Joint and soft tissue aspiration and injection

The indications for joint or soft tissue aspiration and injection are diagnostic or therapeutic. A common diagnostic indication is the aspiration of synovial fluid for evaluation. Synovial fluid evaluation can differentiate among various joint disease aetiologies including infection, inflammation and trauma. A second diagnostic indication involves injection of a local anaesthetic to confirm the presumptive diagnosis through symptom relief of the affected body part. Therapeutic indications for joint or soft tissue aspiration and injection include decreased mobility and pain, and injection of medication as an adjunct to other forms of treatment.

Therapeutic injection with corticosteroids should always be viewed as adjuvant therapy. Improper or indiscriminate use of corticosteroids is likely to have a bad outcome. These injections should never be undertaken without diagnostic definition and a specific treatment plan.

Timing

Appropriate timing can minimize complications and allow a clear diagnosis or therapeutic response. For diagnostic injections, the procedure should be performed when acute or chronic symptoms are present, when the diagnosis is unclear or needs to be confirmed, when other diagnostic modalities have been considered, and when septic arthritis has been ruled out (by aspiration and fluid analysis). For therapeutic injections, the procedure should be performed when acute or chronic symptoms are present, after the diagnosis and therapeutic plan have been made, and after consideration has been given to obtaining radiographs. Therapeutic injection should be performed only with or after the initiation of other therapeutic modalities (e.g. physiotherapy).

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Complications

A number of potential complications can arise from joint and soft tissue procedures. Local infection is always possible, but can be avoided by following the proper technique. Joint injections should always be performed using sterile procedure to prevent iatrogenic septic arthritis. Local reactions at the injection site may include swelling, tenderness and warmth, all of which may develop a few hours after injection and can last up to 2 days. A post-injection steroid flare, thought to be a crystal-induced synovitis caused by preservatives in the injectable suspension, may occur within 24–36 hours of injection. This is self-limited and responds to use of ice packs for 15-minute intervals.

Soft tissue (fat) atrophy and local depigmentation are possible with any steroid injection into soft tissue, particularly at superficial sites (e.g. lateral epicondyle). Periarticular calcifications are described, but are rare. Tendon rupture can be avoided by not injecting directly into the tendon.

Systemic effects are possible (especially after triamcinolone acetonide injection or injection into a vein or artery), and patients should always be acutely monitored for reactions. Alterations in taste have been reported for 1–2 days after steroid injection. Hyperglycaemia is possible in patients who have diabetes.

To avoid direct needle injury to articular cartilage or local nerves, attention should be paid to anatomical landmarks and depth of injection. Other rare, but possible, complications include perilymphatic depigmentation, steroid arthropathy, adrenal suppression and abnormal uterine bleeding.

The contraindications to joint injection and aspiration are shown in *Table 1*.

Subacromial space injection

Subacromial space injection is used for several reasons. The first is for determining whether shoulder pain is the result of rotator cuff inflammation (tendinitis) or rotator cuff disruption (tear). Subacromial injection of anaesthetic takes just minutes and can eliminate the need for ultrasound or magnetic resonance imaging (MRI). Pain can inhibit muscle contraction, mimicking weakness secondary to a tear. Injection of the subacromial space relieves the pain. If strength returns after injection, the cause of the pain is more likely to be inflammation than disruption, and should be treated with aggressive physiotherapy. If strength does not return, the cause may be a tear. At this point, the patient may need surgical evaluation, including an MRI.

A second common reason for the procedure is to distinguish acromioclavicular (AC) joint pain from subacromial pain. This involves a two-step sequence of injection of the AC joint with 1.0–1.5 ml of anaesthetic, followed by injection of the subacromial space, if necessary. The solution for injection of the AC joint can contain all short-acting anaesthetic, equal parts short- and long-acting anaesthetic, or 5–10 mg steroid with anaesthetic.

Subacromial space injection can also be used for injection of corticosteroid to reduce inflammation and to achieve long-term pain relief for tendinitis and bursitis (impingement syndrome). This method for 'curing' tendinitis has not been documented in clinical studies, but has resulted in short- and long-term pain relief. Corticosteroid is not required for diagnostic injections, but many clinicians include it with the hope of longer pain relief.

Table 1. Contraindications to joint injection and aspiration

Contraindications to intra-articular or soft tissue injection	Adjacent osteomyelitis
	Bacteraemia
	Haemarthrosis
	Impending (scheduled within days) joint replacement surgery
	Septic arthritis
	Osteochondral fracture
	Periarticular cellulitis
	Uncontrolled bleeding disorder or coagulopathy
Contraindications to joint or soft tissue needle aspiration	Bacteraemia
	Infection in overlying tissues
	Severe coagulopathy
	Severe overlying dermatitis
	Clinician unfamiliar with anatomy of or approach to joint

A good knowledge of anatomy is vital, as for any attempted injection of a joint or soft tissue area (*Figure 1*).

The entry point for injection should be identified and marked with an impression from a thumbnail, a needle cap, or an indelible ink pen. The risk of infection at the site should be minimized. Prepare the area with an alcohol or povidone-iodine (Betadine) wipe. For all intra-articular injections, sterile technique should be used.

