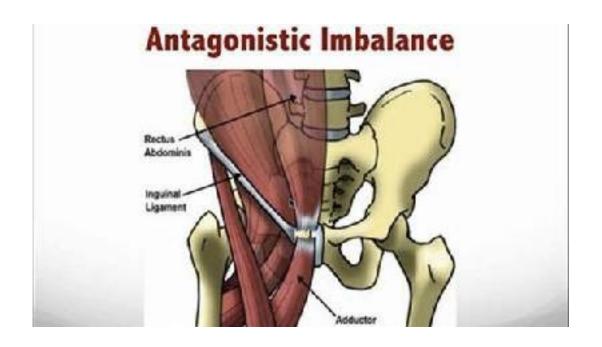
Hip Holding





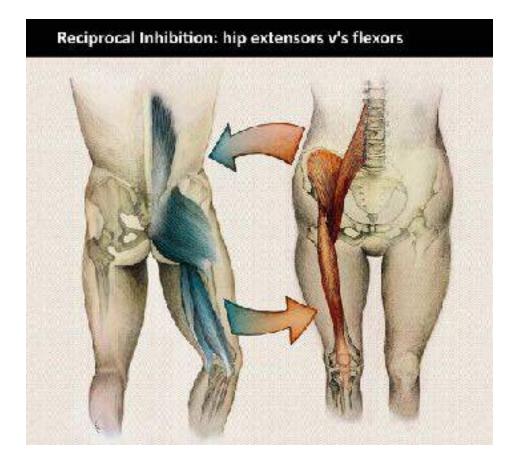
ALTERED MOVEMENT PATTERNS

- In the case of prolonged sitting, the antagonist tight hip flexors are causing inhibition of the agonist gluteal muscles.
- When the agonist and antagonist are in perfect balance, the light dimmer is shut off, allowing the light to be at full brightness. This allows for both muscles to be at full contraction and full range of motion (ROM). Blumberg et al.





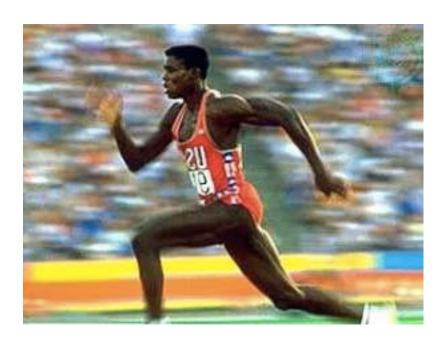
Reciprocal Inhibition





HIP EXTENSION

- PRIME MOVERS –
- GLUTEUS MAXIMUS
- HAMSTRINGS
- ERECTOR SPINAE
- THE MAIN RESTRICTOR –
- TIGHT /OVERACTIVE FLEXORS
- INHIBITS GLUTEUS MAX/MEDIUS



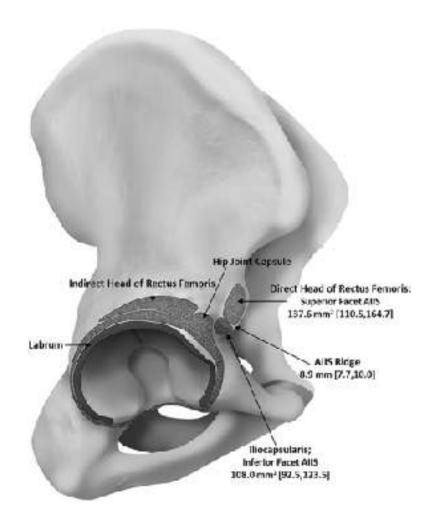
Important Structures

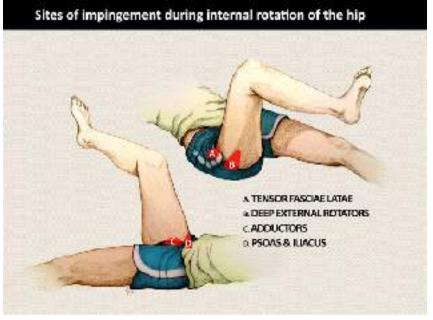


- Hip Adductor Group
- Iliopsoas
- Gluteus Maximus
- Hamstrings and Biceps Femoris
- TFL
- Lumbar Erector Spinae
- Small Hip Muscles



Areas of dysfunction







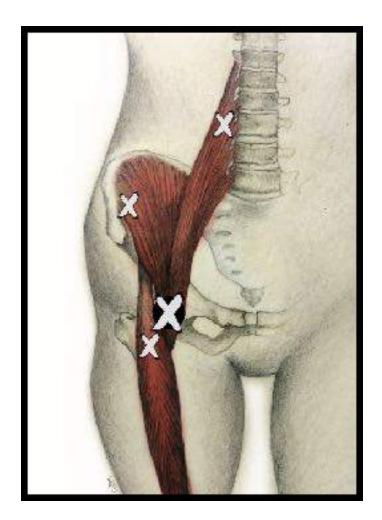
HIP EXTENSION ASSESSMENT







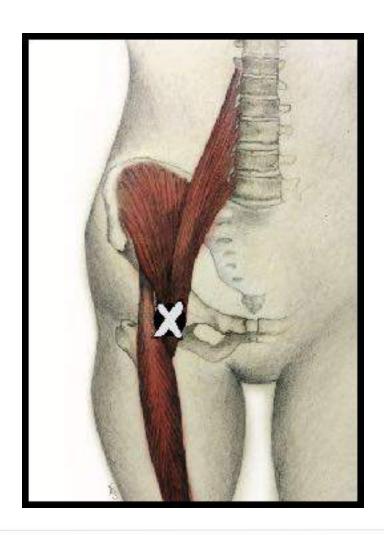
Testing the Psoas

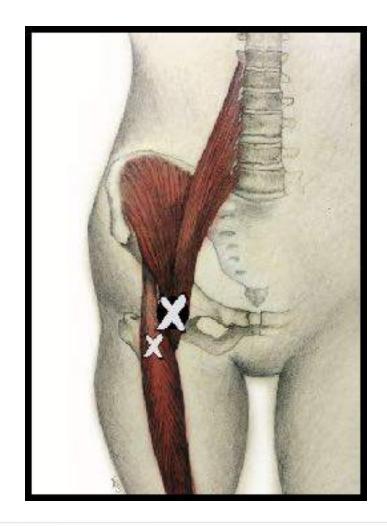






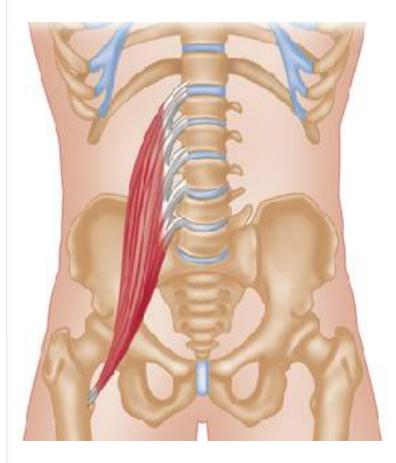
ILIOPSOAS / RECTUS FEMORIS







Iliopsoas



ORIGIN

- Psoas major: bases of transverse processes of all lumbar vertebrae, (L1–L5). Bodies of 12th thoracic and all lumbar vertebrae, (T12–L5). Intervertebral discs above each lumbar vertebra.
- Iliacus: superior two-thirds of iliac fossa. Internal lip of iliac crest. Ala
 of sacrum and anterior ligaments of lumbosacral and sacroiliac joints.

INSERTION

- Psoas major: lesser trochanter of femur.
- Iliacus: lateral side of tendon of psoas major, continuing into lesser trochanter of femur.

ACTION

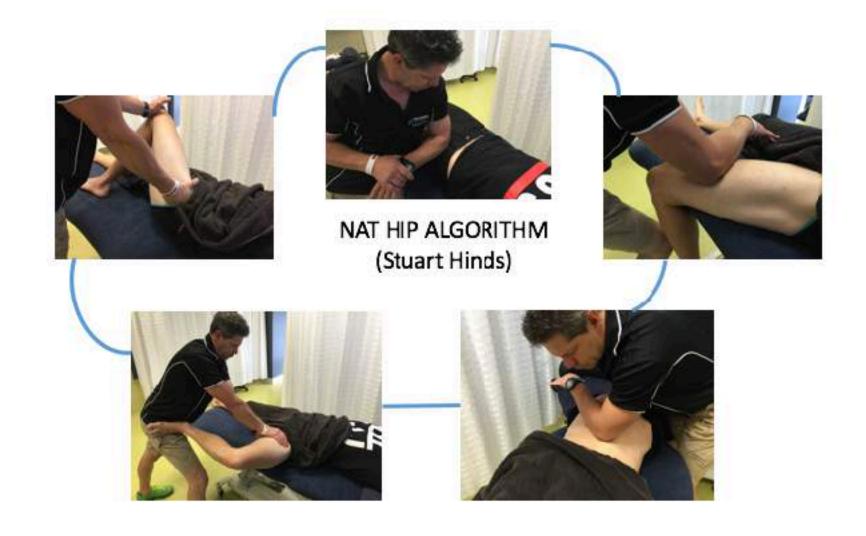
- Main flexor of hip joint (flexes and laterally rotates thigh, as in kicking a football). Acting from its insertion, flexes trunk, as in sitting up from the supine position.
- · Antagonist: Gluteus Maximus.

NERVE

- Psoas major: ventral rami of lumbar nerves, L1, 2, 3, 4 (psoas minor innervated from L1, 2).
- Iliacus: femoral nerve, L1, 2, 3, 4.



NAT Hip Algorithm



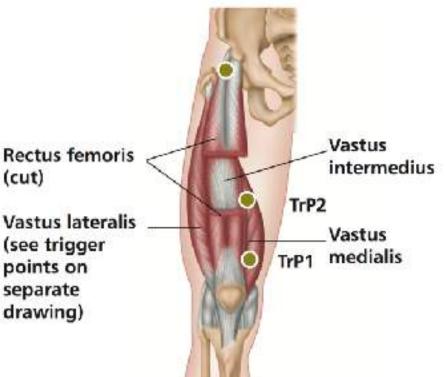


STEP 1- HIP EXTENSION- ILIOPSAOS TREATMENT





The Quadriceps



- ORIGIN
- Vastus group: upper half of shaft of femur. Rectus femoris: front part of ilium (AIIS). Area above hip socket.
- INSERTION
- Patella, then via patellar ligament into upper anterior part of tibia (tibial tuberosity).
- ACTION
- Vastus group: extends knee joint. Rectus femoris: extends knee joint, and exes hip joint (particularly in combination, as in kicking a ball). Antagonists: hamstrings.
- **NERVE**
- Femoral nerve, L2, 3, 4



(cut)

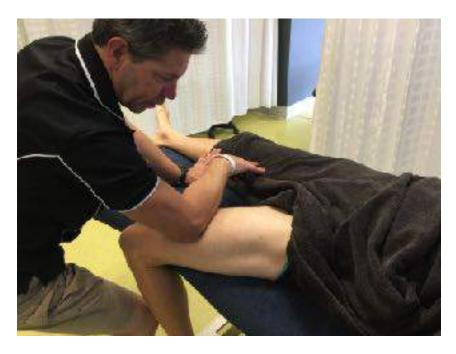
(see trigger

points on

separate

drawing)

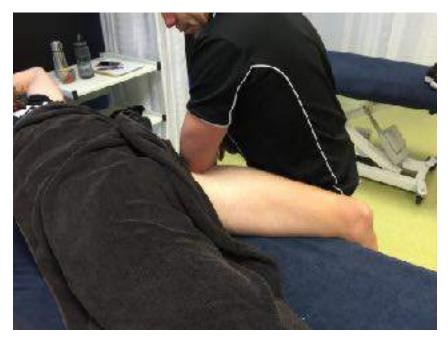
HIP EXTENSION- RECTUS FEMORIS MYOFASCIAL TENSION TECH

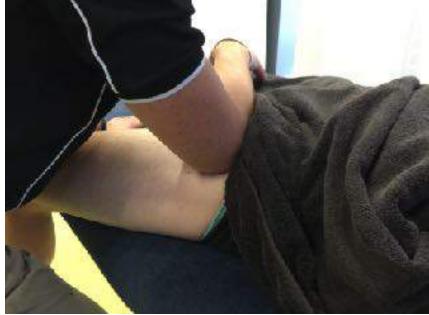




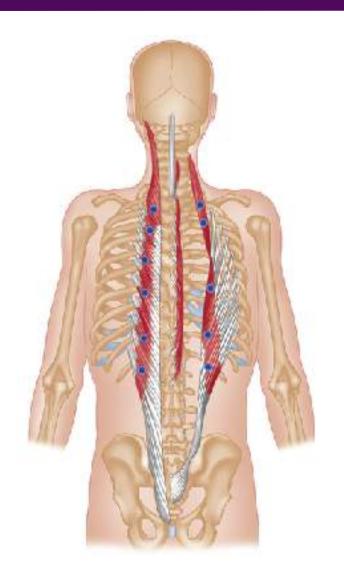


HIP EXTENSION-RECTUS FEMORIS TREATMENT





Erector Spinae



ORIGIN

 Slips of muscle arising from the sacrum. Iliac crest. Spinous and transverse processes of vertebrae.

