

AdelaideMRI

DIAGNOSTIC IMAGING
& INTERVENTIONAL RADIOLOGY



Interventional Pain Management
Newsletters

Ultrasound-guided percutaneous injection of lateral epicondylitis

Ultrasound guided percutaneous injection of lateral epicondylitis (“tennis elbow”) is a well-tolerated, simple, and safe procedure. This procedure could be an alternative treatment to more invasive procedures, particularly in patients over thirty five with significant pain interfering with daily activities, where it is desirable to delay or postpone surgical intervention.



Corticosteroids often are injected in and around soft-tissue periarticular lesions to treat regional pain syndromes. Epicondylitis can be treated successfully in up to 90% of cases by local corticosteroid injection into the tender tendon origin at the humeral epicondyle. (Wise C, 2004)

In follow-up periods ranging from 9 to 108 weeks, multiple studies reported sustained, statistically significant ($p < 0.05$) improvement on visual analogue scale primary outcome pain score measures and disease specific questionnaires; relative effect sizes ranged from 51% to 94%.

Best T.M et al, (2002) published a systematic review of injection therapies for epicondylitis in the Journal of Sports Med, stating that lateral epicondylitis “tennis elbow” has an incidence up to 4–7/1000 patients per year with substantial impact on athletes and workers. A subset of patients are refractory to non-surgical therapy including relative rest, eccentric exercise and corticosteroid injections and suffer long-term pain and disability on average lasting for six months up to two years.

Forearm extensor tendon pathology can be diagnosed with Ultrasound and plain radiographs. Referral for bulk-billed Ultrasound and X-ray is available for all Medicare eligible studies at AdelaideMRI.

Where pain management is indicated, I would be happy to discuss non-invasive treatment options including image-guided injection for your patients.

A/Prof Roger Davies (Mobile: 0414 450 215)

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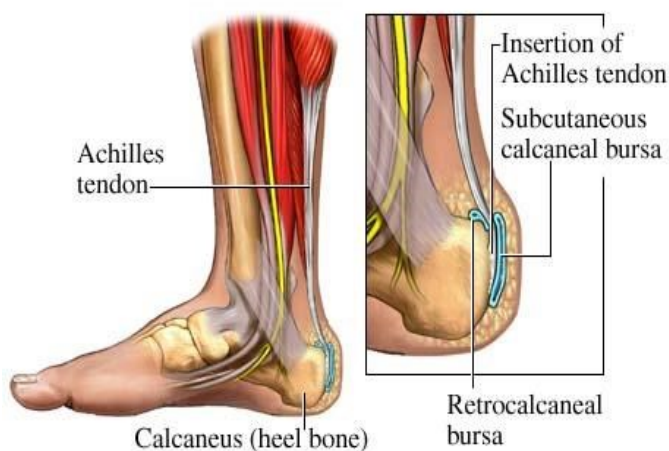
Injection Therapies for Achilles Tendinopathy

Achilles tendinopathy is a common condition, often with significant functional consequences. As a wide range of injection treatments are available, a review of randomised trials evaluating injection therapies to help inform treatment decisions is warranted.

Ultrasound will assess the extent and severity of Achilles tendinopathy and identify co-existing pathology such as retro-calcaneal bursitis. Other causes of postero-medial or postero-lateral pain are readily differentiated by ultrasound and plain radiographs, including posterior tibial, or flexor hallucis longus tendinopathy; peroneus longus and brevis tendinopathy or disruption; synovitis or osteoarthritis of the ankle joint and heel pain related to sinus tarsi syndrome or plantar fasciitis

Kearney RS et al, (2015) reported a study in Cochrane Database to assess the effects (benefits and harms) of injection therapies for people with Achilles tendinopathy.

Their review included randomised and quasi-randomised controlled trials evaluating injection therapies in adults with an investigator-reported diagnosis of Achilles tendinopathy.



The only major adverse event in the injection therapy group was an Achilles tendon rupture, which happened in a trial testing corticosteroid injections.

There was very low quality evidence in favour of the injection therapy group in short-term (under three months) pain (219 participants, seven trials) and in the return to sports (335 participants, seven trials). There was very low quality evidence indicating little difference between groups in patient satisfaction with treatment (152 participants, four trials).

They concluded, “There is insufficient evidence from randomised controlled trials to draw conclusions on the use, or to support the routine use, of injection therapies for treating Achilles tendinopathy.”

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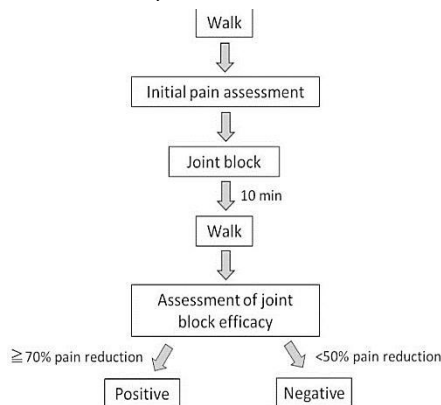


Knee pain in Osteoarthritis – Is pain from the joint?

Ikeuchi M et al, (2013) published a review in Springer plus

“Clinical characteristics of pain originating from intra-articular structures of the knee joint in patients with medial knee osteoarthritis.”

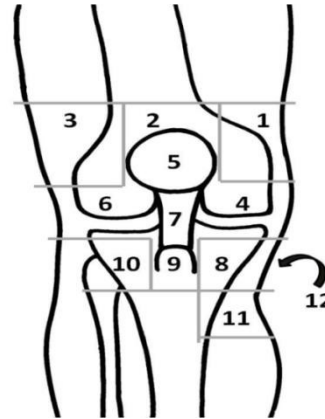
They noted that although disease progression of osteoarthritis has been well documented, pain pathophysiology is largely unknown. Their study was designed with two purposes: 1) to identify and characterize patients with knee pain predominantly originating from intra-articular structures and 2) to describe the location and pattern of their pain. They studied patients with medial knee osteoarthritis by an intra-articular injection of local anaesthetics (joint block). At least 70% pain relief was defined as a positive result for the joint block, while less than 50% relief as negative (pain not originating from the articular surfaces).



The following knee chart may assist you in documenting the site of a patient’s symptoms.