Although there are several entry points for shoulder injections, the posterior subacromial approach is the easiest. Furthermore, by angling the needle to the underside of the acromion, the physician can easily verify that the needle is properly positioned and, since the humeral head lies more anteriorly, there is no danger of hitting it.

Method

The patient should sit with the arms resting on the lap. Clothing should be removed so that a wide area posteriorly is exposed.

The posterior tip and inferior border of the acromion should be palpated. The thumb is placed on the inferior border and the index finger of the same hand on the coracoid process anteriorly. The entry point, 1–2 cm medial to the tip of the acromion, under the thumb palpating the inferior border is marked.

A wide area of skin is cleaned with povidone-iodine solution. Local anaesthetic infiltration of skin is usually unnecessary but may be used in the anxious patient.

A separate syringe containing local anaesthetic with or without steroid is prepared and well mixed. Ideally a 20 gauge needle is used for injection.

Place the thumb and index finger of the non-injecting hand on the inferior border of the acromion and coracoid process; the direction between the two digits indicates the aim and direction of the needle. The needle is inserted through the entry point and directed towards the coracoid process; this angle is important because a needle angled medial to the coracoid process in the horizontal plane will enter the glenoid space; a give may be felt as the needle passes into the subacromial space.

Entry into the subacromial space is usually simple, but if the acromion or head of the humerus is encountered during joint entry, back the needle off and advance slowly with the redirected needle. An unexpected increase in resistance may indicate entry into ligament or the supraspinatus tendon.

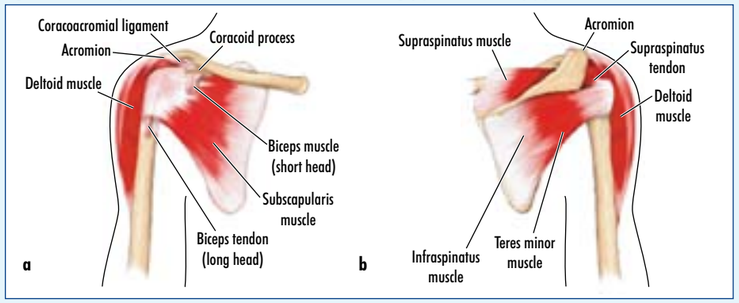
The needle should be inserted to nearly its full length. Before injecting into the space, aspirate to ensure there is no return of blood. If there is unexpected flow resistance to the injection, withdraw the needle slightly to see if the flow resistance decreases.

Following withdrawal of the needle, dress the puncture wound with antibiotic ointment and an adhesive sterile dressing.

Calcific tendinitis

Calcific tendinitis of the shoulder causes pain that is not activity dependent and often severe. Its cause is uncertain and calcium deposits can be asymptomatic, so diagnosis is primarily by history and examination in conjunction with X-rays. Tenderness over the greater tuberosity generally differentiates calcific tendinitis from other conditions. For subacute and acute forms, needling (use of a hypodermic needle to disrupt deposits) followed by corticosteroid injection into the subacromial space can be diagnostic and therapeutic. The needling technique is different from that of subacromial space injection and is the most effective method of pain relief for this.

Figure 1. Anatomy of the shoulder and rotator cuff, showing (a) anterior and (b) posterior view.



Subacute calcific tendinitis can be treated with oral non-steroidal anti-inflammatory medication and rest, but if signs and X-rays confirm calcific tendinitis, early needling and injection of the area is appropriate because the response is often diagnostic. Needling is believed to allow the encapsulated, pressurized deposit to decompress and permit vascular contact for calcium resorption and neovascularization.

The midpoint of the acromion laterally is marked, having palpated anterior and posterior borders. The skin is prepared as described above and may be infiltrated with local anaesthetic. Using a syringe and a 20 gauge needle loaded with local anaesthetic and steroid, the needle is directed perpendicular to the surface of the skin. The needle will pass through the deltoid muscle into the firm tissue of the rotator cuff. If further anaesthesia is necessary for patient comfort, withdraw the needle from the cuff tissue just until it is free of resistance, and inject a small amount of the mixture. Then make passes with the needle into the rotator cuff to locate the calcium deposit, which will have a gritty texture. Insert the needle into the deposit four or five times to break it up, taking care not to inject any of the solution into the tendon. Withdraw the needle just until it clears the rotator cuff tissue and redirect it into the subacromial space. Then inject the mixture of lignocaine and corticosteroid into the subacromial bursa.

For both techniques, the patient must be advised to avoid strenuous activity of the affected area for several days after injection because of the small risk of local tissue tears secondary to temporarily high concentrations of steroid. This risk lessens as the steroid dissipates. Patients should look for signs of infection including erythema, warmth, or swelling at the injection site, or systemic signs including fever and chills. The patient should keep the injection site clean and may bathe. BJHM

Conflict of interest: none.

KEY POINTS

- The indications for joint or soft tissue aspiration are diagnostic or therapeutic.
- Injection of corticosteroid should be part of a treatment plan for a specific diagnosis.
- Surface anatomical knowledge is an absolute prerequisite.