INSERTION

 Ribs. Transverse and Spinous processes of vertebrae. Occipital bone.

ACTION

 Extends and laterally flexes vertebral column (i.e. bending backward and sideways). Helps maintain correct curvature of spine in the erect and sitting positions. Steadies the vertebral column on the pelvis during walking.

Antagonist: rectus abdominis.

NERVE

Dorsal rami of cervical, thoracic, and lumbar spinal nerves



HIP EXTENSION -THORACO-LUMBAR TREATMENT.



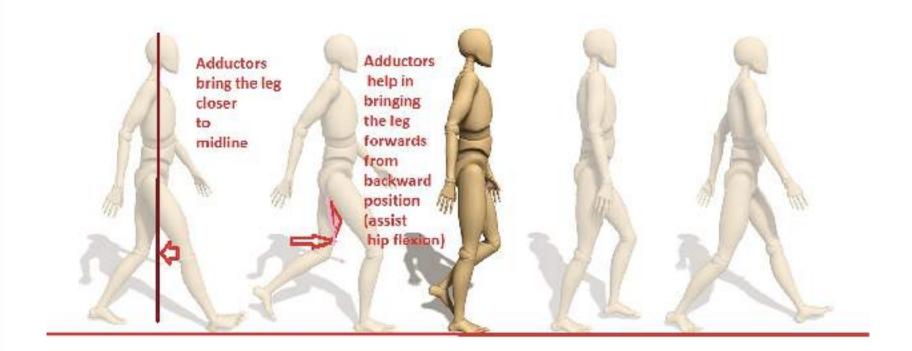




Reciprocal Inhibition: hip stabilisers v's adductors



ADDUCTORS:

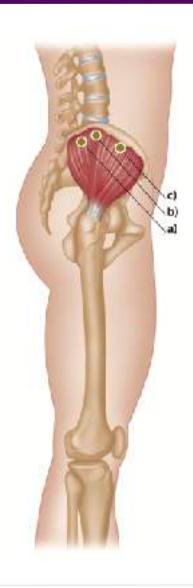


HIP ABDUCTION ASSESSMENT





Gluteus Medius



- ORIGIN
- Outer surface of ilium inferior to iliac crest, between posterior gluteal line and anterior gluteal line.
- INSERTION
- Oblique ridge on lateral surface of greater trochanter of femur
- ACTION
- Abducts hip joint. Anterior fibers medially rotate and may assist in extension of hip joint. Posterior fibers slightly laterally rotate hip joint. Antagonists: lateral rotator group.
- NERVE
- Superior gluteal nerve, L4, 5, S1.



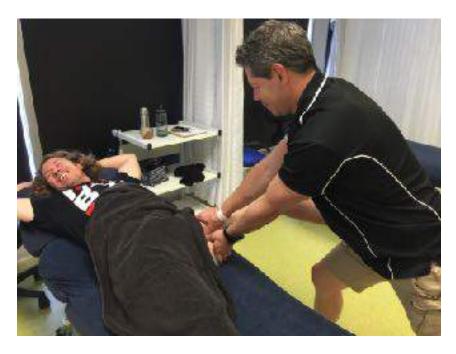
Pectineus



- ORIGIN
- Pecten of pubis, between iliopubic (iliopectineal) eminence and pubic tubercle.
- INSERTION
- Pectineal line, from lesser trochanter to linea aspera of femur.
- ACTION
- Adducts hip joint. Flexes hip joint.
- NERVE
- Femoral nerve, L2, 3, 4. Occasionally receives an additional branch from obturator nerve, L3.



STEP2 GLUTEAL / ADDUCTORS - HIP ABDUCTION TREATMENT





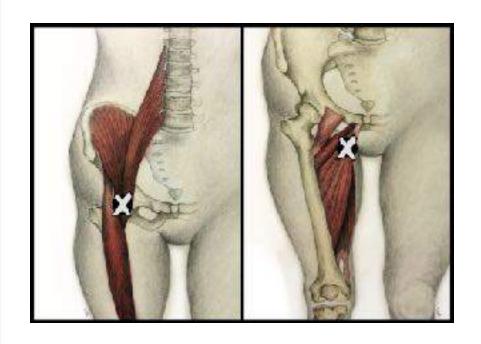


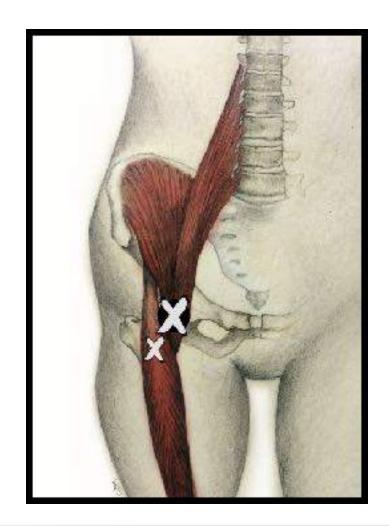
INTERNAL ROTATION

- The final piece in the jigsaw.
- Our opportunity to address underlying restrictions
- TREATMENT SEQUENCE
- STEP 1- HIP EXTENSION
- STEP 2- HIP ABDUCTION
- STEP 3- INTERNAL ROTATION
- CHASE THE RESTRICTION
- ANTAGONIST CONTRACTION- EXTERNAL ROTATION.



ILIOPSOAS/ ADDUCTOR MAGNUS







Hip Adductor Group



Adductor magnus posterior view



ORIGIN

 Anterior part of pubic bone (ramus). Adductor Magnus also takes origin from Ischial tuberosity.

INSERTION

Whole length of medial side of femur, from hip to knee.

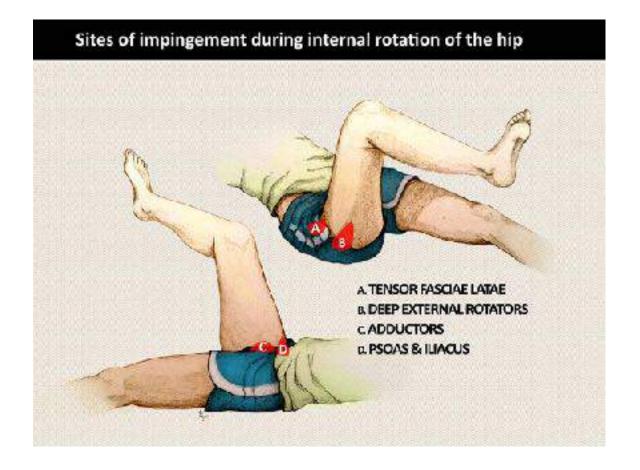
ACTION

 Adduct and laterally rotate hip joint. Adductors Longus/ Brevis also flex extended femur and extend flexed femur.

NERVE

- Magnus: posterior division of Obturator nerve L2, 3, 4.
 Tibial portion of sciatic nerve, L4, 5, S1.
- Brevis: anterior division of Obturator nerve, (L2–L4).
 Sometimes the posterior division also supplies a branch to it.
- Longus: anterior division of Obturator Nerve, L2, 3, 4.







INTERNAL ROTATION ASSESSMENT

Restrictions sites

- 1)TFL 2) Gluteus medius 3) Adductors 4) External rotators
- 5) ilipsoas/Rectus Femoris





Tensor Fascia Lata (TFL)



ACTION

- Upper fibers: laterally rotate hip joint.
 May assist in abduction of hip joint.
- Lower fibers: extend and laterally rotate hip joint (forceful extension as in running or rising from sitting).
- Extend trunk. Assists in adduction of hip joint. Through its insertion into IT tract, helps to stabilize knee in extension.

Antagonist: Iliopsoas.

NERVE

Inferior gluteal nerve, L5, S1, 2.



EXTERNAL ROTATORS

TENSOR FASCIA LATAE





- 1. Arendt-Nielsen L, Sluka KA, Nie HL: Experimental muscle pain impairs descending inhibition. Pain 140:465-471, 2008
- 2. Aymard C, Baret M, Katz R, Lafitte C, Penicaud A, Raoul S: Modulation of presynaptic inhibition of la afferents during voluntary wrist flexion and extension in man. Exp Brain Res 137:127-131, 2001
- 3. Cavallari P, Fournier E, Katz R, Pierrot-Deseilligny E, Shindo M: Changes in reciprocal la inhibition from wrist extensors to wrist flexors during voluntary movement in man. Exp Brain Res 56:574-576, 1984
- 4. Crone C: Reciprocal inhibition in man. Dan Med Bull 40: 571-581, 1993
- 5. Cummings M, Baldry P: Regional myofascial pain: Diagnosis and management. Best Pract Res Clin Rheumatol 21: 367-387, 2007
- 6. Chaitow L: Muscle Energy Techniques. Philadelphia, PA, Churchill Livingstone, 2006
- 7. Chen RS, Tsai CH, Lu CS: Reciprocal inhibition in writer's cramp. Mov Disord 10:556-561, 1995
- 8. Dommerholt J, Huijbregts P: Myofascial Trigger Points. Pathophysiology and Evidence-Informed Diagnosis and Management. Sudbury, MA, Jones and Bartlett Publishers, 2009
- 9. Fishbain DA, Goldberg M, Robert Meagher B, Steele R, Rosomoff H: Male and female chronic pain patients categorized by DSM-III psychiatric diagnostic criteria. Pain 26: 181-197, 1986





- 10. Ge HY, Arendt-Nielsen L: Latent Myofascial Trigger Points. Curr Pain Headache Rep 15:386-392
- 11. Ge HY, Zhang Y, Boudreau S, Yue SW, Arendt-Nielsen L: Induction of muscle cramps by nociceptive stimulation of latent myofascial trigger points. Exp Brain Res 187:623-629, 2008
- 12. Geertsen SS, Stecina K, Meehan CF, Nielsen JB, Hultborn H: Reciprocal la inhibition contributes to motoneuronal hyperpolarisation during the inactive phase of locomotion and scratching in the cat. J Physiol 589:119-134, 2011
- 13. Gerwin RD: Myofascial Pain Syndrome: Here We Are, Where Must We Go? J Musculoskelet Pain 18:329-347, 2010



- 14. Gerwin RD: A study of 96 subjects examined both for fi- bromyalgia and myofascial pain. J Musculosket Pain 3(Suppl 1):
 121-125, 1995
- 15. Gerwin RD, Dommerholt J, Shah JP: An expansion of Simons's integrated hypothesis of trigger point formation. Curr Pain Headache Rep 8:468-475, 2004
- 16. Grieve R, Clark J, Pearson E, Bullock S, Boyer C, Jarrett A: The immediate effect of soleus trigger point pressure release on restricted ankle joint dorsiflexion: A pilot randomised controlled trial. J Bodyw Mov Ther 15:42-49, 2011
- 17. Hamm K, Alexander CM: Challenging presumptions: Is reciprocal inhibition truly reciprocal? A study of reciprocal inhibition between knee extensors and flexors in humans. Man Ther;388-393, 2010
- 18. Hodges PW: Pain and motor control: From the laboratory to rehabilitation. J Electromyogr Kinesiol 21:220-228, 2011
- 19. Hong CZ: Persistence of local twitch response with loss of conduction to and from the spinal cord. Arch Phys Med Rehabil 75:12-16, 1994
- 20. Hubbard DR, Berkoff GM: Myofascial trigger points show spontaneous needle EMG activity. Spine 18: 1803-1807, 1993
- 21. Li LT, Ge HY, Yue SW, Arendt-Nielsen L: Nociceptive and non-nociceptive hypersensitivity at latent myofascial trigger points.
 Clin J Pain 25:132-137, 2009
- 22. Lucas KR, Polus BI, Rich PA: Latent myofascial trigger points: Their effects on muscle activation and movement efficiency. J Bodywork Mov Ther 8:160-166, 2004
- 23. Lucas KR, Rich PA, Polus BI: Muscle activation patterns in the scapular positioning muscles during loaded scapular plane elevation: The effects of Latent Myofascial Trigger Points. Clin Biomech (Bristol, Avon);765-770, 2010



