

NFI (Non Full-time Interventionist) Guide to Musculoskeletal Intervention

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BACKGROUND

There has been an increase in the case load of musculoskeletal, image guided procedures in recent years. As a result, there has been increasing pressure on the general radiologist to perform an increasing number of these procedures on a regular basis. Most medical imaging trainees obtain little experience in musculoskeletal intervention during their training and, as such, have varying levels of confidence in performing these procedures. There is a growing need for further teaching and education in this expanding area of clinical practice to ensure the provision of quality health care.

LEARNING OBJECTIVES

This poster aims to provide education and instruction for commonly performed image guided musculoskeletal procedures for the general and trainee radiologist.

1. Improve understanding of commonly performed interventional procedures.
2. Improve confidence and efficiency in performing image guided musculoskeletal procedures.

GENERAL TIPS

1. Wherever possible the radiologist should hold the ultrasound probe in order to utilise one's own proprioception (i.e. left hand knows what the right hand is doing). This makes needle visualisation easier.
2. Ergonomics are important. Wherever possible there should be a straight line between the radiologist, patient and ultrasound screen (Fig. 1).
3. Wherever possible use a fine gauge needle (25-gauge needle).
4. Only non-particulate steroids and short acting local anaesthetic should be used for procedures above the level of the clavicle and for spinal procedures [1,2].
5. Patient comfort should be a priority. Local anaesthetic should be used for procedures involving larger bore needles (greater than 22-gauge). Injecting local first, prior to drawing up other medications, allows time for the local anaesthetic to work.
6. Aseptic, no touch technique is adequate for most procedures. Chlorhexidine preparations are more effective than betadine based preparations [3,4]. Regular gloves from boxes, as opposed to sterile gloves, are adequate for most procedures [5,6].
7. Procedures in the hand and procedures in patients who are predisposed to vasovagal attacks are best done with the patient lying down
8. Procedures in the hand and foot are best performed with the use of a hockey stick ultrasound probe.
9. The bevel of a needle can be used to steer the needle to target area. The needle will move in the opposite direction to the bevel.
10. A short history from the patient regarding allergies, propensity to vasovagal attacks, along with informed consent, is essential.
11. Micro-bubbles, formed by shaking the syringe with an air bubble in situ, creates a contrast agent



CONCLUSION

A better understanding of image guided musculoskeletal interventions will help the general radiologist provide more effective patient care. This poster provides a valuable, easy to use reference for the general and trainee radiologist to assist in teaching and performing image guided musculoskeletal procedures.

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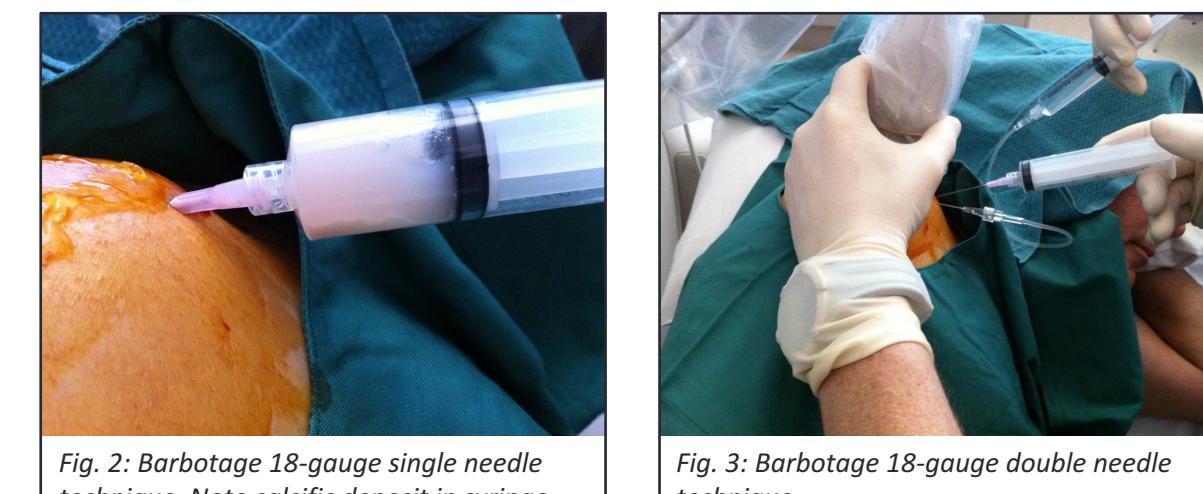
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IMAGING FINDINGS OR PROCEDURE DETAILS