Pain characteristics in patients positive for joint block were evaluated in detail using a knee pain map.

Patients negative for the joint block were significantly higher age, suffered for longer



time, and complained of more diffuse pain.

They concluded that the “characteristics of joint pain are widely variable even in patients with similar radiological features.”

“Extra-articular sources are (important as the main source of pain) especially in older patients with a long history of diffuse pain.” “Differences in pain characteristics among knee areas should be taken into account when examining the pain source” they concluded.

Where pain is derived from soft tissue structures outside the knee joint space, image-guided injection other than into the knee joint (around collateral ligaments, or bursae) may be a valuable treatment option.

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Intraarticular corticosteroid for treatment of Osteoarthritis of the knee

Osteoarthritis (OA) is a common joint disorder, commonly in the knee; injections of corticosteroids into the joint (intra-articular (IA)) may relieve inflammation, and reduce pain and disability.

A study by Bellamy N et al, (2005) published in the **Cochrane Database System Review** evaluated the efficacy and safety of IA corticosteroids in treatment of OA of the knee. Randomised controlled trials of IA corticosteroids for patients with OA of the knee were chosen: some which included single/double blind, placebo-based/comparative studies, reporting at least one core OMERACT III outcome measure. Furthermore methodological quality of trials was assessed, and data were extracted in duplicate.

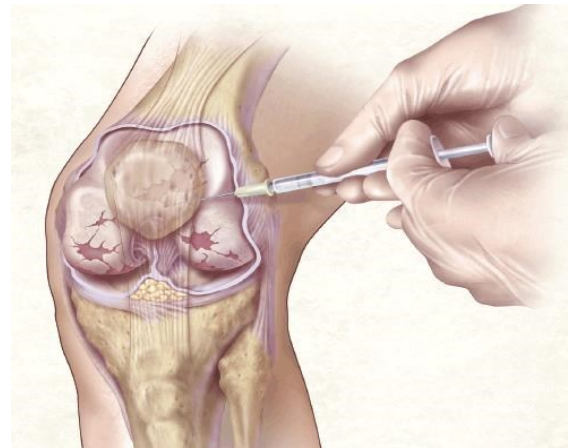
Twenty-six trials (1721 participants) comparing IA corticosteroid against placebo, against IA hyaluronan/hylan (HA products), against joint lavage, and against other IA corticosteroids, were included.

IA corticosteroid was more effective than IA placebo for pain reduction (WMD -17.79; 95% confidence interval (CI) -25.02 to -10.55) and patient global assessment (the RR was 1.44 (95% CI 1.13 to 1.82)) at one week post injection with an NNT of 3 to 4 for both, based on n=185 for pain on 100 mm visual analogue scale (VAS) and n=158 for patient global assessment.

taken from Steve OH, CMI, 2012

There was evidence of pain reduction between two weeks (the RR was 1.81 (95% CI 1.09 to 3.00)) to three weeks (the RR was 3.11 (95% CI 1.61 to 6.01)), but a lack of evidence for efficacy in functional improvement. At four to 24 weeks post injection, there was lack of evidence of effect on pain and function. For patient global, there were three studies which consistently showed lack of effect longer than one week post injection. However, all were fairly small sample sizes (less than 50 patients per group). In comparisons of corticosteroids and HA products, no statistically significant differences were in general detected at one to four weeks post injection.

One study showed a difference in function between 14 to 26 weeks, but no differences in efficacy were detected at 45 to 52 weeks. In general, the onset of effect was similar with IA corticosteroids, but was less durable than with HA products. Comparisons of IA corticosteroids showed triamcinolone hexacetonide was superior to betamethasone for number of patients reporting pain reduction up to four weeks post injection (the RR was 2.00 (95% CI 1.10 to 3.63)). Comparisons between IA corticosteroid and joint lavage showed no differences in any of the efficacy or safety outcome measures. The short-term benefit of IA corticosteroids in treatment of knee OA is well established, and few side effects have been reported.



Illustration

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Ultrasound-guided joint injection and percutaneous drainage of meniscal cysts of the knee

Ultrasound or CT-guided percutaneous aspiration of meniscal cysts, (most often found in association with degenerative meniscal tears) is a well-tolerated, simple, and safe procedure. This may be treatment alternative to more invasive procedures such as surgical debridement, particularly in patients over thirty five with significant knee pain interfering with daily activities, where it is desirable to delay or postpone surgical intervention.



Meniscal cysts often present with localised pain or as a palpable mass along the joint line. They may be found incidentally as an asymptomatic finding associated with a meniscal tear (Rutten MJ et al, 1998).

Meniscal cyst occurs twice as often in the medial compartment than in the lateral compartment (Campbell SE, 2001). McMahon PJ et al, (2007) reported their early clinical experience with ultrasound-guided percutaneous drainage of symptomatic meniscal cysts; they found this was a well-tolerated, simple, and safe procedure; and that it was associated with positive early results with favourable outcomes in the mid to long-term.

Allen TL et al, (2009) reported their experience treating Lumbar spine facet-joint synovial cysts with guided facet joint injection therapy; they found this to be a safe and effective minimally invasive treatment option with “excellent long term pain relief” in around three quarters of their study group. Lumbar zygapophyseal joint (facet-joint) pathology is diagnosed by CT or MR imaging.

Meniscal and para-meniscal pathology can be diagnosed with Magnetic Resonance Imaging or CT arthrogram.

Referral for bulk-billed MRI and CT is available; as a medical practitioner referral for MRI scan of the KNEE is Medicare eligible at AdelaideMRI, for inability to extend the knee suggesting the possibility of acute meniscal tear or clinical findings suggesting acute anterior cruciate ligament tear).

Where pain is significant, I would be happy to discuss non-invasive treatment options including image-guided injection of synovial cysts, for your patients.