- 24. Mense S: How Do Muscle Lesions such as Latent and Active Trigger Points Influence Central Nociceptive Neurons? J Musculoskeletal Pain 18:348-353, 2010
- 25. Mense S, Simons DG: Muscle Pain: Understanding Its Nature, Diagnosis, and Treatment. Philadelphia, PA, Lippincott Williams & Wilkins, 2001
- 26. Morita H, Crone C, Christenhuis D, Petersen NT, Nielsen JB: Modulation of presynaptic inhibition and disynaptic reciprocal la inhibition during voluntary movement in spasticity. Brain 124:826-837, 2001
- 27. Niddam DM, Chan RC, Lee SH, Yeh TC, Hsieh JC: Central modulation of pain evoked from myofascial trigger point.
 Clin J Pain 23:440-448, 2007
- 28. Petersen N, Morita H, Nielsen J: Modulation of reciprocal inhibition between ankle extensors and flexors during walking in man. J Physiol 520:605-619, 1999
- 29. Rossi A, Decchi B, Dami S, Della Volpe R, Groccia V: On the effect of chemically activated fine muscle afferents on interneurones mediating group I non-reciprocal inhibition of extensor ankle and knee muscles in humans. Brain res 815:106-110, 1999
- 30. Shindo M, Harayama H, Kondo K, Yanagisawa N, Tanaka R: Changes in reciprocal la inhibition during voluntary contraction in man. Exp Brain Res 53:400-408, 1984
- 31. Simons DG: Diagnostic criteria of myofascial pain caused by trigger points. J Musculoskeletal Pain 7:111-120, 1999



- 32. Simons DG: Review of enigmatic MTPs as a common cause of enigmatic musculoskeletal pain and dysfunction.
 J Electromyogr Kinesiol 14:95-107, 2004
- 33. Simons DG, Hong CZ, Simons LS: Endplate potentials are common to midfiber myofascial trigger points. Am J Phys Med Rehabil 81:212-222, 2002
- 34. Simons DG, Hong CZ, Simons LS: Prevalence of spontaneous electrical activity at trigger spots and at control sites in rabbit skeletal muscle. J Musculoskelet Pain 3:35-48, 1995
- 35. Simons DG, Travell JG, Simons LS: Travell & Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual. Baltimore, MD, Williams & Wilkins, 1999
- 36. Xu YM, Ge HY, Arendt-Nielsen L: Sustained nociceptive mechanical stimulation of latent myofascial trigger point induces central sensitization in healthy subjects. J Pain 11: 1348-1355, 2010

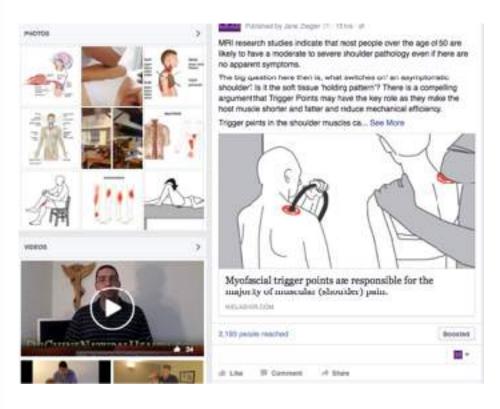




Facebook Communities

https://www.facebook.com/ triggerpointcentral

https://www.facebook.com/shoulderhealth









What equipment do I need?

Nothing Special – just your hands and some cream; please try to avoid adding modalities at this stage of your training. UP/DOWN treatment couch (optional) preferably with face-hole (optional). Foam wrist support. Models of shoulder (optional). Goniometer. Creams (BLUE NIVEA). Clinical testing equipment.

What creams or lotions should I use?

In general it is better to avoid oils as they may cause you to slide off from the pressure points once you have found them. We generally use plain blue 'Nivea' cream. Alternatively: Arnica cream, Plain Aqueous cream (with a few drops of vitamin E – food quality oil), Petroleum Gel, Massage oils/ liniments may be used.

NB/ always ask if you or your patient has a Lanolin allergy, or an allergy to any of the above.

NB/ be aware of any open skin wounds or skin lesions before applying creams or lotions.

What handhold do I use?

I use my elbow for treating the pressure points. This is because it allows
me to generate more force. This is something that you can try, but at the
beginning you may tend to slip – so go slowly. You can try using your
thumb re- enforced with your other hand.

How much pressure (FORCE) do I use?

- This is something that comes with experience but as a rule of thumb; the more painful the tissue the slower and deeper the pressure. In all cases the key words are 'work slowly' and 'thoroughly'.
- Another factor which determines the amount of force which you should apply is the – Muscle type (red/white fiber) and morphology of the patient. This will affect the depth of treatment. If the patient is 'stocky' I would expect to have to work quite vigorously, especially into the posterior capsule. If they are slight, you won't need to use as much force to affect a change in the tissues.

How fast do I go in STEP 1 (VELOCITY)?

- This depends somewhat on what you want to achieve. Varying the speed of the stroke can do the following:
- Faster is more stimulatory and it is especially useful in a phase III treatment or in general n the last few treatments sessions to 'ramp-up' abduction
- Slower and deeper is more useful for the stubborn, stuck or diabetic shoulder

What is the direction of force?

 The direction of force varies slightly from person to person. In general the aim is to reproduce the painful symptoms. When you find the painful nodules and with a sustained pressure change or vary the direction of force; see the effects that this has on the pain. We want to find the direction of pressure, which, where possible reproduces the exact pain that the patient experiences.



Does the treatment stop the frozen shoulder?

- In an early phase I case without masses of inflammation the answer is 50:50.
- It is our experience that little can be done to stop a frozen shoulder developing once the process has started in earnest.
- The treatment we are advocating seems to accelerate the condition through its phases rather than stop-it in its tracks.

Steroid injections?

 In about 5-10% of phase I cases, I recommend one or a series (up to three) local steroid injections into the front and back of the joint.
 Preferably these should be ultrasound guided.

What would be my course of action if the patient had not improved in:

- (i) six weeks? (ii) two months?
- For those of you who are against this type of intervention patients should not need this
- Practically speaking, however, some patients are in so much pain (due to the massive amounts of inflammation) that it may be more expedient in some cases to follow this route – you must use your own discretion.
- This depends on the phase at which the patient presents. If they are in phase I and in a lot of pain and. If there is no change after 5 sessions; If the night pain is still extremely severe.

Firstly you should thoroughly explain the natural history and pathogenesis of the condition. This is to put the patient at ease as much as possible, remember, they are scared and often in very bad pain. Then we would refer-on to a colleague (orthopedic physician) for further investigation and or steroid injection. If investigations etc... were NAD, we would continue with our treatment program. If the (night) pain was still extremely severe, we might refer the patient for either a course of Amytryptaline, Lyrica or a suprascapular nerve block (Guinethedine) – this is rare. We have, thankfully, never needed to recommend manipulation under anesthetic (MUA) which has a very poor evidence base.

Is there a pattern in which mobility returns?

 Yes. This depends on the phase and/or presentation (A/P/L). As a rule simple movements come back first. That is why we measure 'pure' simple passive ROM. Complex movements should start to return after this: From the 8th session – pre-phase I/phase I From the 5th session - phase II From the 3rd session - phase III



My patient is complaining that they still can't reach behind their back. How can I increase the range of motion for getting the arm up behind the back (APLEY)?

- •The APLEY maneuver is always the 'last to return' There is a very potent trigger point. In the biceps belly which can accelerate a return for this movement pattern. Ideally this should be used towards the end of the treatment cycle, once the range of motion is above 160° flexion.
- •As a result of the granulomatous LHB inflammation, the whole of the biceps muscle becomes shortened and fibrotic. In my opinion this is the major limiting factor for internal rotation and the APLEY maneuver.
- •Inhibition to the trigger point in **the biceps belly** should be used to rapidly increase the APLEY range of motion.

Pain Thresholds!

•Patients have different pain levels/thresholds, this has to be taken into account. One of the facts about FS is it occurs in patients with lower pain thresholds or central sensitization. This may be due to the fact that they are more frightened to move the injured arm and it thus seems to 'freeze' more quickly.

Ice and Splinting

- •Patient might benefit from using Ice and Heat at night on the front of the shoulder (region of the biceps tendon) before they go to sleep.
- •On no account should the patient stop using or splint the arm, if anything he should be encouraged to do daily ROM exercises.

Treatment reactions / side effects:

- The majority of people (70%) have a reaction to treatment after a session. Treatment reactions are a natural part of the overall effect of NAT therapy. We have become accustomed to going to the doctor and receiving a pill or remedy, which usually works within a few hours.
- Osteopathy seems to work differently. NAT taps into the bodies own healing mechanisms and these often take a few days to adjust and rebalance. Curiously, from research it seems that the worse the treatment reaction the better the improvement which seems to follow it! (JACM April 1997 & June 1997)

Some common side/treatment effects:

- Tiredness
- Headache
- · Local post treatment soreness
- · Changes in bowel movement (diarrhea or constipation)
- Increased urinary frequency
- Joint aching ('flu-like) and/or increased pain for about 24-48 hours
- Some people feel emotional, vulnerable and/or tearful

Note: A treatment reaction commonly lasts for two-three days.



How do I structure a typical appointment?

In our clinics we spend half an hour per session. This is for the first session and each subsequent session. We will attempt here to take you through typical treatment session sequences for unilateral and bilateral presentations; we will give you an indication of the time each STEP might take. We will also explore the nuance and variation at different stages in the treatment cycle.

Pre-Phase I

•You are most likely to see a phase 0-I presentation in patients who have seen you before with a previous frozen shoulder. This is because they know the signs. In such a case the patient may not have lost all mobility, in fact they may well have almost all of their range of motion. As discussed previously, in my opinion there is a 50/50 chance of 'nipping' the frozen shoulder in the bud. In the other cases you can 'speed' the shoulder through its course – the key diagnostic difference between these is the time elapsed since onset and the amount of inflammation in the joint.

Phase I

- Once per week for 5 weeks then, depending on inflammation levels once every week.
- This should take three to five sessions to lessen the inflammation (measured by less or no night pain) followed by five to seven sessions to regain the range of motion.

Phase II

- Once a week for 7-8 weeks or more often if required.
- This should take three sessions to lessen the inflammation (measured by less – no night pain) followed by three to five sessions to regain the range of motion.

Phase III

- Once a week for three to five sessions or more often (every three to four days) if required.
- This should take three to five sessions.
- As a rule 85% of cases can be treated in less than eight to ten sessions.



Managing expectations

Management

When a patient presents around the peak of phase I (sharp, catching pain, restricted movement, sleep disturbed ++) we would initially like to see them once weekly for the first three to four weeks. Initially we are looking for a reduction in night pain and sharp, catching pain. Initial relief often only lasts one to two days post treatment, then symptoms slowly return. It is important to let patients know this is what to expect, otherwise they are quick to become disheartened, especially if they have tried numerous other treatment approaches. With each successive treatment, we would expect to see a longer resolution of symptoms, such that by the third, if not fourth, treatment the patient reports a definite improvement.

They are aware they are sleeping better and the sharp, catching pain is largely gone and they usually report a reduction in use of analgesia/NSAIDs.



Managing expectations

Once a patient has reached this stage we like to spread the treatments out to two weeks apart and introduce some strengthening exercises. It is imperative the patient stays within the pain-free range and doesn't overdo it as this just seems to aggravate the shoulder. Exercises should initially be introduced every other day and ice used post-exercise if there is any soreness. Emphasise that if the exercises are done correctly (and introduced at the appropriate point) there should be no pain either during or after exercise. Pain generally indicates the patient is doing the exercises wrong – usually trying to push through too great a range.

Once pain has gone, the range of motion starts to return. Once the pain is gone the patient is in phase II (the restricted or frozen phase). After seeing the patient roughly three times at two-weekly intervals we would spread the treatment to three to four weeks apart, increasing the number and intensity of the exercises. In a non-complicated frozen shoulder presenting at the peak of phase I, we would expect to see them eight-twelve times from initial presentation to complete resolution. Paradoxically, the later in the condition they present, the easier it is to treat.



Manual therapy

- Joint and soft tissue mobilisation techniques have been shown to augment the effect of the exercise program.
- Initially, supervised exercises with manual therapy is recommended. During that time patients should be instructed in a home programme.
- We have found it necessary to watch the patient doing their exercises for 3-4 weeks running to ensure they are able to do them correctly and understand what is correct movement.

As patients progress treatment is spaced further apart and patients can move entirely to a home programme when they no longer are in need of manual therapy.



Patient advice sheet

Managing Frozen Shoulder – What You Can Do To Help Yourself

Daily Living

What you do with your shoulder on a daily basis is important both for managing pain and increasing the rate of recovery. The instinct we have when something is hurting is not to use the painful area. Where as this may be appropriate for other problems such as a fracture or ligament sprain, it is not so for a frozen shoulder.