Unless otherwise specified all procedures performed under ultrasound guidance.

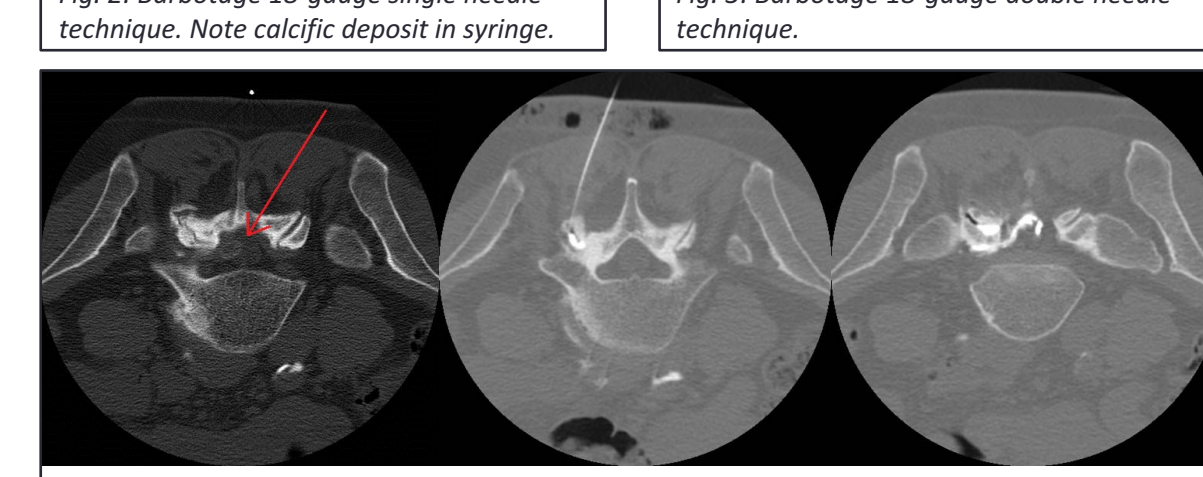
Barbotage:

- Liberally inject bursa with 10-15ml of Xylocaine for anaesthesia and to break up adhesions.
- Flush with saline using either single or double needle technique and 20ml syringe (Fig. 2, 3).
- Always inject steroid into the bursa at the end of the procedure to prevent associated bursitis.
- Avoid mistaking linear dystrophic calcification for calcific tendonitis, which is oval or dumbbell shaped.