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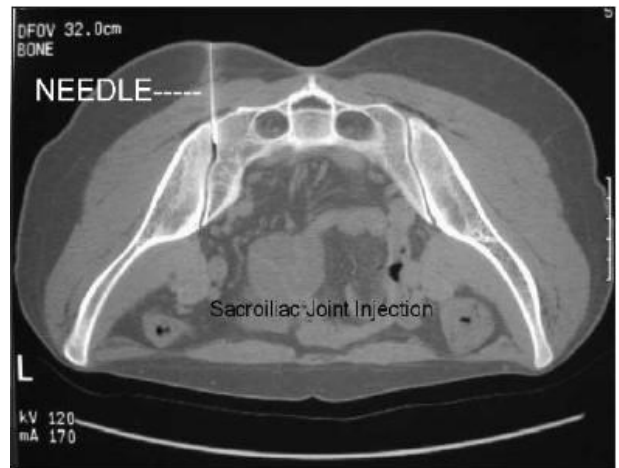
The diagnostic accuracy of sacroiliac joint interventions

The contributions of the sacroiliac joint to low back and lower extremity pain have been a subject of considerable debate and research. It is generally accepted that 10% to 25% of patients with persistent mechanical low back pain below L5 have pain secondary to sacroiliac joint pathology. (Simopoulos et al, 2012) However, no single historical, physical exam, or radiological feature can definitively establish a diagnosis of sacroiliac joint pain.

Simopoulos et al, (2012) conducted a review of the accuracy of diagnostic sacroiliac joint interventions. Methodological quality assessment of included studies was performed using Quality Appraisal of Reliability Studies (QAREL).

They found the evidence is good for the diagnosis of sacroiliac joint pain utilizing controlled comparative local anaesthetic blocks. The prevalence of sacroiliac joint pain is estimated to range between 10% and 62% based on the setting; however, the majority of analysed studies suggest a point prevalence of around 25%, with a false-positive rate for uncontrolled blocks of approximately 20%. They concluded, “On this systematic review, the evidence for the diagnostic accuracy of sacroiliac joint injections is good”.

Rupert MP et al, (2009) conducted a review on “Evaluation of sacroiliac joint interventions: a systematic appraisal of the literature“. They found “The indicated level of evidence is II-2 for the diagnosis of sacroiliac joint pain utilizing comparative, controlled local anaesthetic blocks. The prevalence of sacroiliac joint pain is estimated to range between 10% and 38% using a double block paradigm in the study population.” They concluded with “The indicated evidence for the validity of diagnostic sacroiliac joint injections is Level II-2.”

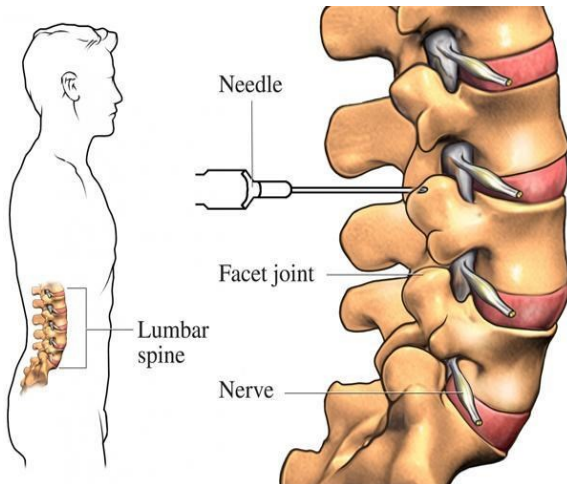


Where pain is significant, I would be happy to discuss non-invasive treatment options including image-guided injection of sacro-iliac joint, for your patients.
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Epidural steroids in the management of lower back pain

Epidural injection of corticosteroids is one of the most commonly used non-invasive interventions in managing chronic spinal pain. Abdis et al, (2007) conducted a review of the value of epidural steroid injections in managing spinal pain.



A systematic review utilizing the criteria established by the Agency of Healthcare Research and Quality (AHRQ) for evaluation of randomized and non-randomized trials, and criteria of Cochrane Musculoskeletal Review Group for randomized trials were used.

The primary outcome measure was pain relief. Other outcome measures were functional improvement, improvement of psychological status, and return to work. Short-term improvement was defined as 6 weeks or less,

and long-term relief was defined as 6 weeks or longer.

In managing lumbar radicular pain with interlaminar lumbar epidural steroid injections, the evidence was strong for short-term relief and limited for long-term relief. The evidence for cervical transforaminal epidural steroid injections in managing cervical nerve root pain was moderate. The evidence for cervical and lumbar transforaminal epidural steroid injections was moderate for long-term improvement in managing nerve root pain.

Manchikanti L et al (2012) conducted a systematic review in Pain Physician on “Effectiveness of therapeutic lumbar transforaminal epidural steroid injections in managing lumbar spinal pain.” They found the evidence is strong for radiculitis secondary to disc herniation with local anaesthetics and steroids; it is fair for radiculitis secondary to spinal stenosis with local anaesthetic and steroids; and limited for axial pain and post-surgery syndrome using local anaesthetic with or without steroids.

Rezendre R, (2015) conducted a double blind “Comparison of the efficacy of transforaminal and interlaminar radicular block techniques for treating lumbar disk hernia.” There was a significant improvement in the state of pain in all patients who underwent radicular block using both local anaesthetics and steroids.

Where pain is significant, I would be happy to discuss non-invasive treatment options including image-guided injection of lumbar and cervical epidural/perineural space, for your patients.

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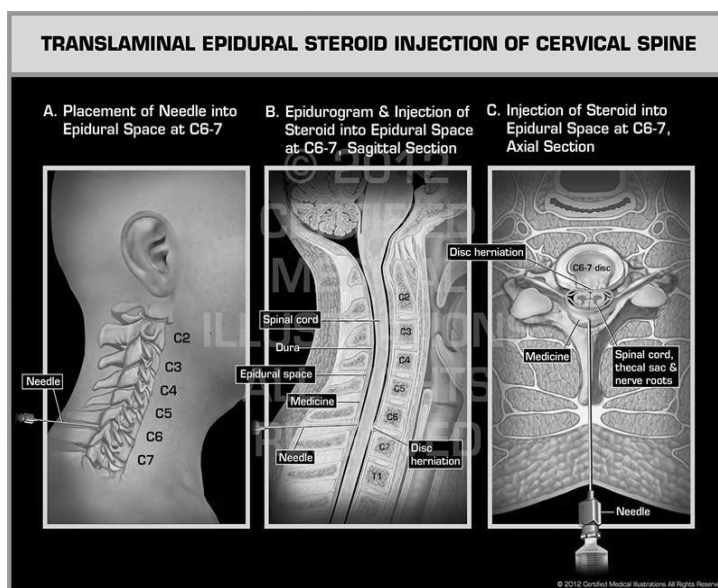
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Effectiveness of cervical epidural injections in the management of chronic neck and upper extremity pain

Chronic persistent neck pain with or without upper extremity pain is common in the general adult population with prevalence of 48% for women and 38% for men, with persistent complaints in 22% of women and 16% of men (Diwan et al, 2012).