Although instinctively all frozen shoulder sufferers want to cradle their arm in the sling position, it is very important to avoid doing so as it only compounds the problem. Immobilising the arm, however tempting it may seem, just causes greater shortening and stiffness and in the long term will slow down recovery. Try to keep the arm straight allowing the arm to hang alongside your body. In this position the weight of the arm acts as a gentle traction force, stretching the biceps tendon and slightly separating the shoulder joint.

Wherever possible it is important to try and use the arm as normally as possible, but within the pain-free range, avoiding those activities that you know will cause that sharp catching pain. Try swinging the arms when walking; don't just hold the arm rigid. Try putting your arm up on the sofa when you are sitting. If you are standing, try sliding your hand up the wall, but remember to keep your shoulder relaxed. Don't be afraid to move your arm, you will not make it worse, just try to avoid tweaking the tendon,.



Walking

When walking through a busy supermarket or going on public transport it may be very difficult not to remain tense and protective towards the shoulder for fear of someone knocking into you. However, whenever possible it is important to allow the shoulder to relax and straighten the arm when walking. The tension caused by fear of pain will only compound the problems.

This is what to do when walking:

- Relax the shoulder down.
- Straighten the arm.
- "Let it swing", swinging the arm along the side of your body like you would under "normal" circumstances. It may feel odd initially but if you persevere, you will soon get used to it.
- Breathe and relax.

Swinging the arm during a very acute phase may be painful, so achieving the first two points is enough. Just remember that the pain is not due to an injury (in which case immobility would be appropriate), but largely due to the immobility, so movement will actually make it better! The more you move the arm within the pain-free range, the larger the pain-free range will become.



Sleeping

Night pain and sleeplessness are some of the worst aspects of the frozen shoulder, especially in the early days. At first, you will probably not be able to tolerate pressure on your affected side. As your symptoms ease, however, you will find you can gradually ease into some type of position. The degree of night pain is directly proportional to the amount of inflammation within the joint. Some comfort and relief may be obtained by:

- Lying on your back, with a pillow lengthways under the affected arm(s) and shoulders, supporting them.
- Lying on the good side with a pillow or towel over your waist and under the arm. Try to avoid sleeping with the arm above your head. This inhibits shoulder tissue repair, which mainly occurs at night.
- Lying on your back with a good neck pillow.



Ice

Ice can be particularly beneficial in the acute, freezing phase (I) when the inflammation is most active. You may feel sceptical about this, but so many people have enthusiastically described the relief they felt from applying ice to their shoulders that it is worth trying.

- Wrap some crushed ice or frozen peas in a towel and place over the front of the shoulder joint.
- Leave it there for five to ten minutes.
- Let the area rest without ice for five to ten minutes and repeat.

The cycle can be repeated four to five times and can be done several times during the day. You can also apply the ice to the back of the shoulder joint, the top, the side or other areas where there is acute pain. It is a good idea to ice the front of the shoulder even if it is not painful. When ice is not appropriate (at work etc) then cold sprays or gels may be useful.

NB: never apply ice directly to the skin as it burns and leaves brown marks.



Heat

In the early stages of a frozen shoulder applying direct heat is not a good idea, though a warm bath may be helpful. Warm packs / hot water bottles that are not too hot can be applied in the second and third phases, and this is particularly beneficial prior to attempting any stretching exercises. If you find that heat does give you temporary relief, then an alternating cycle of five minutes ice, five minutes warmth, ending with five minutes ice can be tried. It is very important to end the cycle with ice.

Posture

The benefits of maintaining a good posture are something that we Osteopaths often try to emphasise to our patients. Round shoulders and long term poor posture causes the shoulder muscles and joints to work inefficiently and can lead to a "pinching" of the tissues; causing further damage. The neck muscles are also vulnerable in frozen shoulder as they often go rigid in a frozen shoulder where they are used to hitch the shoulder.



Although the pain of a frozen shoulder can be constant, the demands of life do not necessarily let up. At work you may spend a long time in the same position or perform some repetitive tasks. Here are some tips on how to get through the day with the least amount of discomfort:

- Avoid carrying heavy bags or cases for long distances; this has been demonstrated to precipitate tears in the supraspinatus, one of the important rotator cuff muscles
- If you are driving all day, or keeping your arm in a fixed position, take regular breaks where you can move your arm around to encourage circulation to muscles of the shoulder
- When working in front of the computer screen, take regular breaks. Get up and walk away from your work station and the PC for a couple of minutes every half an hour. This is important for the same reasons as above.
- Make sure your chair has good back support and preferably adjustable arm rests.

Adopt the 'ideal' work posture if you are sitting at a desk.



Use it!!

Maybe that is the last thing you want to be doing when the arm is hurting, but it really will help long term! The only thing to avoid is the "catchy" type of pain that I am sure you are familiar with. Whatever you normally do with the arm, try to keep doing it as long as it is not too painful. Things like brushing your teeth, shampooing your hair or using your knife and fork. Although it may be difficult, these little things will help to keep the shoulder free and more mobile.



Patient advice sheet exercise

Spasm Exercise

- Rest the hand on a table or chair back palm up.
- Allow the weight of the arm to rest on the hand, causing slight compression at the shoulder joint. It is as though you were about to lean your body weight on your hand, while only applying a fraction of the force.

Breathe deeply and slowly. It helps to apply the pressure as you breathe out.



Patient advice sheet exercises

Repositioning the Shoulder

This is originally an Alexander Technique exercise which is excellent for resetting the shoulder position.

Do everyday if possible.

- Place a duvet or thick towel on the floor and lie on it, face up.
- Place pillows under both elbows and forearms.
- Rest the hands on your stomach, palm downwards (if that is not possible just rest the arms on the pillow).
- Stay in this position for twenty minutes. Try putting on some relaxing music.

Very slowly the muscles at the front of their chest should relax, allowing the shoulders to drop backwards, towards the floor.

You may not be able to get the hands flat for a while, but eventually you will. If necessary you can place a cushion on your abdomen and rest the hands there. Gradually try to lower this cushion to a few towels and eventually nothing.

When your shoulder has started to "defrost" in the second and third phase, you might be able to place the arms at 45° angle from the body. Turn the palms upwards if possible.



Patient advice sheet exercises

Shoulder Retraction

This is another exercise for resetting your shoulder position and posture. The good thing about this exercise is that it can be done everywhere, and does not require any equipment:

- Turn your hands palm outwards slowly.
- Turn your hands palm outwards slowly.
- Try to squeeze your shoulder blades together, automatically bringing your shoulders backwards.
- Keep your shoulders where they are but let the hands roll back into your sides.
- Hold that position for 30 seconds.
- Rest and repeat.



Patient advice sheet exercises

Swimming

As soon as the night pain is gone it is a good idea to get into the water. At first it may not look or feel like you are swimming, but do not despair; you are still doing your shoulder the world of good. The resistance of the water will help mobility and improve the strength of the shoulder.

- Try to go when it is quiet in the pool
- If you can't swim then simply walk up and down using your arms to help you
- Don't try to swim fifty laps; you are swimming to help your shoulder, not to win the Olympics
- Rest after every lap
- Vary the type of stroke you use after each lap
- Concentrate on trying to move the shoulder as much as possible rather than swimming fast or far
- Don't overdo it!! Easily done, stop well before you are tired or when the shoulder is hurting
- Water aerobics classes may also be useful so check if there is a class in your area.



References

Simons, D.G., Travell, J.G., Simons, L., 1999. Myofascial Pain and Dysfunction: The Trigger Point

Manual. Williams & Wilkins, Baltimore.

Mense, S., Simons, D.G., 2001. Muscle Pain: Understanding its Nature, Diagnosis, and Treatment. Lippincott Williams & Wilkins, Baltimore and Philadelphia.

Hubbard, D.R., Berkoff, G.M., 1993. Myofascial trigger points show spontaneous needle EMG activity. Spine 18, 1803–1807.

Huguenin, L.K., 2004. Myofascial trigger points: the current evidence. Physical Therapy in Sport 5, 2–12. Hagg, G., 1988. Ny forklaringsmodell for muskelskador vid statisk belastnin i skuldra och nacke [Swedish; New explanation for muscle damage as a result of static loads in the neck and shoulder]. Arbete Manniska Miljo 4, 260–262.

Willard, F., 2008. Basic mechanisms of pain. In: Audette, J.F., Bailey, A. (Eds.), Integrative Pain Medicine: The Science and Practice of Complementary and Alternative Medicine in Pain Management. Humana Press, Totowa (Chapter 2).

Lechner SG, Lewin GR. Peripheral sensitisation of nociceptors via G-protein-dependent potentiation of mechanotransduction currents. J Physiol. 2009 Jul 15;587(Pt 14):3493-503.

Woolf CJ & SalterMW (2000). Neuronal plasticity: increasing the gain in pain. *Science* **288**, 1765–1769.

Lewin GR & Moshourab R (2004). Mechanosensation and pain. *J Neurobiol* **61**, 30–44.

Hoheisel U, Koch K, Mense S. Functional reorganization in the rat dorsal horn during an experimental myositis. Pain. 1994 Oct; 59(1):111-8.

Woolf, C J: Thompson, S W. The induction and maintenance of central sensitization is dependent on Nmethyl- D-aspartic acid receptor activation; implications for the treatment of post-injury pain

hypersensitivity states. Pain. 1991 Mar; 44(3): 293-9



Hughes AM, Rhodes J, Fisher G, Sellers M, Growcott JW. Assessment of the effect of dextromethorphan and ketamine on the acute nociceptive threshold and wind-up of the second pain response in healthy male volunteers. Br J Clin Pharmacol. 2002 Jun;53(6): 604-12.

Weiss T, Miltner WH, Adler T, Brückner L, Taub E. Decrease in phantom limb pain associated with prosthesis-induced increased use of an amputation stump in humans. Neurosci Lett. 1999 Sep 10;272 (2):131-4.

Taub E, Uswatte G, Elbert T. New treatments in neurorehabilitation founded on basic research. Nat Rev Neurosci. 2002 Mar;3(3):228-36

Machner A, Merk H, Becker R, et al. Kinesthetic sense of the shoulder in patients with impingement syndrome. Acta Orthop Scand 2003;74(1):85–8.



Safran MR, Borsa PA, Lephart SM, et al. Shoulder proprioception in baseball pitchers. Shoulder Elbow Surg 2001;10(5):438–44.

Yamashita, Toshihiko, Minaki, Yasuhiko, Takebayashi, Tsuneo, Sakamoto, Naotoshi and Ishii,

Seiichi(1999). Neural response of mechanoreceptors to acute inflammation in the rotator cuff of the shoulder joint in rabbits. Acta Orthopaedica, 70: 2, 137 — 140

Coggeshall R E, Hong K A P, Langford L A, Schaible H-G, Schmidt R F. Discharge characteristics of fine medial articular afferents at rest and during passive movements of inflamed knee joint. Brain Res 1983; 272: 185-8

Jerosch J, Steinbeck J, Schröder M, Westhues M, Reer R. Acta Orthop Belg. 1997 Mar;63(1):8-14. Intraoperative EMG response of the musculature after stimulation of the glenohumeral joint capsule.

Page & Frank 2007. The Janda Approach to Chronic Musculoskeletal Pain http://www.jbpub.com/samples/0763732524/ The%20Janda%20Approach.doc

Sandor R. Adhesive capsulitis. Optimal treatment of 'frozen shoulder'. Phys Sportsmed. 2000;28:23–9.

Malone T, Hazle C. Rehabilitation of adhesive capsulitis. In:Ellenbecker TS, editor. Shoulder rehabilitation. Non-operative treatment. New York: Thieme; 2006.

Harryman DT, Lazurus MD, Rozencwaig R. The stiff shoulder. In: Rockwood Cam Matsen FA, Wirth MA, Lippitt SB, editors. The shoulder. 3rd ed. Philadephia: Saunders; 2004.

Clarke GR, Willis LA, Fish WW, Nichols PJR. Assessment of movement at the glenohumeral joint.

Binder AI, Bulgen DY, Hazleman BL, Roberts S. Frozen shoulder: a long-term prospective study. Ann Rheum Dis.1984;43:361–4.

Mangine RE, Heckmann T, Eifert-Mangine M. Alternative techniques for the motion-restricted shoulder. In: Andrews J, Wilk K, editors. The athletes shoulder. New York: Churchill Livingstone; 1994.Rheumatol Rehabil.1975;14:39–46.



Yilmaz MH, Kantarci F, Adaletli I, Ulus S, Gulsen F, Ozer H, Aktas I, Akgun K, Kanberoglu K. Pain & resistance in patients with adhesive capsulitis during contrast material injection phase of MR arthrography. Indian J Med Res. 2007 Apr;125(4):572-6.

Connell DA, Potter HG, Wickiewicz TL, Altchek DW, Warren RF. Noncontrast magnetic resonance imaging of superior labral lesions: 102 cases confirmed at arthroscopic surgery. Am J Sports Med. 1999;27:208-213.