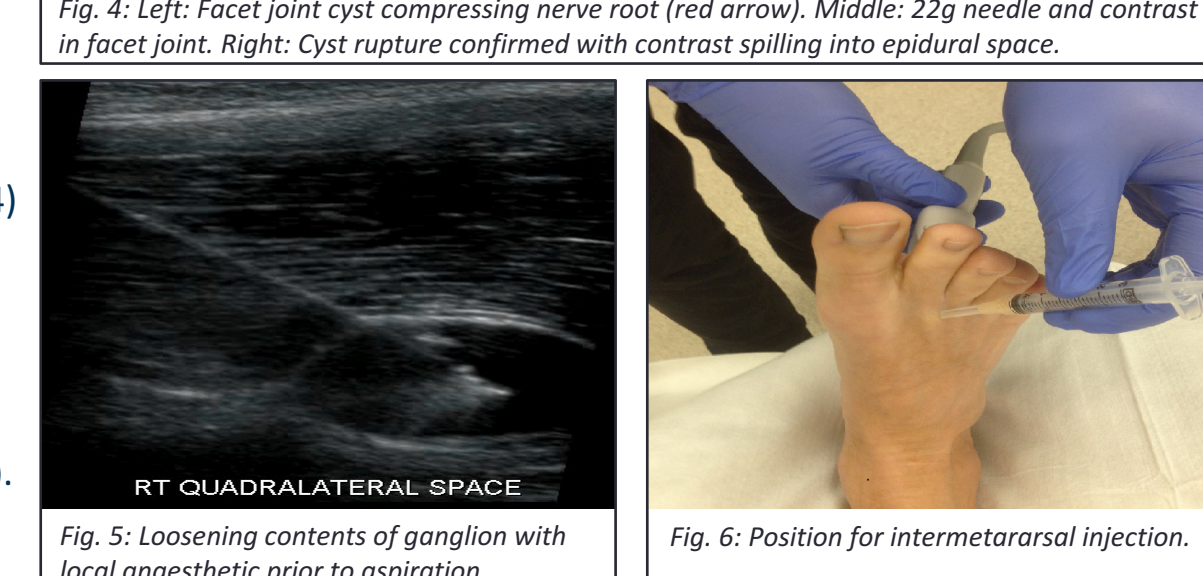
Cervical Nerve Root Injection - CT Guided

- Safety is paramount – there have been catastrophic events and deaths related to this procedure.
- Use smallest gauge needle possible.
- Aim for inferior aspect of foramen to avoid the artery.
- Inject a small test dose of Xylocaine and assess for posterior circulation symptoms prior to injecting non-particulate steroid. Do not use particulate steroid due to risk of microvessel infarction [1].
- Confirm position with contrast and aspirate prior to injection.



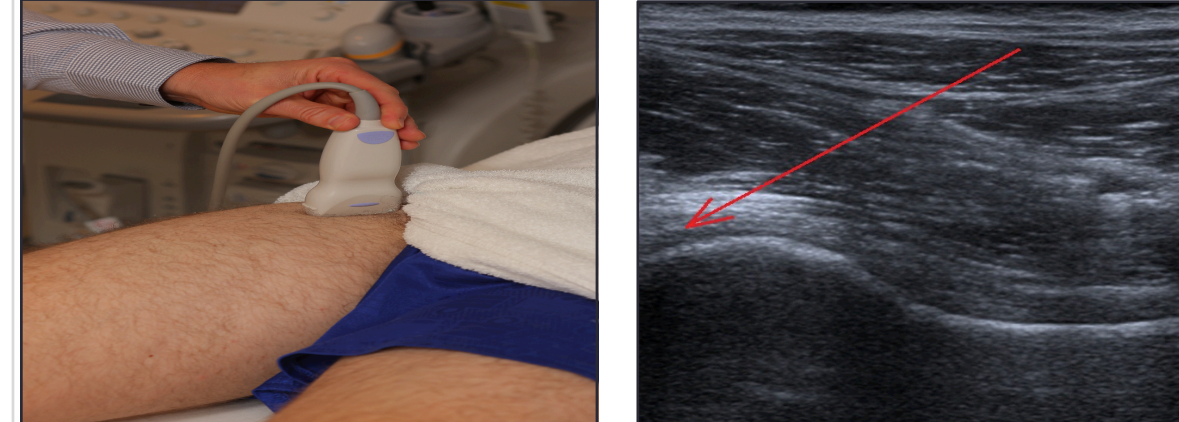
Facet Joint Cyst Rupture - CT Guided

- Perform an epidural steroid and anaesthetic injection first for analgesia.
- Jam 22-gauge needle into degenerate facet. Inject until contrast ruptures into epidural space (Fig. 4)
- Use air as contrast in the initial epidural injection, this will allow you to confirm cyst rupture by contrast extravasation from the facet joint into the epidural space.