Diwan et al (2012) reviewed evidence for modalities of treatments in managing chronic neck pain. They conducted a systematic review of cervical interlaminar epidural injections for cervical disc herniation, cervical axial discogenic pain, cervical central stenosis, and cervical post-surgery syndrome.



The quality assessment and clinical relevance criteria utilized were the **Cochrane Musculoskeletal Review Group** criteria as utilized for interventional techniques for randomized trials and the criteria developed by the Newcastle-Ottawa Scale criteria for observational studies.

The primary outcome measure was pain relief (short-term relief = up to 6 months and long-term > 6 months). Secondary outcome measures were improvement in functional status,

psychological status, return to work, and reduction in opioid intake.

For cervical disc herniation, the evidence is good for cervical epidural with local anaesthetic and steroids; whereas, it was fair with local anaesthetic only. For discogenic pain, the evidence is fair for local anaesthetic, with or without steroids. For spinal stenosis, the evidence is fair for local anaesthetic, with or without steroids. For post-surgery syndrome, the evidence is fair for local anaesthetic, with or without steroids.

They concluded “The evidence is good for radiculitis secondary to disc herniation with local anaesthetics and steroids.”

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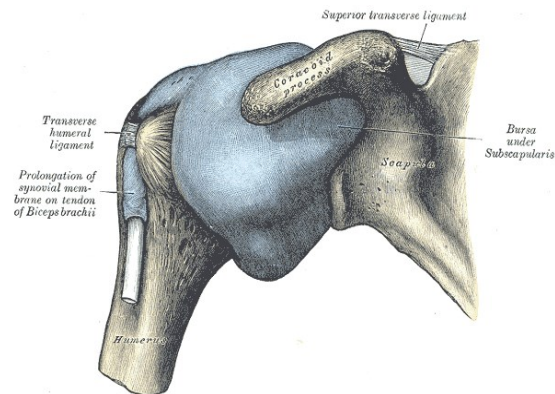
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Treatment Options for Adhesive Capsulitis-(Frozen Shoulder)

Adhesive capsulitis (also termed frozen shoulder) is commonly treated by manual



therapy and exercise, usually delivered together as components of a physical therapy intervention.

Page MJ et al (2014) conducted a review in **Cochrane Database** of the available evidence regarding the benefits and harms of manual therapy and exercise, alone or in combination with gluco-corticoid injection, for the treatment of patients with adhesive capsulitis.

Main outcomes of interest were participant reported pain relief of 30% or greater, overall function, active shoulder abduction, quality of life and the number of participants experiencing adverse events.

Evidence of moderate quality shows that a combination of manual therapy and exercise is less efficacious than manual therapy **combined with glucocorticoid injection.**

The mean change in pain with glucocorticoid injection was 58 points on a 100-point scale, and 32 points with manual therapy and exercise (mean difference (MD) 26 points, for an absolute difference of 26% (15% to 37%).

Mean change in function with glucocorticoid injection was 39 points on a 100-point scale, and 14 points with manual therapy and exercise for an absolute difference of 25% (15% to 35%).

Forty-six per cent (26/56) of participants reported treatment success with manual therapy and exercise compared with 77% (40/52) of participants receiving glucocorticoid injection.

They concluded “The best available data show that a combination of manual therapy and exercise may not be as effective as glucocorticoid injection in the short-term... Following arthrography joint distension with glucocorticoid and saline, manual therapy and exercise may confer effects similar to those of sham ultrasound in terms of overall pain, function and quality of life, but may provide greater patient-reported treatment success and active range of motion.”

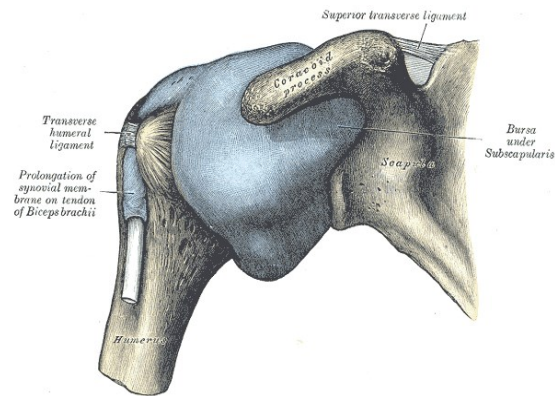
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Manual Therapy Treatment Options for Subdeltoid BURSITIS -(Painful Arc Syndrome)

Subdeltoid Bursitis (also termed Painful Arc) is commonly treated by manual



therapy and exercise, usually delivered together as components of a physical therapy intervention.

Rotator cuff disease is a common cause of shoulder pain. People with rotator cuff disease often describe their pain as being worse at night and exacerbated by movement in specific directions including overhead activity. It is often associated with loss of function and some people describe weakness.

Page et al conducted a review “Manual therapy and exercise for rotator cuff disease” published on 10 June 2016.

Manual therapy comprises movement of the joints and other structures by a healthcare professional (e.g. physiotherapist). Exercise includes any purposeful movement of a joint, muscle contraction or prescribed activity. The aims of both treatments are to relieve pain, increase strength and joint range, and improve function.

Results: People who had manual therapy and exercise had improvements in pain that were little or no different to people who had placebo. Improvement in pain was 6.8 points more (ranging from 0.7 points less to 14.3 points more) at 22 weeks (7% absolute improvement). People who had manual therapy and exercise improved slightly more than people who had placebo. Improvement in function was 7.1 points more (ranging from 0.3 to 13.9 points more) at 22 weeks (7% absolute improvement).

Treatment success 16 more people out of 100 rated their treatment as successful with manual therapy and exercise compared with placebo, 16% absolute improvement (ranging from 2% less to 34% more improvement).