Barber FA, Field LD, Ryu R. Biceps tendon and superior labrum injuries: decision-marking. J Bone Joint Surg Am. 2007;89:1844-1855

Kelly BT, Kadrmas WR, Speer KP. The manual muscle examination for rotator cuff strength. An electromyographic investigation. Am J Sports Med. 1996 Sep-Oct;24(5):581-8. Holtby R, Razmjou H. Accuracy of the Speed's and Yergason's tests in detecting biceps pathology and SLAP lesions: comparison with arthroscopic findings. Arthroscopy. 2004 Mar;20(3):231-6.

Bennett WF. Specificity of the Speed's test: arthroscopic technique for evaluating the biceps tendon at the level of the bicipital groove. Arthroscopy. 1998 Nov-Dec;14(8):789-96.

Park GY, Park JH, Bae JH. Structural changes in the acromioclavicular joint measured by ultrasonography during provocative tests. Clin Anat. 2009 Jul;22(5):580-5.

Chronopoulos E, Kim TK, Park HB, Ashenbrenner D, McFarland EG. Diagnostic value of physical tests for isolated chronic acromioclavicular lesions. Am J Sports Med. 2004 Apr-May;32(3):655-61.

Guanche CA, Jones DC. Clinical testing for tears of the glenoid labrum. Arthroscopy. 2003 May/Jun; 19(5):517-23.

Hegedus EJ, Goode A, Campbell S, Morin A, Tamaddoni M, Moorman CT 3rd, Cook C. Physical examination tests of the shoulder: a systematic review with meta-analysis of individual tests. Br J Sports Med. 2008 Feb;42(2):80-92.

Farber AJ, Castillo R, Clough M, Bahk M, McFarland EG. Clinical assessment of three common tests for traumatic anterior shoulder instability. J Bone Joint Surg Am. 2006 Jul;88(7):1467-74.



Arroll B,Goodyear-Smith, F. Corticosteroid injections for painful shoulder: a meta-analysis. Br J Gen Pract. 2005 March 1; 55(512): 224–228.

Baslund B: Frozen shoulder current concepts. Scandinavian J Rheumatology 19: 321-325, 1990

Binder A, Hazleman BL, Parr G, Roberts S. A controlled study of oral prednisolone in frozen shoulder. Br J Rheumatol. 1986 Aug; 25(3):288-92

Black DM, Filak AT. Hyperglycemia with non-insulin-dependent diabetes following intraarticular steroid injection. J Fam Pract. 1989 Apr;28(4):462-3

Birnbaum K, Lierse W 1992 Anatomy and function of the bursa subacromialis. Acta Anat 145: 354–363

Border WA, Noble NA. Transferring growth factor beta in tissue fibrosis. N Engl J Med 1994;331:1286–92.

Brugger P, Kollias SS, Müri RM, Crelier G, Hepp-Reymond MC, Regard M. Beyond re membering:

phantom sensations of congenitally absent limbs. Proc Natl Acad Sci U S A. 2000 May 23;97(11):6167-72.

Buchbinder R, Hoving JL, Green S, Hall S, Forbes A, Nash P. Short course prednisolone for adhesive capsulitis (frozen shoulder or stiff painful shoulder): a randomised, double blind, placebo controlled trial. Ann Rheum Dis. 2004 Nov;63(11):1460-9

Buchbinder R, Green S, Youd JM, Johnston RV. Oral steroids for adhesive capsulitis. Cochrane Database Syst Rev. 2006 Oct 18; (4)

Bunker TD, Anthony PP. The pathology of frozen shoulder. A Dupuytren-like disease. J Bone Joint Surg Br. 1995 Sep;77(5):677-83.

Bush G, Vogt BA, Holmes J, Dale AM, Greve D, Jenike MA, Rosen BR. Dorsal anterior cingulate cortex: a role in reward-based decision making. Proc Natl Acad Sci U S A. 2002 Jan 8;99(1):523-8.

Canturk F, Canturk T, Aydin F, Karagoz F, Senturk N, Turanli AY. Cutaneous linear atrophy following

intralesional corticosteroid injection in the treatment of tendonitis. Cutis. 2004 Mar;73(3):197-8.



Blanchette C Intraarticular corticosteroids, supervised physiotherapy, or a combination of the two in the treatment of adhesive capsulitis of the shoulder: a placebo-controlled trial. Arthritis Rheum. 2003 Mar;48(3):829-38

Chen F, Castranova V, Shi X, Demers L. New Insights into the Role of Nuclear Factor- B, a Ubiquitous Transcription Factor in the Initiation of Diseases. Clinical Chemistry 45: 7-17, 1999.

Cheon H, Sun YK, Yu SJ, Lee YH, Ji JD, Song GG, Lee JH, Kim MK, Sohn J. Platelet-derived growth factor-AA increases IL-1beta and IL-8 expression and activates NF-kappaB in rheumatoid fibroblast-like synoviocytes. Scand J Immunol. 2004 Nov;60(5):455-62.

Codman EA. The shoulder. Boston: Todd; 1934.

D'Antona G, Pellegrino MA, Adami R, Rossi R, Carlizzi CN, Canepari M, Saltin B, Bottinelli R. The effect of ageing and immobilization on structure and function of human skeletal muscle fibres. J Physiol. 2003 Oct 15;552 (Pt 2):499-511.

Dacre JE, Beeney N, Scott DC. Injections and physiotherapy for the painful stiff shoulder. Ann Rheum Dis 1989;48:322-5.

Dahan TH, Fortin L, Pelletier M, Petit M, Vadeboncoeur R, Suissa S. Double blind randomized clinical trial examining the efficacy of bupivacaine suprascapular nerve blocks in frozen shoulder. J Rheumatol. 2000 Jun;27(6):1464-9.

Dierickx C, Ceccarelli E, Conti M, Vanlommel J, Castagna A. Variations of the intra-articular portion of the long head of the biceps tendon: a classification of embryologically explained variations. J Shoulder Elbow Surg. 2009 Jul-Aug;18(4):556-65.

Drugs and Therapeutic bulletin: Need Patients be stuck with a frozen shoulder?: DTB Vol 38 November 2000

Duke O, Zeclear E, Grahame R. Anti-inflammatory drugs in periarthritis of the shoulder: a double-blind, between-patients study of naproxen versus indomethacin. Rheumatol Rehabil 1981;20:54–9.

Duplay E S: De La Periarthrite scapulohumerale et des raideurs de l'epaule qui en son la consequence. Arch Gen Med 20:513-542, 1872

Edelson J G, Taitz C Anatomy of the coracoacromial arch: relation to degeneration of the acromion. J Bone Jt Surg 1992 74A: 589–594

Edelson J G, Zuckerman J, Hershkovitz I Os acromiale: anatomy and surgical implications. J Bone Jt Surg 1993 74B: 551–555



Ehde DM, Czerniecki JM, Smith DG, Campbell KM, Edwards WT, Jensen MP, Robinson LR. Chronic phantom sensations, phantom pain, residual limb pain, and other regional pain after lower limb amputation. Arch Phys Med Rehabil. 2000 Aug;81(8):1039-44.

Eustace JA, Brophy DP, Gibney RP, et al: Comparison of the accuracy of steroid placement with clinical outcome in patients with shoulder symptoms. Ann Rheum Dis 1997 Jan; 56(1): 59-63

Fareed DO, Gallivan WR: Office management of frozen shoulder syndrome: treatment with hydraulic distension under local anaesthesia. *Clin Orthop* **242**:177-183, 1989

Ferrari DA. Capsular ligaments of the shoulder. Anatomical and functional study of the anterior superior capsule. Am J Sports Med. 1990 Jan-Feb;18(1):20-4.

Franceschi F, Longo UG, Ruzzini L, Morini S, Battistoni F, Dicuonzo G, Maffulli N, Denaro V. Circulating substance P levels and shoulder joint contracture after arthroscopic repair of the rotator cuff. Br J Sports Med. 2008 Sep;42(9):742-5.

Ghalayini SR, Board TN, Srinivasan MS. Anatomic variations in the long head of biceps: contribution to shoulder dysfunction. Arthroscopy. 2007 Sep;23(9):1012-8.

Gerber C, Espinosa N, Perren TG. Arthroscopic treatment of shoulder stiffness. Clin Orthop 2001;290:119–28.

Goetz EW 1909. A Manual of Osteopathy. Meridian Institute, Online Publication

Goldstein B. Shoulder anatomy and biomechanics. Phys Med Rehabil Clin N Am 2004;15: 313–349

Green S, Buchbinder R, Hetrick S. Physiotherapy interventions for shoulder pain. Cochrane Database Syst Rev.2003; (2):CD004258.

Grubbs N: Frozen shoulder syndrome – a review of literature. *JOSPT* Volume **18**, Number 3, Sept 1993

Hanley MA, Ehde DM, Jensen M, Czerniecki J, Smith DG, Robinson LR. Chronic pain associated with upper-limb loss. Am J Phys Med Rehabil. 2009 Sep;88(9):742-51



Hannafin JA, Chiaia TA. Adhesive capsulitis, a treatment approach. Clin Orthop 2000;372: 95–109.

Hendry F 1995. NMS Course Notes. British School of Osteopathy

Hertel R. Die steife Schulter. Orthopade. 2000 Oct;29(10):845-51

Hollingworth GR, Ellis R, Hattersley TS. Comparison of injection techniques for frozen shoulder pain: results of a double-blind, randomized study. BJM 1983;287:1339–41.

Hooper L, Brown TJ, Elliott R, Payne K, Roberts C, Symmons D. The effectiveness of five strategies for the prevention of gastrointestinal toxicity induced by non-steroidal anti-inflammatory drugs: systematic review. BMJ. 2004 Oct 23;329(7472):948. Epub 2004 Oct 08.

Hugate R, Pennypacker J, Saunders M, Juliano P. The effects of intratendinous and retrocalcaneal intrabursal injections of corticosteroid on the biomechanical properties of rabbit Achilles tendons. J Bone Joint Surg Am. 2004 Apr;86-A(4): 794-801

Jacobs LG, Barton MA, Wallace WA, Ferrousis J, Dunn NA, Bossingham DH Intra-articular distension and steroids in the management of capsulitis of the shoulder. BMJ. 1991 Jun 22;302(6791):1498-501

Jokhio IA, Siddiqui KA, Waraich T, Abbas M, Ali A. 1998. Study of efficacy and tolerance of ketoprofen and diclofenac sodium in the treatment of acute rheumatic and traumatic conditions. J Pak Med Assoc. 48(12):373-6.

Jost B, Koch PP, Gerber C. Anatomy and functional aspects of the rotator interval. J Shoulder Elbow Surg Am 2000;9:336–341

Kesler RM: The shoulder. In: Kesler RM, Hertling D (Eds.), *Management of Common Musculo-Skeletal Disorders*, 274-310. Philadelphia: Harper and Row, 1983



Kofler S, Nickel T, Weis M. The role of cytokines in cardiovascular diseases. Focus on endothelial response to inflammation. Clin Sci (Lond). 2004 Nov 12; [Epub ahead of print]

Lazzaroni M, Bianchi Porro G. Gastrointestinal side-effects of traditional non-steroidal anti-inflammatory drugs and new formulations. Aliment Pharmacol Ther. 2004 Jul;20 Suppl 2:48-58.

Lee JC, Guy S, Connell D, Saifuddin A, Lambert S. MRI of the rotator interval of the shoulder. Clinical Radiology. 2007; 62(5):416-423.

Lippitt S, Vanderhooft E, Harris SL. Glenohumeral stability from concavity-compression: a quantitative analysis. J Shoulder Elbow Surg 1993;2:27–35.

Longfield M D, Dowson D, Walker P S, Wright V 1969 'Boosted lubrication' of human joints by fluid enrichment and entrapment. Biomed Eng 4: 517–522

Lundberg BJ. The frozen shoulder: clinical and radiographical observations: the effect of manipulation under general anesthesia: structure and glycosaminoglycan content of the joint capsule. Acta Orthop Scand 1969;119:1–59.

Manton GL, Schweitzer ME, Weishaupt D, Karasick D. Utility of MR arthrography in the diagnosis of adhesive capsulitis. Skeletal Radiol. 2001 Jun;30(6):326-30

Matsen FA III, Lippitt SB, Sidles JA, et al. Practical evaluation and management of the shoulder. Philadelphia: WB Saunders; 1994.

Mengiardi B, Pfirrmann CW, Gerber C, Hodler J, Zanetti M. Frozen shoulder: MR arthrographic findings. Radiology. 2004 Nov;233(2):486-92.