Ganglion Cyst Aspiration

- Loosen cyst contents with 3-5ml Xylocaine and 25-gauge needle. Allow time for anaesthesia (Fig. 5).
- Use an 18-gauge needle and 10ml syringe to perforate and aspirate the ganglion.
- Inject 1ml Celestone at the end of the procedure.



Intermetatarsal Bursa Injection

- A dorsal needle approach with probe on the plantar aspect of the foot is beneficial as it is less painful and there is potentially less skin flora on dorsal aspect of foot compared to plantar aspect (Fig. 6).
- Massaging jelly into plantar aspect of the foot improves contact and visualisation [7].

Joint Injection – Hip

- Always use a 9cm, 22-gauge or longer spinal needle to prevent falling short on length.
- Internally rotating the foot moves the femoral vessels medially, out of the needles path.
- In contradistinction to fluoroscopic guided injection, do not aim for femoral neck as this puts the needle more perpendicular to the probe, reducing needle visualisation. On ultrasound, position is confirmed by needle tip beneath labrum and micro-bubbles in joint (Fig. 7, 8).
- Inf. capsule is harder to penetrate than the Sup. capsule – another benefit of aiming deep to labrum.
- Turning the needle 180 degrees clockwise/anticlockwise will help bore through a tented capsule.

Joint Injection – Knee

- In the absence of suprapatellar pouch fluid, aim for the trochlea with lateral approach and knee in flexion. In a small number of patients the suprapatellar pouch does not freely communicate with the remainder of the joint making this technique is preferable in any case (Fig. 9).

Mechanical Hydro Release of Sciatic Nerve

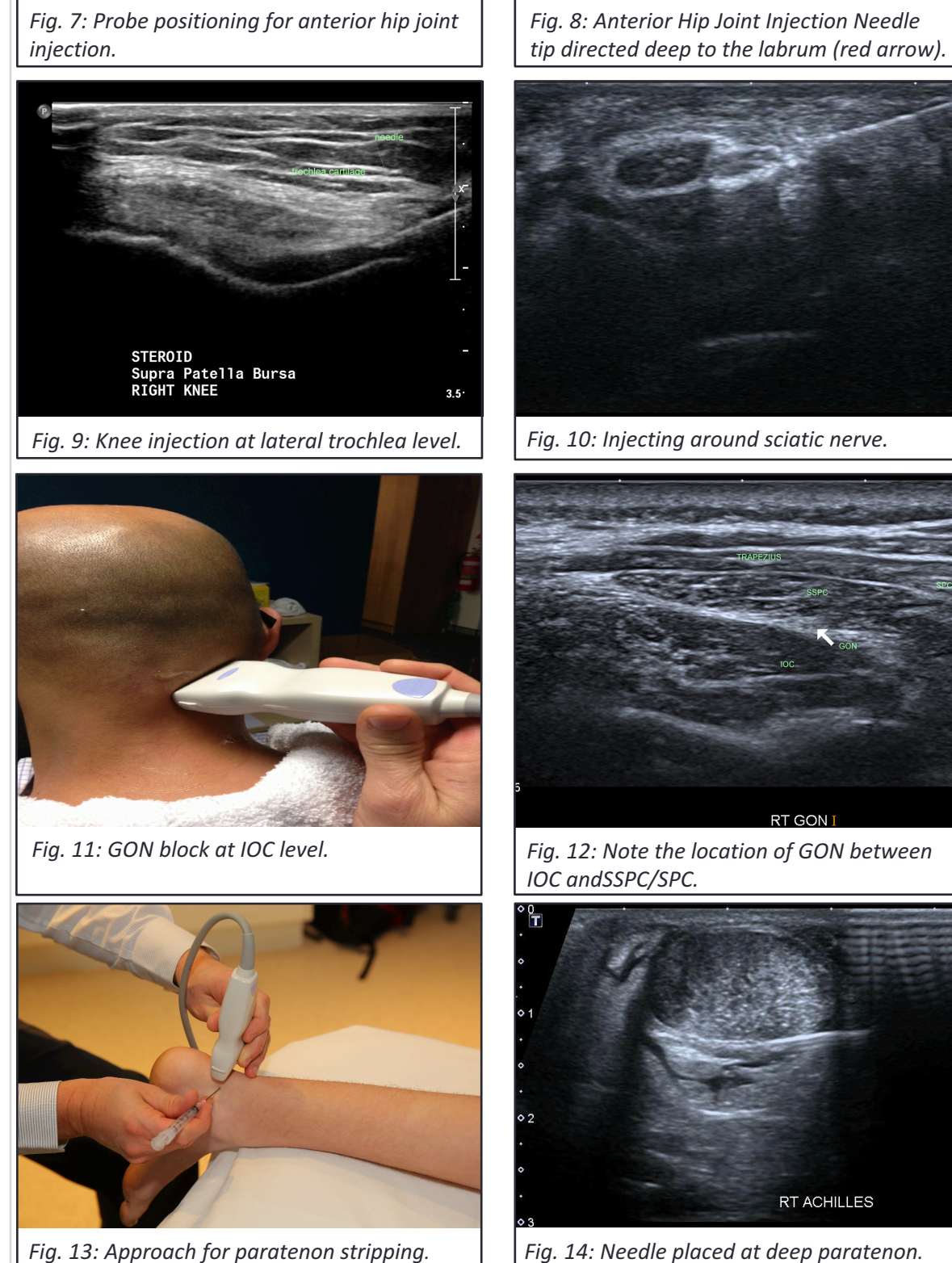
- Use a 22-gauge needle with local anaesthetic and cold saline to strip away adhesions from the sciatic nerve, which form secondary to chronic hamstring injury (Fig 10).
- Use liquid pressure ahead of the needle to mechanically open tissue planes.