Side effects 23 more people out of 100 people had minor side effects such as temporary pain after treatment with manual therapy and exercise compared with placebo.

High quality evidence from one trial suggested that manual therapy and exercise improved function only slightly more than placebo at 22 weeks, was little or no different to placebo in terms of other patient-important outcomes (e.g. overall pain), and (manual therapy) was associated with relatively more frequent but mild adverse events.

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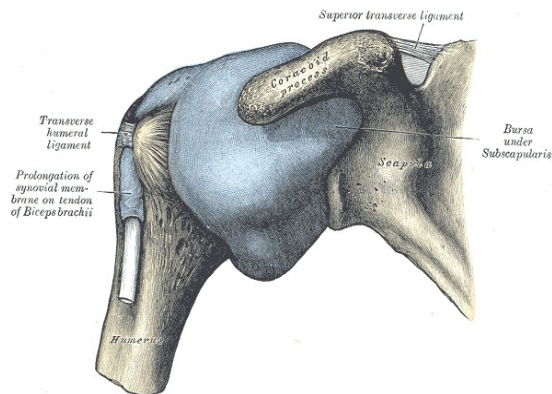
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Surgical Treatment Options for Rotator Cuff Disease

Coghan et al conducted a review of surgical treatment options for rotator cuff disease published on 23 Jan 2008.

They noted in part:-

“ In a lot of people, wear and tear of the rotator cuff tendons is a normal part of ageing and they may not have symptoms. However many people will develop pain in their shoulder at some time as the tendons degenerate further and tears in the rotator cuff tendons develop. There may also be inflammation of the shoulder tendons or bursa (another part of the shoulder that helps it move). Often the pain is made worse by sleeping on the affected shoulder and moving the shoulder in certain directions. Often there will be pressure on the tendons by the overlying bone when lifting the arm up. This is called impingement. It may become difficult to use the shoulder in every day activities, sports or work.”



They went on :-

“If the pain does not go away by itself or with various treatments like steroid injections or physiotherapy or both, surgery can be

performed. Surgery on your rotator cuff may include removing part of your bone to take the pressure off the rotator cuff tendons (acromioplasty), removing any swollen or inflamed bursa (the small sack of fluid around the joint), and removing any damaged tissue to help heal the remaining tissue. This is called a 'decompression'. If one of the tendons of the rotator cuff is torn, the doctor might use special stitches to repair it. This is called a 'repair'. increase strength and joint range, and improve function.

Authors' conclusions:

Based upon our review of 14 trials examining heterogeneous interventions and all susceptible to bias, we cannot draw firm conclusions about the effectiveness or safety of surgery for rotator cuff disease. There is "Silver"

(www.cochranemsk.org) level evidence from three trials that **there are no significant differences in outcome between open or arthroscopic subacromial decompression and active non-operative treatment for impingement**. There is also "Silver" level evidence from six trials that there are **no significant differences in outcome between arthroscopic and open subacromial decompression** although four trials reported earlier recovery with arthroscopic decompression.

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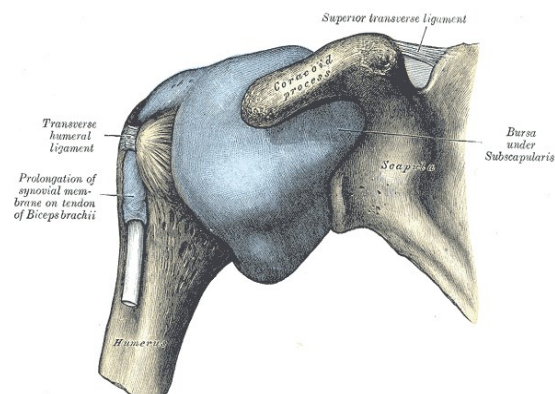
Interventional Imaging and Treatment Options for Rotator Cuff

Disease

Diercks et al conducted a multidisciplinary review by the Dutch Orthopaedic Association for diagnosis and treatment of subacromial pain syndrome published in Acta Orthop June 2014.

They noted in part:-

“Treatment of “subacromial impingement syndrome” of the shoulder has changed drastically in the past decade. The anatomical explanation as “impingement” of the rotator cuff is not sufficient to cover the pathology. “Subacromial pain syndrome”, SAPS, describes the condition better.”



They went on :- “The sensitivity and specificity of ultrasound and conventional MRI are not significantly different in the detection of partial- or full-thickness rotator cuff tears (Dinnes et al. 2003)”

They noted:- “It is likely that ultrasound is an accurate method for the detection or exclusion of rotator cuff tendinopathy, subacromial bursitis, biceps tendon rupture, and tendinosis calcarea (Ottenheijm et al.

2010). The interobserver variability of ultrasound with respect to detection of rotator cuff injuries is low, as the results are very similar (Rutten et al. 2010, Sipola et al. 2010).”

“When repair of a rotator cuff tear is intended, MRI provides useful information on size, retraction, and matching atrophy and fatty infiltration.”

“Ultrasound is advised as the most valuable and cost-effective diagnostic imaging if a first period of non-operative treatment fails. This can be combined with conventional radiography of the shoulder to determine osteoarthritis, osseous abnormalities, and presence/absence of calcium deposits.

Treatment Options they noted in part:-

Corticosteroid injections

“Scientific evidence level 1: In the first 8 weeks, corticosteroid injections are more effective than placebo injections, physiotherapy, or no treatment in reducing pain and improving shoulder function. Corticosteroid injections in the short term are no more effective than NSAIDs in reducing pain. The effect of corticosteroids in the long term (≥ 3 months) is unclear (Buchbinder et al. 2003, Arroll and Goodyear-Smith 2005, Gaujoux-Viala et al. 2009).”

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The efficacy of Corticosteroid injection for the treatment of Trigger Finger

Trigger finger, also known as stenosing tenosynovitis is a condition in which one of your fingers gets stuck in a bent position. Your finger may straighten with a snap, like a trigger being pulled and released. Available treatments include local injection with corticosteroids, surgery, or splinting. A study conducted by Benan M. et al, 2012 investigated ninety digits with at least a year follow up. The

Trigger Finger



study mainly focused on the efficacy of the injections, as well as co-morbidities, presence of a nodule, actual digit injected and the severity at presentation using Green's classification.