Mobbs D, Marchant JL, Hassabis D, Seymour B, Tan G, Gray M, Petrovic P, Dolan RJ, Frith CD. From threat to fear: the neural organization of defensive fear systems in humans. J Neurosci. 2009 Sep 30;29(39):12236-43.

Morag Y, Jacobson JA, Shields G, Rajani R, Jamadar DA, Miller B, Hayes CW. MR arthrography of rotator interval, long head of the biceps brachii, and biceps pulley of the shoulder. Radiology. 2005 Apr;235(1):21-30.



Moseley GL. 2007. Motor control in chronic pain: new ideas for effective intervention. In: *Movement Stability & Lumbopelvic Pain.* 2nd Edition. p513-525. Churchill Livingstone.

Murnaghan JP: Frozen shoulder. In: Rockwood CA, Matsen FA (Eds.) *The shoulder* pp. 837-862. Philadelphia: W B Saunders & Co., 1990

Nago M, Mitsui Y, Gotoh M, Nakama K, Shirachi I, Higuchi F, Nagata K. Hyaluronan modulates cell proliferation and mRNA expression of adhesion-related procollagens and cytokines in glenohumeral synovial/capsular fibroblasts in adhesive capsulitis. J Orthop Res. 2010 Jan 7. [Epub ahead of print]

Nash P, Hazleman BL: Frozen shoulder. Baillières Clin Rheumatol 1989;3(3):551-566

Neviaser JS. Adhesive capsulitis of the shoulder: a study of the pathologic findings in periarthritis of the shoulder. J Bone Joint Surg 1945;27:211–22.

Neviaser JS. Adhesive capsulitis and the stiff and painful shoulder. Orthop Clin North Am 1980;11:327–31.

Neviaser RJ, Neviaser TJ. The frozen shoulder: diagnosis and management. Clin Orthop1987;223:59–64.

Okita M, Yoshimura T, Nakano J, Motomura M, Eguchi K. Effects of reduced joint mobility on sarcomere length, collagen fibril arrangement in the endomysium, and hyaluronan in rat soleus muscle. J Muscle Res Cell Motil. 2004;25(2):159-66.

Pajareya K, Chadchavalpanichaya N, Painmanakit S, Kaidwan C, Puttaruksa P, Wongsaranuchit Y. Effectiveness of physical therapy for patients with adhesive capsulitis: a randomized controlled trial. J Med Assoc Thai. 2004 May;87(5):473-80.

Pal B, Anderson J, Dick WC, Griffiths ID: Limitation of joint mobility and shoulder capsulitis in insulin and Non-insulin dependant diabetes mellitus. *Br J Rheumatol.* **25**: 147-151, 1986

Pearsall A, Osbahr DC, Speer KP. An arthroscopic technique for treating patients with frozen shoulder. Arthroscopy 1999;15:2–11.

Peura DA. Prevention of nonsteroidal anti-inflammatory drug-associated gastrointestinal symptoms and ulcer complications. Am J Med. 2004 Sep 6;117 Suppl 5A:63S-71S.



Price DD. Psychological and neural mechanisms of the affective dimension of pain. Science. 2000 Jun 9;288(5472): 1769-72.

Ramachandran VS, Rogers D, 1996. Synaesthesia in phantom limbs induced with mirrors. Proceedings of the Royal Society of London, *263*, 377-386

Ramachandran VS, Blakeslee S. Phantoms in the Brain: Probing the Mysteries of the Human Mind. Perennial 1999

Reeves B. The natural history of the frozen shoulder. Scandinavian Jour Rheumatol: 4: 193 196. 1975

Rizk TE, Pinals RS. Frozen shoulder. Semin Arthritis Rheum 1982;11:440.

Rizk TE, Christopher RP, Pinals RS. Treatment of adhesive capsulitis (frozen shoulder): a new approach to its management. Arch Phys Med Rehabil 1983;64:29–33.

Rodeo SA, Hannafin JA, Tom J, Warren RF, Wickiewicz TC. Immunolocalization of cytokines and their receptor in adhesive capsulitis of the shoulder. J Orthop Res 1997;15: 427–36.

Saadah ES, Melzack R. Phantom limb experiences in congenital limb-deficient adults. Cortex. 1994 Sep;30(3):479-85.

Selvi E, De Stefano R, Lorenzini S, Marcolongo R. Arthritis induced by corticosteroid crystals. J

Rheumatol. 2004 Mar;31(3):622

Shaffer B, Tribone JE, Kerlan RK, Frozen shoulder a long term follow-up. J Bone and Joint Surg 1992; 74-A: 738-46

Schellingerhout JM, Verhagen AP, Thomas S, Koes BW. Lack of uniformity in diagnostic labeling of shoulder pain: time for a different approach. *Man Ther. 2008* Dec;13(6):478-83.



Shaikh A, Sundaram M. Adhesive capsulitis demonstrated on magnetic resonance imaging. Orthopedics. 2009 Jan;32(1):2.

Simons DG, Travell JG, Simons LS: Travell & Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual, Vol. 1, Second Edition, Williams & Wilkins, Baltimore, 1999

Tasker DL 1916. Principles of Osteopathy. 4th Ed. Meridian Institute, Online Publication

Tauro JC. Stiffness and rotator cuff tears: incidence, arthroscopic findings, and treatment results. Arthroscopy. 2006; 22(6):581-6.

Van der Windt D A W M, Koes B W, Devillé W, Boeke A J P, de Jong B A, Bouter L M. Effectiveness of corticosteroid injections versus physiotherapy for treatment of painful stiff shoulder in primary care: randomised trial BMJ. 1998 November 7; 317(7168): 1292–1296.

Wadsworth CT: Frozen shoulder Phys Ther 66:1878-1883, 1986

Wall PD, Melzack R (Eds). Textbook of Pain, 3rd ed. Edinburgh: Churchhill Livingstone, 1994

Warner JP, Allen A, Marks PH, Wong P. Arthroscopic release for chronic, refractory adhesive capsulitis of the shoulder. J Bone Joint Surg Am 1996;78:1808–16.

Warner JP. Frozen shoulder: diagnosis and management. J Am Acad Orthop Surg 1997;5: 130-40.

Weis J, Niel-Asher S, Latham M, Hazleman B, Speed C, A randomised placebo controlled trial of physiotherapy and osteopathic treatment for frozen shoulder - Rheumatology (UK) Vol. 42 supplement 1 146. article 418 BHPR 2003

Wiley AM. Arthroscopic appearance of frozen shoulder. Arthroscopy 1991;7:138–43.

Winters J, Sobel J, Groenier K, Arendzen H, Jong B: Comparison of Physiotherapy, Manipulation and Corticosteroid injection for treating shoulder complaints in general practice: Randomised, single blind study. BMJ 314:1320-1325, 1997



Zanotti RM, Kuhn JE. Arthroscopic capsular release for the stiff shoulder: description of technique and anatomic considerations. Am J Sports Med 1997;25:294–8.

Curtis AS, Burbank KM, Tierney JJ, Scheller AD, Curran AR. The insertional footprint of the rotator cuff: an anatomic study. Arthroscopy. 2006 Jun;22(6):609.e1.

Anderson MK., Hall SJ, Martin M, 2000. Sports Injury Management (2nd ed.). Baltimore: Lippincott, Williams, & Wilkins.

Bak K., Fauno P., 1997. Clinical findings in competitive swimmers with shoulder pain. American Journal of Sports Medicine 25 (2), 254-260

Barr KP, 2004. Rotator cuff disease. Phys Med Rehabil Clin N Am; 15: 475-491

Berenson MC, Blevins FT, Plaas AH, Vogel KG, 1996. Proteoglycans of human rotator cuff tendons. J Orthop Res; 14:518–25.

Bigliani L, Morrison D, April E, 1986. The morphology of the acromion and rotator cuff impingenent. Orthopaedic Transactions; 10:228.

Bigliani LU, Levine WN, 1997. Subacromial impingement syndrome. J. Bone Joint Surg. Am. 79, 1854-1868

Bigliani LU, Ticker JB, Flatow EL, Soslowsky LJ, Mow VC, 1991. The relationship of acromial architecture to rotator cuff disease. Clin Sports Med;10:823–38.

Blevins FT, Djurasovic M, Flatow EL, Vogel KG, 1997. Biology of the rotator cuff tendon. Orthop Clin North Am;28:1–16.

Brophy RH, Marx RG, 2005. Osteoarthritis following shoulder instability. Clin Sports Med.; 24(1):47-56.

Bruehl S, Harden RN, Galer BS, Saltz S, Backonja M, Stanton-Hicks M, 2002. Complex Regional Pain Syndrome: Are There Distinct Subtypes and Sequential Stages of the Syndrome? *Pain.*;95:119-124



Buckwalter JA, Saltzman C, Brown T, 2004. The impact of osteoarthritis: implications for research. Clin Orthop Relat Res.;(427 Suppl):S6-15

Budoff, JE, Nirschl RP, Guidi EJ, 1998. Debridement of partial thickness tears of the rotator cuff without

acromioplasty. Long-term follow-up and review of the literature. J. Bone Joint Surg. Am. 80, 733-748

Burkhart SS, Morgan CD, Kibler WB, 2000. Shoulder injuries in overhead athletes: the dead arm revisited. Clin Sports Med;19:125–58.

Burkhead W, Arcand M, Zeman C, Habermeyer P, Walch G, 1998. The biceps tendon. In: Rockwood

CA, Matsen FA, editors. The shoulder. 2nd edition. Philadelphia: WB Saunders;

Buttaci CJ, Stitik TP, Yonclas PP, Foye PM, 2004. Osteoarthritis of the acromioclavicular joint: a review of anatomy, biomechanics, diagnosis, and treatment. Am J Phys Med Rehabil.; 83(10):791-7

Calis M, Akgun K, Birtane M, Karacan I, Calis H, Tuzun F, 2000. Diagnostic values of clinical diagnostic tests in subacromial impingement syndrome. Ann Rheum Dis. Jan; 59(1):44-7

Chang WK, 2004. Shoulder impingement syndrome. Phys Med Rehabil Clin N Am;15: 493-510

Chen SK, Simonian PT, Wickiewicz TL, Otis JC, Warren RF, 1999. Radiographic evaluation of glenohumeral kinematics: a muscle fatigue model. J. Shoulder Elbow Surg. 8, 49-52

Cibulka MT, Hunter HC, 1985. Acromioclavicular joint arthritis treated by mobilizing the glenohumeral joint. Phys Ther; 65:1514–6.

Clark JM, Harryman DT II, 1992. Tendons, ligaments and capsule of the rotator cuff: gross and microscopic anatomy. J Bone Joint Surg [Am]; 74:713–25.



Codman EA. The shoulder. Boston: Thomas Todd; 1934.

Cuomo F, Kummer FJ, Zuckerman JD, Lyon T, Blair B, Olsen T, 1998. The influence of acromioclavicular joint morphology on rotator cuff tears. J Shoulder Elbow Surg; 7:555 – 9.

Czop C, Smith TL, Rauck R, Koman LA, 1996. The pharmacologic approach to the painful hand. Hand Clin;12(4):633–42.

Davidson P, ElAttrache N, Jobe C, Jobe FW, 1995. Rotator cuff posterior-superior glenoid labrum injury associated with increased glenohumeral motion: a new site of impingement. J Shoulder Elbow Surg; 4:384–90.

DePalma A, 1959. The role of the disks of the sternoclavicular and the acromioclavicular joints. Clin Orthop; 13:222–3.

Edelson JG, 1996. Patterns of degenerative change in the acromioclavicular joint. J Bone Join Surg Br;78:242–3.

Farin PU, 1996. Consistency of rotator-cuff calcifications. Observations on plain radiography, sonography, computed tomography, and at needle treatment. Invest Radiol.;31(5):300-4.

Flatow EL, Soslowsky LJ, Ticker JB, Pawluk RJ, Hepler M, Ark J 1994. Excursion of the rotator cuff under the acromion. Patterns of subacromial contact. Am. J. Sports Med. 22, 779-788

Fu FH, Harner CD, Klein AH, 1991. Shoulder impingement syndrome. A critical review. Clin. Orthop., 162-173

Gartner J, Simons B, 1990. Analysis of calcific deposits in calcifying tendinitis. Clin Orthop; (254): 111-20

Gartsman GM, Brinker MR, Khan M, Karahan M, 1998. Self-assessment of general health status in patients with five common shoulder conditions. J Shoulder Elbow Surg;7: 228–37.

Greenfield B, Catlin PA, Coats PW, Green E, McDonald JJ, North C, 1995. Posture in patients with shoulder overuse injuries and healthy individuals. J. Orthop. Sports Phys. Ther. 21, 287-295

Harryman DT II, Mack LA, Wang KY, 1991. Repairs of the rotator cuff. J Bone Joint Surg Am; 73:982–9.