Greater Occipital Nerve (GON) Block

- Best performed at the inferior obliquus capitus (IOC) muscle level. The alternative location at the external occipital protuberance is rendered difficult due to the patient's hair [8, 9] (Fig. 11).
- Use non-particulate steroid as injecting above the clavicle.
- To locate sonographically, find the posterior arch of C1, move inferior until the bifid C2 spinous process is in view, then move the probe laterally and obliquely to find IOC (Fig. 12).
- Locate GON between IOC and Semispinalis Capitus (SSPC) / Splenius Capitus (SPC) muscles (Fig. 13).

Paratenon Stripping (Brisement) of Non-insertional Achilles Tendinosis

- Medial or lateral approach – 22-gauge needle deep to paratenon but not into tendon (Fig. 13, 14).
- High volume injection – 10mls Xylocaine, then 1ml Celestone and 30-50mls cold saline.
- Smaller volume of 20-40ml can be used on the patella tendon.



Plantar Fascia Injection with Nerve Block

- Tibial nerve block just above medial malleolus makes this procedure much more tolerable (Fig. 14).
- Injecting tibial nerve inferior to this may miss the branch to the plantar fascia (lateral plantar nerve).
- Inject steroid deep to plantar fascia to prevent fat pad necrosis.
- Dry needling can be performed at the same time