The study found that 66% of trigger digits were effectively treated using steroid injections. There was a difference between the efficacy of the injection in the different digits, with a statistical significance between the thumb and the fingers. The results also showed that there was no statistical relationship between the severity of the condition, the presence of a nodule or co-morbidities and the efficacy of the steroid injections. The study

found the total efficacy for steroid injections to be 66% (59/90). There was a 34% success rate with the first injection (31/90). This rose to 63% (57/90) with the second injection and 66% (59/90) with the third injection.

Another randomized study produced by Veluthamaningal P. et al, (2009) in the **Cochrane Database System Review** compared corticosteroids and lidocaine to lidocaine alone. They found that corticosteroid injection with lidocaine was more effective than lidocaine alone with treatment success at four weeks (relative risk 3.15, 95% CI 1.34 to 7.40).

In conclusion, steroid injection is a successful first-line intervention for the treatment of trigger digit, especially in the thumb. In one study the effects of corticosteroid injections lasted up to four months. No adverse effects were observed. The available evidence for the effectiveness of intratendon sheath corticosteroid injection for trigger finger can be graded as a silver level evidence for superiority of corticosteroid injections combined with lidocaine over injections with lidocaine alone.

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Musculoskeletal (MSK) Injections: A Review of Potential Complications

Typical MSK injections involve a combination of local anaesthetics, which provide immediate analgesia and confirmation of accurate injection placement, and corticosteroids, which provide prolonged analgesia. Corticosteroid duration of action usually depends on the preparation. Longer-acting preparations have a slightly higher risk of complications, including tendon rupture and tissue atrophy, but these risks are nevertheless small (Nichols AW, 2005).

Musculoskeletal injections are safe and comfortable with the use of proper technique. Adverse effects from the medications used in joint injection are rare. Intra-articular corticosteroid injections do not lead to progression of osteoarthritis.

Post-injection inflammation is caused by intra-articular injection of corticosteroid crystals and can mimic septic arthritis;

however, septic arthritis usually occurs later than post-injection inflammation and the findings are more persistent. The reported risk of septic arthritis from intra-articular injections is less than 0.03%. The risk of hyperglycaemia in patients with diabetes is very small and transient usually lasting some years.

Other risks include skin hypo pigmentation, fat atrophy, tendon rupture, and facial flushing. The intra-articular injection procedure is safe with experienced clinicians and appropriately selected patients. Risk of hem arthrosis is small even in those taking antiplatelet agents or warfarin. Precautions should also be taken to avoid the risk of septic arthritis. In particular, the injection of joints that contain prosthetic hardware should be undertaken under the advice of an orthopaedic surgeon.

Additionally, injection should be avoided through suspected cellulitis, in areas of infectious arthritis or bursitis, in patients with bacteraemia, or in severely immunocompromised patients. Various authors report response to blind injection is suboptimal, it may be beneficial to use ultrasound guidance to ensure injection placement for subsequent injections where injection by the primary treating physician has not resulted in sufficient improvement.

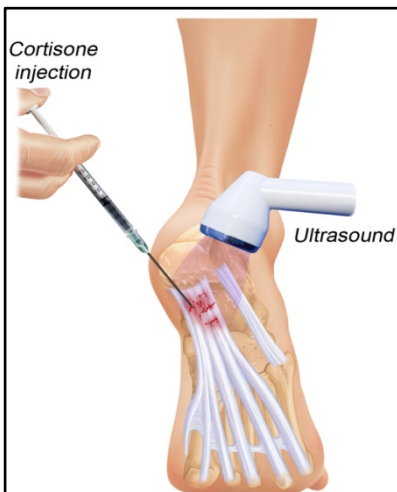
Where pain is significant, I would be happy to discuss non-invasive treatment options including image-guided injection of sacro-iliac joint, for your patients.

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Plantar Fasciitis: A Review of Treatment

One challenge in the treatment of plantar fasciitis is that very few high-quality studies exist to which comparing different treatment modalities to guide evidence-based management. Plantar fasciitis is one of the most common causes of heel pain. Plantar fasciitis affects both sedentary and athletic people and is thought to result from chronic overload either from lifestyle or exercise.



Treatment mechanisms have been wide ranging, from ice, nonsteroidal anti-inflammatory medications, stretching, formal physical therapy, night splints, custom orthotics, over-the-counter heel cups, Low Dye taping, corticosteroid injections, platelet-rich plasma injections, botulinum toxin injections, iontophoresis, extracorporeal shock wave therapy, and fasciotomy. It is widely accepted that in general practice, first-line treatment may include a corticosteroid injection. This may relieve symptoms, especially during an acute flare up and often with chronic pain.

A 2008 **Cochrane Review** showed that custom orthotics may not reduce foot pain any more than sham orthotics, over-the-counter orthotics, or night splints and were not any better than stretching alone (Crawford, FC).

Uden H et al, (2011) and others also reviewed the literature. Experimental studies, from 1998 to 2010 were accepted for inclusion in this review. Six randomized controlled trials which met the selection criteria were included in this review. Four reported on customized functional foot orthoses and 2 on corticosteroid injections. This indicates that both customized functional foot orthoses and corticosteroid injections can lead to a decrease in pain associated with plantar fasciitis. Corticosteroid injections may have side effects, especially pain (from the injection).

The risk factors for the use of cortico-steroid injection in single case reports include plantar fascial rupture, hypoglycemia in diabetic patients, skin and fat-pad atrophy, and sepsis 4, 24 and 25. However, this was not supported by evidence from the included studies. Neither of the studies reviewed involving a corticosteroid injection reported any such occurrences.

Where pain is significant, I would be happy to discuss non-invasive treatment options including image-guided injection, for your patients.

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1. Interventions for treating plantar heel pain; Crawford F, Thomson C Cochrane Database Syst Rev. 2003; (3):CD000416.)
2. Perm J. 2014, Winter; 18(1): e105–e107. Plantar Fasciitis: A Concise Review [Emily N Schwartz](#), MD
3. Hayley Uden, Eva Boesch, and Saravana Kumar J, 2011, "Plantar fasciitis- to jab or to support-A systematic review of the current best evidence", Multidiscipline Health Journal; 4: 155–164.