Hawkins RJ, Abrams JS, 1992. Impingement syndrome in the absence of rotator cuff tears. Orthop Clin North Am; 18:373–82.

Hawkins RJ, Bokar DJ, 1990. Clinical evaluation of shoulder problems. In: Rockwood CA, Matsen FA, editors. The shoulder. Philadelphia: WB Saunders; p. 149–77.

Hendry F, 1995. NMS Course Notes. British School of Osteopathy

Howell SM, Galinat BJ, Renzi AJ, Marone PJ, 1988. Normal and abnormal mechanics of the

glenohumeral joint in the horizontal plane. J Bone Joint Surg Am;70:227–32.

Hunter DM, 1996. Shoulder pain. In: Tintinalli JE, editor. Emergency medicine: a comprehensive study guide. 4th edition. New York: McGraw Hill; 1996. p. 1286–97.

Hurt G, Baker CL Jr., 2003. Calcific tendinitis of the shoulder. Orthop Clin North Am.;34(4):567 75.

lannotti JP, Bernot MP, Kuhlman JR, Kelley MJ, Williams GR, 1996. Postoperative assessment of shoulder function: a prospective study of full-thickness rotator cuff tears. J Shoulder Elbow Surg;5:449 – 57.

Itoi E, Kuechle DK, Newman SR, Morrey BF, An KN, 1993. Stabilizing function of the biceps in stable and unstable shoulders. J Bone Joint Surg Br;75:546–50.

Jacob A, Sallay P, 1997. Therapeutic efficacy of corticosteroid injections in the acromioclavicular joint. Biomed Sci Instrum;34:380–5.

Jobe FW, Moynes DR, 1982. Delineation of diagnostic criteria and a rehabilitation program for rotator cuff injuries. Am J Sports Med;10:336–9.

Jordan LK, Kenter K, Griffiths HL, 2000. Relationship between MRI and clinical findings in the acromioclavicular joint. Skeletal Radiol;31:516–21.



Kumagai J, Sarkar K, Uhthoff HK, 1994. The collagen types in the attachment zone of rotator cuff tendons in the elderly: an immunohistochemical study. J Rheumatol; 21:2096–100.

Liu SH, Henry MH, Nuccion SL, Shapiro MS, Dorey F. A comparison between magnetic resonance imaging and clinical examinations. Am J Sports Med 1996;24:149–54.

Lucas DB, 1973. Biomechanics of the shoulder joint. Arch Surg;107:425–32.

Ludewig PM, Cook TM, 2000. Alterations in shoulder kinematics and associated muscle activity in people with symptoms of shoulder impingement. Phys Ther. 80 (3), 276-291

Ludewig PM, Cook TM, 2002. Translations of the humerus in persons with shoulder impingement symptoms. J. Orthop. Sports Phys.Ther. 32, 248-259

Maleki J, Bennett G, LeBel A, Schwartzman R, 1998. Three patterns of spread in complex regional pain syndrome, Type I (RSD). 17th Annual Meeting, American Pain Society, November 5-8, 1998, A949.

Matsen FA III, Rockwood CA Jr, Wirth MA, Lippitt SB, 1998. Glenohumeral arthritis and its management. In: Rockwood CA Jr, Matsen FA III, editors. The shoulder, vol. 2. Philadelphia: WB Saunders; 1998. p. 840–964.

Matsen FA, Arntz CT, Lippitt SB, 1998. Rotator cuff. In: Rockwood CA, Matsen FA, Wirth MA, Harryman DT, editors. The shoulder. Philadelphia: WB Saunders; p. 755–839.

McFarland EG, Campbell G, McDowell RN, 1996. Posterior shoulder laxity in asymptomatic athletes. Am J Sports Med 1996;24:468–71.

Mehrberg RD, Lobel SM, Gibson WK, 2004. Disorders of the acromioclavicular joint. Phys Med Rehabil Clin N Am; 15: 537–555

Mehta S, Gimbel JA, Soslowsky LJ, 2003. Etiologic and pathogenetic factors for rotator cuff tendinopathy. Clin Sports Med; 22:791–812



Merskey H, editor, 1986. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms. Pain;26(S29).

Michener LA, McClure PW, Karduna AR, 2003. Anatomical and biomechanical mechanisms of subacromial impingement syndrome. Clin Biomech; 18: 369-379

Moseley HF. Disorders of the shoulder. Clin Symp 1960;12:1–30.

Murnaghan JP, 1988. Adhesive capsulitis of the shoulder: current concepts and treatment. Orthopedics;11(1):153-8.

Needell SD, Zlatkin MK, Sher JS, Murphy BJ, Uribe JW, 1996. MR imaging of the rotator cuff: peritendinous and bone abnormalities in an asymptomatic population. AJR Am J Roentgenol;166: 863–7.

Neer CS, 1972. Anterior acromioplasty for the chronic impingement syndrome in the shoulder: a preliminary report. J Bone Joint Surg. (Am) 54, 41-50

Neer CS, 1983. Impingement lesions. Clin Orthop;173:70–7.

Neviaser RJ, 1980. Lesions of the biceps and tendinitis of the shoulder. Orthop Clin North Am;11:343–8.

Nicholson GP, Goodman DA, Flatow EL, Bigliani LU, 1996. The acromion: morphologic condition and age-related changes. A study of 420 scapulas. J Shoulder Elbow Surg; 5:1–11.

O'Brien SJ, Pagnani MJ, Fealy S, McGlynn SR, Wilson JB 1998. The active compression test:a new and effective test for diagnosing labral tears and acromioclavicular joint abnormalities. Am J Sports Med;26:610–3.

Ozaki J, Fujimoto S, Nakagawa Y, Masuhara K, Tamai S, 1988. Tears of the rotator cuff of the shoulder associated with pathological changes in the acromion. A study in cadavera. J Bone Joint Surg; 70:1224–30.



Paynter KS, 2004. Disorders of the long head of the biceps tendon. Phys Med Rehabil Clin N Am; 15: 511–528

Pettersson G. Rupture of the tendon aponeurosis of the shoulder joint in antero-inferior dislocation. Acta Chir Scand; 77(Suppl):1–187.

Post D, Benca P, 1989. Primary tendinitis of the long head of the biceps. Clin Orthop;246: 117 25.

Rathbun JB, Macnab I, 1970. The microvascular pattern of the rotator cuff. J Bone Joint Surg. Br; 52:540–53.

Riley GP, Harrall RL, Constant CR, Cawston TE, Hazleman BL, 1996. Prevalence and possible

pathological significance of calcium phosphate salt accumulation in tendon matrix degeneration. Ann Rheum Dis.;55(2): 109-15.

Rowe CR, editor, 1988. The shoulder. New York: Churchill Livingstone; p. 145.

Rupp S, Seil R, Kohn D, 2000. Tendinosis calcarea of the rotator cuff. Orthopade; 29(10): 852-67

Schneeberger AG, Nyffeler RW, Gerber C, 1998. Structural changes of the rotator cuff caused by experimental subacromial impingement in the rat. J Shoulder Elbow Surg; 7:375 – 80.

Schultz JS, 2004. Clinical evaluation of the shoulder. Phys Med Rehabil Clin N Am; 15: 351–371

Schwartzman RJ, Kerrigan J, 1990. The movement disorder of reflex sympathetic dystrophy. Neurology; 40:57-61

Schwartzman RJ, Popescu A, 2002. Reflex Sympathetic Dystrophy. Curr Rheumatol Rep.;4:165-169

Sethi J, Wright R, Yamaguchi K, 1999. Disorders of the long head of the biceps tendon. J Shoulder Elbow Surg;8:644–54.



Shaffer BS, 1999. Painful conditions of the acromioclavicular joint. J Am Acad Orthop Surg;7:176–88.

Sher JS, 1999. Anatomy, biomechanics, and pathophysiology of rotator cuff disease. In: lannoti JP,

Williams GR, editors. Disorders of the shoulder: diagnosis and management. Philadelphia: Lippincott Williams & Wilkins; p. 3–30.

Snyder S, Karzel R, Del Pizzo W, Ferkel RD, Friedman MJ, 1990. S.L.A.P. lesions of the shoulder. Orthop Trans; 14:267–71.

Solem-Bertoft E, Thuomas KA, Westerberg CE, 1993. The influence of scapular retraction and protraction on the width of the subacromial space. An MRI study. Clin. Orthop., 99-103

Soslowsky LJ, An CH, Johnston SP, Carpenter JE, 1994. Geometric and mechanical properties of the coracoacromial ligament and their relationship to rotator cuff disease. Clin Orthop. 304:10-17

Soslowsky LJ, Carpenter JE, Bucchieri JS, Flatow EL, 1997. Biomechanics of the rotator cuff. Orthop Clin North Am; 28(1):17 – 30

Soslowsky LJ, Flatow EL, Bigliani LU, Pawluck RJ, Mow VC, 1992. Articular geometry of the glenohumeral joint. Clin Orthop;288:181–90.

Speer KP, Hanna.n JA, Altchek DW, Warren RF, 1994. An evaluation of the shoulder instability relocation test. Am J Sports Med;22:177–83.

Stanton-Hicks M, Janig W, Hassenbursch S, Haddox JD, Boas R, Wilson P, 1995. Reflex sympathetic dystrophy: changing concepts and taxonomy. Pain 1995 63:127-33.



Stenlund B, Goldie I, Hagberg M, Hogstedt C, Marions O, 1992. Radiographic osteoarthrosis in the

acromioclavicular joint resulting from manual work or exposure to vibration. Br J Ind Med;49:588–93.

Taft TN, Wilson FC, Oglesby JW, 1987. Dislocation of the acromioclavicular joint. J Bone Joint Surg Am;69:1045–51.

Thomopoulos S, Hattersley G, Rosen V, Mertens M, Galatz L, Williams GR, Soslowsky LJ, 2002. The localized expression of extracellular matrix components in healing tendon insertion sites: an in situ hybridization study. J Orthop Res; 20:454–63.

Ting A, Jobe FW, Barto PI, et al. 1987. An EMG analysis of the lateral biceps in shoulders with rotator cuff tears. Presented at Third Open Meeting of the Society of American Shoulder and Elbow Surgeons.

San Francisco, January 21–22, 1987. In Paynter KS, 2004. Disorders of the long head of the biceps tendon. Phys Med Rehabil Clin N Am;15 (2004) 511–528

Toivonen DA, Tuite MJ, Orwin JF, 1995. Acromial structure and tears of the rotator cuff. J. Shoulder Elbow Surg. 4, 376-383

Tsai N, 1998. Change in scapular kinematics with induced fatigue of infraspinatus and teres minor. Master's Thesis, MCP Hahnemann University

Turnbull JR. Acromioclavicular joint disorders. Med Sci Sports Exerc 1998;30:S26–32.

Uhthoff HK, Loehr JW, 1997. Calcific Tendinopathy of the Rotator Cuff: Pathogenesis, Diagnosis, and Management. J Am Acad Orthop Surg.; 5(4):183-191

Uhthoff HK, Sano H, 1997. Pathology of failure of the rotator cuff tendon. Orthop Clin North Am 28: 31–41.

Uhthoff HK, Sarkar K, 1991. Classification and definition of tendinopathies. Clin Sports Med;10: 707–20.

Uhthoff HK, Sarkar K, Hammond I, 1982. Significance of density and demarcation of calcifications in

calcifying tendinitis (author's transl). Radiologe.;22(4):170-4.

Uhthoff HK, Sarkar K, Maynard JA, 1976. Calcifying tendinitis: a new concept of its pathogenesis. Clin Orthop Relat Res.;(118):164-8.



Wadsworth DJ, Bullock-Saxton JE, 1997. Recruitment patterns of the scapular rotator muscles in freestyle swimmers with subacromial impingement. Int. J. Sports Med. 18, 618-624

Walch G, Nove´-Josserand L, Boileau P, Levigne C, 1998. Subluxations and dislocations of the tendon of the long head of the biceps. J Shoulder Elbow Surg;;7:100–8.

Waldburger M, Meier JL, Gobelet C., 1992. The frozen shoulder: diagnosis and treatment. Prospective study of 50 cases of adhesive capsulitis. Clin Rheumatol.;11(3):364-8.

Wang CH, McClure P, Pratt NE, Nobilini R, 1999. Stretching and strengthening exercises: their effect on three-dimensional scapular kinematics. Arch. Phys. Med. Rehabil. 80, 923-929

Warner JJ, Micheli LJ, Aslanian LE, Kennedy J, Kennedy R, 1992. Scapulothoracic motion in normal shoulders and shoulders with glenohumeral instability and impingement syndrome. A study using Moire topographic analysis. Clin. Orthop., 191-199.

Warner JJP, McMahon PJ, 1995. The role of the long head of the biceps brachii in superior stability of the glenohumeral joint. J Bone Joint Surg Am;77:366–72.