Pulley Release

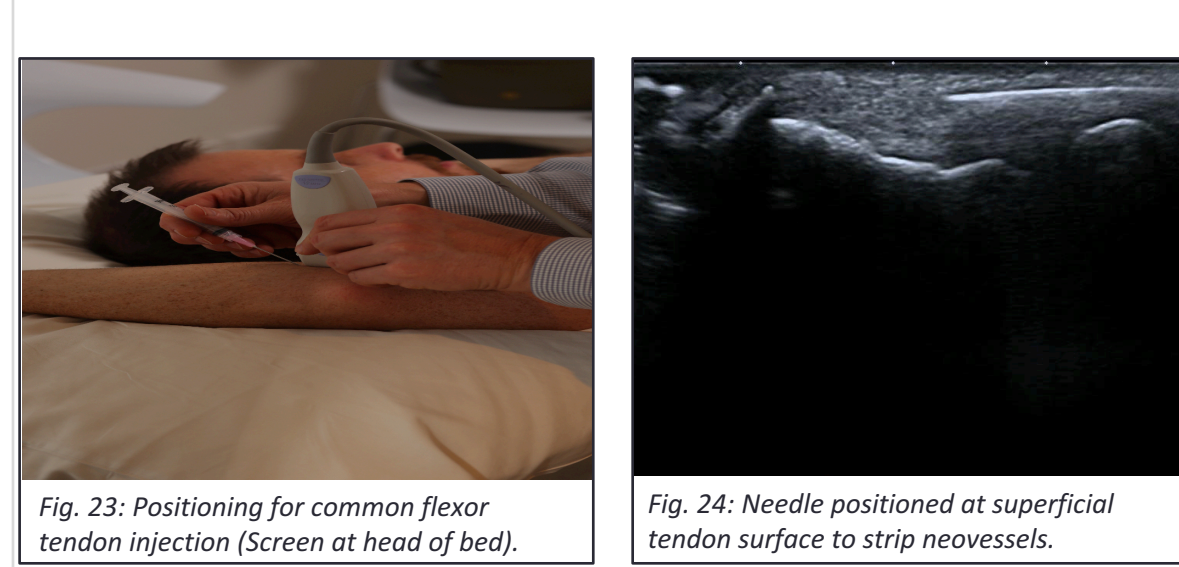
- Best reserved for fingers due to the challenging anatomy of the thumb.
- Full sterile technique.
- A rolled up towel under the hand creates MCPJ hyperextension, allowing easier access to the pulley.
- Mark the tendon path as a guide of the neurovascular bundle location.
- First inject local anaesthetic with a 25-gauge needle.
- Bend an 18-gauge needle, using its cap, at the needle hub and mid-point to use as a cutting device [10]. The bevel should be in a sagittal plane. Attach 3ml syringe as a handle (Fig. 16).
- Position the needle tip deep to pulley and apply force down and back to release the pulley (Fig. 17).
- Concurrent steroid injection at the time of release will treat any co-existent tenosynovitis.
- A hand therapist opinion is recommended post release.

Shoulder Hydrodilatation

- Lay the patient down for comfort – lateral decubitus position (Fig 18).
- Use a medial or lateral (authors preference) approach at the posterior shoulder joint to aid positioning the needle deep to the teres minor or labrum respectively (Fig. 19, 20).
- Low volume (capsule preserving) hydrodilatation, using a maximum of 5-10ml, is effective [11].
- Rupturing capsule is not necessary and allows steroid to escape the joint, potentially reducing efficacy.

Subacromial Bursa Injection

- Asking the patient to watch the ultrasound screen creates distraction.
- Posterior approach helps prevent anterior supraspinatus tears (the most common site).
- Relaxed arm positioning allows relaxation of deltoid muscle reducing pain and discomfort (Fig. 21).



Subtalar Joint Injection

- Anterior and mid subtalar joints communicate with the talonavicular joint, therefore can be accessed by injecting into the dorsal aspect of the talonavicular joint – which is easily accessible with U/S.
- Posterior subtalar joint is more difficult to access with U/S and is best accessed with CT. If U/S is used, target the subtalar joint anterior to the calcaneofibular ligament with an off-plane approach

Suprascapular Nerve Block

- Consider this procedure for older patients with cuff tearing and arthropathy.
- Medial approach (Fig. 22). Inject into suprascapular notch.

Tendon Injection- Common Flexor and Common Extensor Origin

- Position patient supine with arm resting above the head (flexed, abducted, supinated) (Fig. 23).
- Injecting the steroid and anaesthetic along the tendon surface can help to strip neovessels and reduce pain related to tendinopathy (Fig. 24).

Wrist Joint Injection and Arthrogram

- Lay the patient prone in neutral wrist position with volar flexion over a pillow (Fig. 25).
- Use a dorsal/distal approach of the needle onto the scaphoid (Fig. 26).