Bursitis of the Hip- Greater Trochanteric Bursitis

Greater trochanteric bursitis is a very common condition resulting in pain over the greater trochanter. Imaging studies indicate that the pain can be from gluteus minimus or medius injury or inflammation of the bursa itself.

Typical causes are running, local trauma, and gait disturbances, but it is often idiopathic. The pain can be severe, radiate to the buttock or anterior thigh, and be exacerbated by standing or sleeping on the affected side. Patients often describe "hip" pain; however, true intra-articular hip pain usually radiates to the groin.

On examination, palpation over the greater trochanter reproduces the pain. Three bursae (2 major and 1 minor) surround the greater trochanter. Major bursae are the subgluteus medius bursa (posterior and superior to the proximal edge of the greater trochanter) and the subgluteus maximus bursa (lateral to the greater trochanter). The minor bursa is the subgluteus minimus bursa (above and slightly anterior to the superior surface of the greater trochanter).

Treatment options include NSAIDs, correction of gait abnormalities, postural and hip muscle strengthening, and topical application of moist heat, ultrasonography, and corticosteroid injection.

Evidence supports the efficacy of corticosteroid injection therapy for trochanteric bursitis. Rasmussen and Fan showed that corticosteroid injections gave excellent response in two-thirds of patients, with improvement in the remaining cases.

Shbeeb et al (1996) injected 75 patients with trochanteric bursitis with 6, 12, or 24 mg of betamethasone mixed with lidocaine, demonstrating responses in 77%, 69%, and 61% of patients at 1, 6, and 26 weeks, respectively. This study supported the observation that higher doses of betamethasone provide better pain relief.

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1. Shbeeb MI et al, (1996) Evaluation of gluco-corticosteroid injection for the treatment of trochanteric bursitis 1996 Dec; 23(12):2104-6
2. Christopher MW et al, (2009) "Musculoskeletal Injection"- Mayo Clinic Proc, Sep; 84(9): 831-837
3. Rasmussen KJ, Fan N, and Scand J R. (1985), "Trochanteric bursitis - Treatment by corticosteroid injection" 14(4):417-20.

Corticosteroid Injection for Treatment of de Quervain's Tenosynovitis

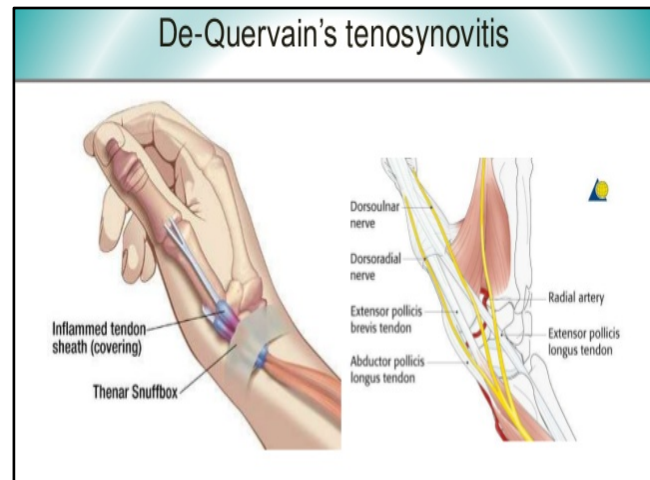
De Quervain's tenosynovitis is a painful and often disabling condition that is mainly observed in workers who perform repetitive manual tasks, wrestlers, and bowlers. Fritz de Quervain's, a Swiss surgeon, first described tenosynovitis within the first dorsal wrist extensor compartment at the radial styloid in 1895.

The published data show that steroid and anaesthetic injection with an estimated 83% cure rate, was the most effective treatment for this condition. Injection is simple, cost-effective, and without serious side effects. There are differences in the type of corticosteroid injected in the literature, and there might have been minor differences in injection technique used by the investigators in the previous studies. Even so, the effect of injection alone is the most successful treatment option across the reported studies in the literature.

The analysed studies in the literature used standard criteria for diagnosis and the definition of treatment efficacy. Specifically, the diagnostic criteria were (1) pain at the radial aspect of the wrist, (2) tenderness at the first dorsal wrist extensor compartment, and (3) a positive Finkelstein test. Treatment efficacy was defined as the absence of all of these criteria subsequent to intervention.

The combination of injection and splinting actually resulted in a greater percentage of treatment

failure (39%) than injection alone (17%). Perhaps this outcome is due to Wolff's law as applied to tendons (tissue heals or remodels in accordance with stresses placed upon it). The authors in the previous studies suggest that surgery might be considered in cases where two well-placed injections have failed, and all diagnostic criteria are still present after 4 months of symptoms.



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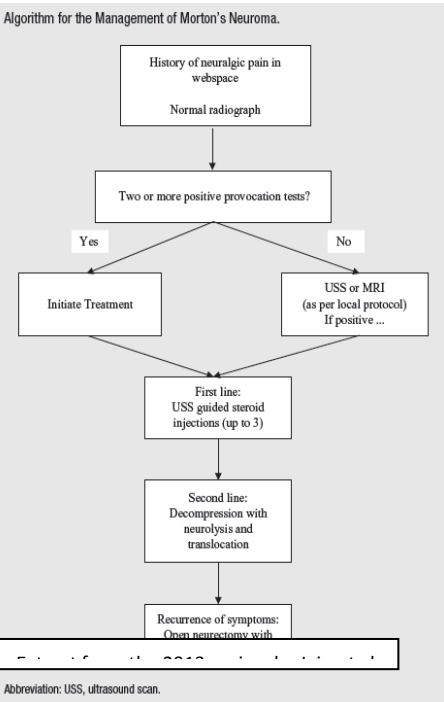
Ultrasound guided steroid injection for the treatment of Morton's neuroma

Morton's neuroma is a common condition causing pain in the web space of the foot. It has predominance for females and the mean age of presentation is between 45 and 50. Classically patients describe a burning or sharp pain in the plantar aspect of the affected web space which may radiate to the toes or be associated with paraesthesia.

The lesion responsible for the pain was first described in 1835 by an Italian anatomist named Filippo Civinini who noted a fusiform swelling of the common digital nerve at dissection. It was in

1876 that an American Orthopaedic Surgeon named Thomas Morton published a case series on this condition and his name became eponymous with it.