Warren RF. Subluxation of the shoulder in athletes. Clin Sports Med 1983;2:339.



Wittenberg RH, Rubenthaler F, Wolk T, Ludwig J, Willburger RE, Steffen R, 2001. Surgical or conservative treatment for chronic rotator cuff calcifying tendinitis--a matched-pair analysis of 100 patients. Arch Orthop Trauma Surg; 121(1-2): 56-9

Wolk T, Wittenberg RH, 1997. Calcifying subacromial syndrome--clinical and ultrasound outcome of non-surgical therapy. Z Orthop Ihre Grenzgeb; 135(5): 451-7

Wuelker N, Schmotzer H, Thren K, Korell M, 1994. Translation of the glenohumeral joint with simulated active elevation. Clin. Orthop., 193-200

Yamanaka K, Matsumoto T, 1994. The joint side tears of the rotator cu.: a follow up study by arthrography. Clin Orthop; 304:68–73.

Ahn K, Lee YJ, Kim EH, Yang SM, Lim TK, Kim YS, Jhun HJ 2008. Interventioal microadhesiolysis: a new nonsurgical release technique adhesive capsulitis of the shoulder. BMC Musculoskeletal Disorders: 9:12.

Bal A Eksioglu E, Gulec B, Aydog E, Gurcay E, Cakci A 2008. Effectiveness of corticosteroid injection in adhesive capsulitis. Clinical Rehabilitation: 22:6:503-12.

Baslund B 1990: Frozen shoulder current concepts. Scandinavian J Rheumatology 19: 321 325.

Binder Al, Bulgen DY, Hazleman BL, et al. 1984; Frozen shoulder: a long-term prospective study. Ann Rheum Dis. Jun: 43(3):361-4.

Buchbinder R, Green S, Youd JM, Johnston RV, Cumpston M. 2008 Arthrographic distension for adhesive capsulitis Cochrane Database Systematic Reviews: ISSN:1469-493X.

Buchbinder R, Youd JM, Green S, Stein A, Forbes A, Harris A, Bennell K, Bell S, Wright WJL 2007.

Efficacy and cost-effectiveness of physiotherapy following glenohumeral joint distension for adhesive capsulitis: a randomized trial. Arthritis and Rheumatism: 57:6:1027-37.



Buchbinder R, Hoving JL, Green S, Hall S, Forbes A, Nash P. 2004 Short course prednisolone for adhesive capsulitis (frozen shoulder or stiff painful shoulder): a randomised, double blind, placebo controlled trial. Annals of the Rheumatic Diseases: 63:11:1460-9.

Callinan N, McPherson S, Cleaveland S, Voss DG, Rainville D, Tokar N. 2003 Effectiveness of hydroplasty and therapeutic exercise for treatment of frozen shoulder. Journal of HAand Therapy: 16:3:219-24.

Carette S, Moffet H, Tardif J, Bessette L, Morin F, Fremont P, Bykerk V, Thorne C, Bell M, Bensen W, Blanchette C. 2003 Arthritis and Rheumatisim: 48:3:829 38.

Cheing GLY, So EML, Chao CYL 2008 Effectiveness of electroacupuncture and interferential electrotherapy in the management of frozen shoulder. Journal of Rehabilitation Medicine: 40:3:166-70.

Dahan TH, Fortin L, Pelletier M, Petit M. 2000 Double blind randomized clinical trial examining the efficacy of bupivacaine suprascapular nerve blocks in frozen shoulder. Journal of Rheumatology: 27:6:1464-9.

Diercks RL, Stevens M. 2004 Gentle thawing of the frozen shoulder: a prospective study of supervised neglect versus intensive physical therapy in seventy-seven patients with frozen shoulder syndrome followed up for two years. Journal of Shoulder and Elbow Surgery: 13:5:499-502.

Duplay ES 1872 De La Periarthrite scapulohumerale et des raideurs de l'epaule qui en son la consequence. Archives General Medicine 20:513-542

Emig EW, Schweitzer ME, Karasick D, Lubowitz J. 1995 Adhesive capsulitis of the shoulder: MR diagnosis. American Journal of Roentgenology: 164:6:1457-9.



Fareed DO, Gallivan WR 1989 Office management of frozen shoulder syndrome: treatment with hydraulic distension under local anaesthesia. Clinical Orthopaedics 242:177-183

Hand C, Clipsham K, Rees JL, Carr AJ. 2008 Long-term outcome of frozen shoulder. Journal of Shoulder and Elbow Surgery: 17:2:231-6.

Hand GCR, Athanasou NA, Matthews T, Carr AJ. 2007 The pathology of frozen shoulder. Journal of Bone and Joint Surgery: 89:7:928-32.

Homsi C, Bordalo RM, da Silva JJ, Stump ZMGRG. 2006 Ultrasound in adhesive capsulitis of the shoulder: is assessment of the coracohumeral ligament a valuable diagnostic tool? Skeletal Radiology: 35:9:673-8.

Jones DS, Chattopadhyay C. 1999 Suprascapular nerve block for the treatment of frozen shoulder in primary care: a randomized trial. British Journal of General Practice: 49:438:39-41.

Jung JY, Jee WH, Chun HJ, Kim YS, Chung YG, Kim JM. 2006 Adhesive capsulitis of the shoulder: evaluation with MR arthrography. European Radiology:16:4:791-6.

Kapandji IA 1998 The Physiology of the Joints Vol. 1 upper limb p. 12-15 Fifth edition. Churchill

Livingstone.

Kesler RM 1983 The shoulder. In: Kesler RM, Hertling D (Eds.), Management of Common Musculo- Skeletal Disorders, 274-310. Philadelphia: Harper and Row.

Kivimaki J, Pohjolainen T, Malmivaara A, Kannisto M, Guillaume J, Seitsalo S, Nissinen M. 2007 Manipulation under anaesthesia with home exercises versus home exercises alone in the treatment of frozen shoulder: a randomized controlled trial with 125 patients. Journal of Shoulder and Elbow Surgery: 16:6:722-6.

Lee MH, Ahn JM, Muhle C, Kim SH, Park JS, Kim SH, Kim SM, Kang HS. 2003 Adhesive capsulitis of the shoulder: diagnosis using magnetic resonance arthrography, with arthroscopic findings as the standard. Journal of Computer Assisted Tomography: 27:6:901-6.

Lee JC, Sykes C, Safuddin A, Connell D. 2005 Adhesive capsulitis: sonographic changes in the rotator cuff interval with arthroscopic correlation. Skeletal Radiology: 34:9:552-7.



Leung MSF, Cheing GLY. 2008 Effects of deep and superficial heating in the management of frozen shoulder. Journal of Rehabilitation Medicine: 40:2:145-50.

Ma T, Kao MJ, Lin IH, chiu YL, Chien C, Ho TJ, Chu BC, Chang YH. 2006 A study on the clinical effects of physical therapy and acupuncture to treat spontaneous frozen shoulder. American Journal of Chinese Medicine: 34:5:759-75.

Manton GL, Schweitzer ME, Weishaupt D, Karasick D. 2001 Utility of MR arthrography in the diagnosis of adhesive capsulitis. Skeletal Radiology: 30:6:326-30.

Mengiardi B, Pfirrmann CWA, Gerber C, Hodler J, Zanetti M. 2004 Frozen shoulder: MR arthrographic findings. Radiology: 233:2:486-92.

Murnaghan JP 1990 Frozen shoulder. In: Rockwood CA, Matsen FA (Eds.) The shoulder pp. 837-862. Philadelphia: W B Saunders Co.

Pal B, Anderson J, Dick WC, Griffiths ID. 1986 Limitation of joint mobility and shoulder capsulitis in insulin and Noninsulin dependant diabetes mellitus. British Journal of Rheumatology. 25:147-151.

Quraishi NA, Johnston P, Bayer J, Crowe M, Chakrabarti AJ. 2007 Thawing the frozen shoulder. A randomised trial comparing manipulation under anaesthesia with hydrodilatation. Journal of Bone and Joint Surgery: 89:9:1197-200.

Reeves B 1975 The natural history of the frozen shoulder. Scandinavian Journal of Rheumatology: 4:193-196.

Saeidian SR, Hemmati AA, Haghighi MH. 2007 Pain relieving effect of short-course, pulse prednisolone in managing frozen shoulder. Journal of Pain & Palliative Care Pharmacotherapy: 21:1:27-30.

Shah N, Lewis M. 2007 Shoulder adhesive capsulitis: systematic review of randomised trials using multiple corticosteroid injections. British Journal of General Practitioners: 57:541:662-7.

Tamai K, Yamato M. 1997 Abnormal synovium in the frozen shoulder: a preliminary report with dynamic magnetic resonance imaging. Journal of Shoulder and Elbow Surgery: 6:6:534-43.



Tamai K, Mashitori H, Ohno W, Hamada J, Jun I, Sakai H, Saotome K. 2004 Synovial response to intraarticular injections of hyaluronate in frozen shoulder: a quantitative assessment with dynamic magnetic resonance imaging. Journal of Orthopaedic Science: 9:3:230-4.

Tveita EK, Tarq R, Sesseng S, Juel NG, Bautz HE. 2008 Hydrodilatation, corticosteroids and adhesive capsulitis: a randomized controlled trial. BMC Musculoskeletal Disorders: 9:53.

Vermeulen HM, Rozing PM, Obermann WR, le Cessie S, Vilet ETPM. 2006 Comparison of high-grade and lowgrade mobilization techniques in the management of adhesive capsulitis of the shoulder: randomized controlled trial. Physical Therapy: 86:3:355-68.

Wadsworth CT 1986 Frozen shoulder Physical Therapy 66:1878 1883

Weis JT, Niel-Asher S, Latham M, Hazleman BL, Speed CA. 2003 A pilot randomised placebo controlled trial of physiotherapy and osteopathic treatment for frozen Shoulder: British Journal of Rheumatology 2003;42:1:146.

Winters J, Sobel J, Groenier K, Arendzen H, Jong B 2006 Comparison of Physiotherapy, Manipulation and Corticosteroid injection for treating shoulder complaints in general practice: Randomised, single blind study. British Medical Journal 314:1320-1325, 199.



More info: Contact: www.triggerpointcentral.com

Find your pain map and

discover self-help



Take a fee tour or sign-up

for membership

Login to your account

to access all courses

Search for a therapist from

over 5,400 NAT members



SH Hip

- Hey Mate,
- this is the raw footage slightly edited of a client who was booked in for a FAI hip surgery, he was referred to me via a a chiro collegue, classic ARI. He plays AFL footy, surfs and triathlete, suffering chronic insidous. Bilat Lx spine pain, lateral hip/groin pain, hamstring tightness etc. Post 3/4 treatments all symptoms resoluted and the treatment your viewing was the maintenance treatment and applying the ARI principle.
- Principle :
- Super TP at Psoas lesser trochanter / Thoracolumbar T12/L1 junction, Hip extension restrictor
- Super TP at Adductor Magnus, Hip Abduction
- Chase/Clear passive internal rotation in hip flexion/ knee flexion.



SH hip

https://drive.google.com/a/nielasher.com/file/d/ 0B9qKHy54SISJVmpHaE9yNnBLWVU/view?pref=2&pli=1

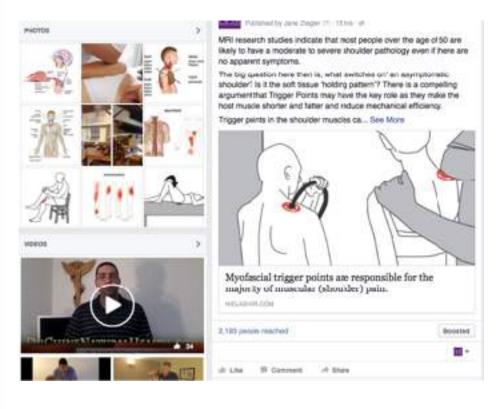


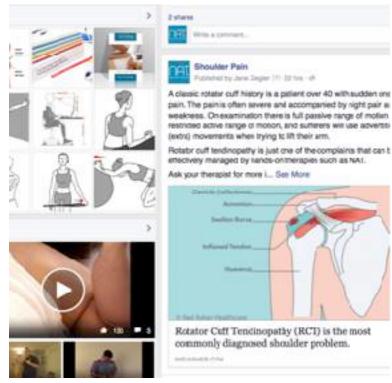


Facebook Communities

https://www.facebook.com/ triggerpointcentral

https://www.facebook.com/ shoulderhealth









NAT ADVANCED SHOULDER PAIN WORKSHOP CERTIFICATE



This certificate of attendance is awarded to:

For completion of the course on 7th-8th May 2016 Simeon Niel-Asher BPhil, BSc (Ost)