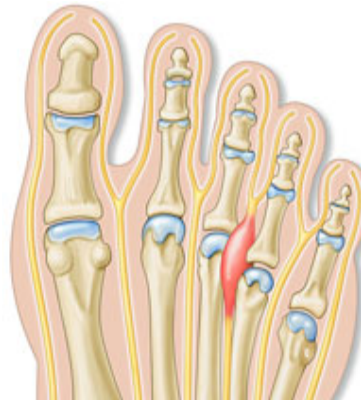
Although referred to



as a "neuroma" histological studies have shown that the swelling is not a true nerve tumour but in fact a focal proliferation of the peri-neural connective tissues.

Narrow shoes have been found to worsen symptoms presumably due to pressure upon the

nerve by compression of the metatarsals. Footwear modifications such as wide toed shoes have been used as a first line of treatment. A 2005 randomised control study by Sayagi et al with 71 feet showed that 50% of patients given a steroid injection reported complete satisfaction compared to 22.9% with footwear modifications ($p < 0.01$). Satisfaction was 73.5% and 28.6% respectively at 6 months ($p < 0.001$). The difference was still evident at 12 months with 82.4% for the injection group and 62.9% for the control group however the power was insufficient to prove statistical significance.



We recommend ultrasound be performed with a radiographic examination to identify concurrent diagnoses such as MTP joint osteoarthritis.

The combination of steroid and local anaesthetic injection is offered to provide both a prolonged therapeutic effect and as a diagnostic test to confirm improvement of symptoms following injection of the local anaesthetic.

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Interventional Pain Management Newsletter

Treatment of Proximal Hamstring Tendinopathy using Ultrasound-Guided Injections.

As our population ages and remains active, it can be expected that the number of chronic degenerative conditions will increase. Chronic hamstring tendinopathy has been suggested to be the result of mild, low-grade micro trauma, usually from running sports, such as long- and mid-distance running. Approximately 20% of people with chronic high (proximal) hamstring tendinopathy who undergo non-invasive (conservative) treatment, such as rest and physical therapy, have residual hamstring pain¹.

For those that find no relief from non-invasive (conservative) management, minimally invasive treatments such as ultrasound-guided corticosteroid injections, ultrasound-guided needle tenotomy, ultrasound-guided platelet-rich plasma (PRP) injections, or ultrasound-guided percutaneous (through the skin) ultrasonic tenotomy may be pursued.

Steroid Injection

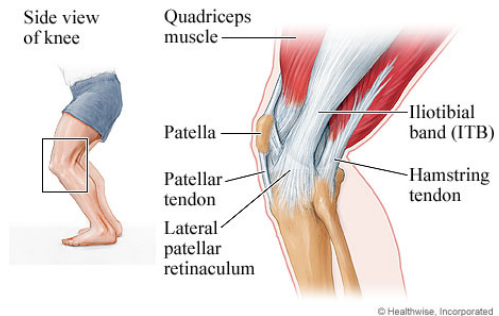
Injecting a corticosteroid into the ischial bursa has been shown to be beneficial to some patients with chronic hamstring tendinopathy. The ischial bursa is a small, fluid-filled structure that acts as a buffer between the overlying gluteal muscles and hamstring tendons at the site bone (ischial tuberosity)².

Qualified practitioners can now use ultrasound to guide the needle into the ischial bursa and avoid inadvertent placement of steroid into the tendon or the sciatic nerve.

Ultrasound has greatly improved the safety and accuracy of steroid injections³.

Platelet-Rich Plasma (PRP) Injections

Ultrasound-guided tendinous injection of Platelet-Rich Plasma (PRP), with or without needle tenotomy, has emerged as a promising treatment of tendinopathies⁴. This is a clinic based procedure that requires the patient's own blood, which is drawn and put into a centrifuge to separate it into layers. The concentrated platelet layer is then put into a syringe and injected into the damaged area under sonographic guidance. Platelets are the body's "healing cells" and when injected release a multitude of "growth factors" that have regenerative and healing properties⁵. PRP has been



shown to be beneficial in improving function and reducing pain in patients with tendinopathies. Recently, it has also been used effectively showing good results in patients with persistent high (proximal) hamstring tendinopathy

Evidential Study

A study showed a comparison between PRP and Whole Blood for the treatment of Proximal Hamstring Tendinopathy. Using a randomised control trial PRP and WB were injected under ultrasound guidance on patients with suspected hamstring tendonitis. Results were monitored post injection and 2, 6, 12 weeks after injections. Results showed that WB group showed greater improvements in pain and function over the PRP group before 12 weeks, however the PRP group showed improved outcomes over the WB group at 6 months⁶.

¹ Lempainen L, Sarimo J, Mattila K, Vaittinen S, Orava S. Proximal hamstring tendinopathy: results of surgical management and histopathologic findings. *Am J Sports Med* 2009;37:727-34.

² Zissen M, Wallace G, Stevens K, Fredericson M, Beaulieu C. High hamstring tendinopathy: MRI and ultrasound imaging and therapeutic efficacy of percutaneous corticosteroid injection. *AJR Am J Roentgenol* 2010;195:993-8.

³ Zissen M, Wallace G, Stevens K, Fredericson M, Beaulieu C. High hamstring tendinopathy: MRI and ultrasound imaging and therapeutic efficacy of percutaneous corticosteroid injection. *AJR Am J Roentgenol* 2010;195:993-8.

⁴ Mishra A, Woodall J, Vieira A. Treatment of tendon and muscle using platelet-rich plasma. *Clin Sports Med* 2009;28:113-25.

⁵ Hall MM, Mautner K. Evolution of musculoskeletal and non-musculoskeletal sports ultrasound. *Br J Sports Med*. 2015 Feb;49(3):139-40. doi: 10.1136/bjsports-2014-094192

⁶ Davenport KL, Campos JS, Nguyen J, Saboiero G, Adler RS, Moley PJ (2015) Ultrasound-guided intratendinous injections with platelet-rich plasma or autologous whole blood for treatment of proximal hamstring tendinopathy: a double-blind randomized controlled trial. *J Ultrasound Med* 34(8):1455-1463