Corticosteroid Injection Techniques

Cortisone Injection
to the Elbow

INTRODUCTION

- Mainstay of treatment in many cases of acute or chronic joint or soft tissue pain conditions

- Mechanism of action

Local – Decreases inflammation in synovial tissues – reduces edema and inflammatory cells in joints.

Systemic – Dose related – decrease in inflammatory markers such as CRP and ESR

Commonly used depot corticosteroids

Choice of depot corticosteroid varies in terms of

- Availability
- Versatility
- Pharmacokinetics
- Cost-effectiveness

Table 1
Characteristics of Depot Corticosteroids*

Generic Name	Solubility (% wt/vol)[5]	Crystal Structure[6]	Serum Half-Life (days)	Peak Plasma Concentration (ng/mL)	Average Duration of Action (days)†	Fluorinated
Betamethasone sodium phosphate and betamethasone acetate	NA	Betamethasone acetate: 10 to 20 µm, rod-shaped with blunted ends, negative birefringence; difficult to distinguish from sodium urate crystals	6.3[7]	10.8 (after 7-mg injection in one knee[7])	Approximately 9[8,9]	Yes
Hydrocortisone acetate	0.002	NA	NA	NA	6-40[8]	No
Methylprednisolone acetate	0.001	Small, pleomorphic, tendency to agglutinate, strong birefringence	5.8	11.8 (dose not specified)	7-84[10]	No
Prednisolone tebutate	0.001	Small, pleomorphic with a branched and irregular configuration, positive birefringence	NA	NA	10-15[8,9]	No
Triamcinolone acetonide	0.004	Very similar to methylprednisolone acetate, but with a slightly increased tendency to agglutinate and slightly stronger birefringence	3.2-6.4[7]	Approximately 11 (after 40-mg injection into one knee)[7]	14[8,9]	Yes
Triamcinolone hexacetonide	0.0002	15 to 60 µm, rod-shaped, negative birefringence; difficult to distinguish from sodium urate crystals	4.6[7]	Approximately 3 (after 40-mg injection into one knee)[7]	8-90+[10]	Yes

USES – Intra-articular

- Acute knee pain in Osteoarthritis
- Rheumatoid Arthritis

- Juvenile RA
- Crystal deposition diseases – Gout and pseudogout
- SLE and MCTDs
- Acute traumatic arthritis
- Psoriatic arthritis
- Ankylosing Spondylitis
- Arthritis associated with inflammatory GI disorders
- Post – arthroscopic pain relief and rehabilitation

USES - Extra-articular

- Elbow epicondylitis
- Shoulder bursitis
- Greater trochanteric bursitis
- De Quervain's Tenosynovitis
- Pes anserine bursitis
- Myofascial trigger points
- Carpal tunnel syndrome
- Finger tenosynovitis
- Tarsal tunnel syndrome
- Backache – epidural injection

Side effects - Local

- Post-injection flare: Marked pain at the site of injection/joint – needle puncture/chemical synovitis due to crystals – treated with analgesics, ice packs
- Facial flushing – common in women – onset within a few hrs of injection
- Skin/fat atrophy – common with less soluble agents
- Joint sepsis - rare

Side effects - Systemic

Influenced by the agent used, dose, frequency and number of joints injected. Generally milder

- Osteoporosis
- Corticosteroid induced myopathy
- HPA axis suppression
- Worsening glucose intolerance

PREREQUISITES

- Sterile gloves
- Bactericidal skin preparation – Spirit and Povidone-Iodine
- Syringes – 5mL
- 18 gauge and 21 gauge needle
- Corticosteroid preparation and 1% lidocaine or 0.5% bupivacaine
- Sterile adhesive bandage

Cervical strain and sprain

- Used in the management of inappropriate inflammation causing chronic pain
- Position – Sitting on exam stool with neck flexed and leaning forward with the arms resting on the exam table
- Clinician stands behind the patient, locates the cervical spinous processes of the posterior neck. Area of maximum tenderness palpated – mark the entry point for the needle
- Patient should not move the neck

Cervical strain and sprain

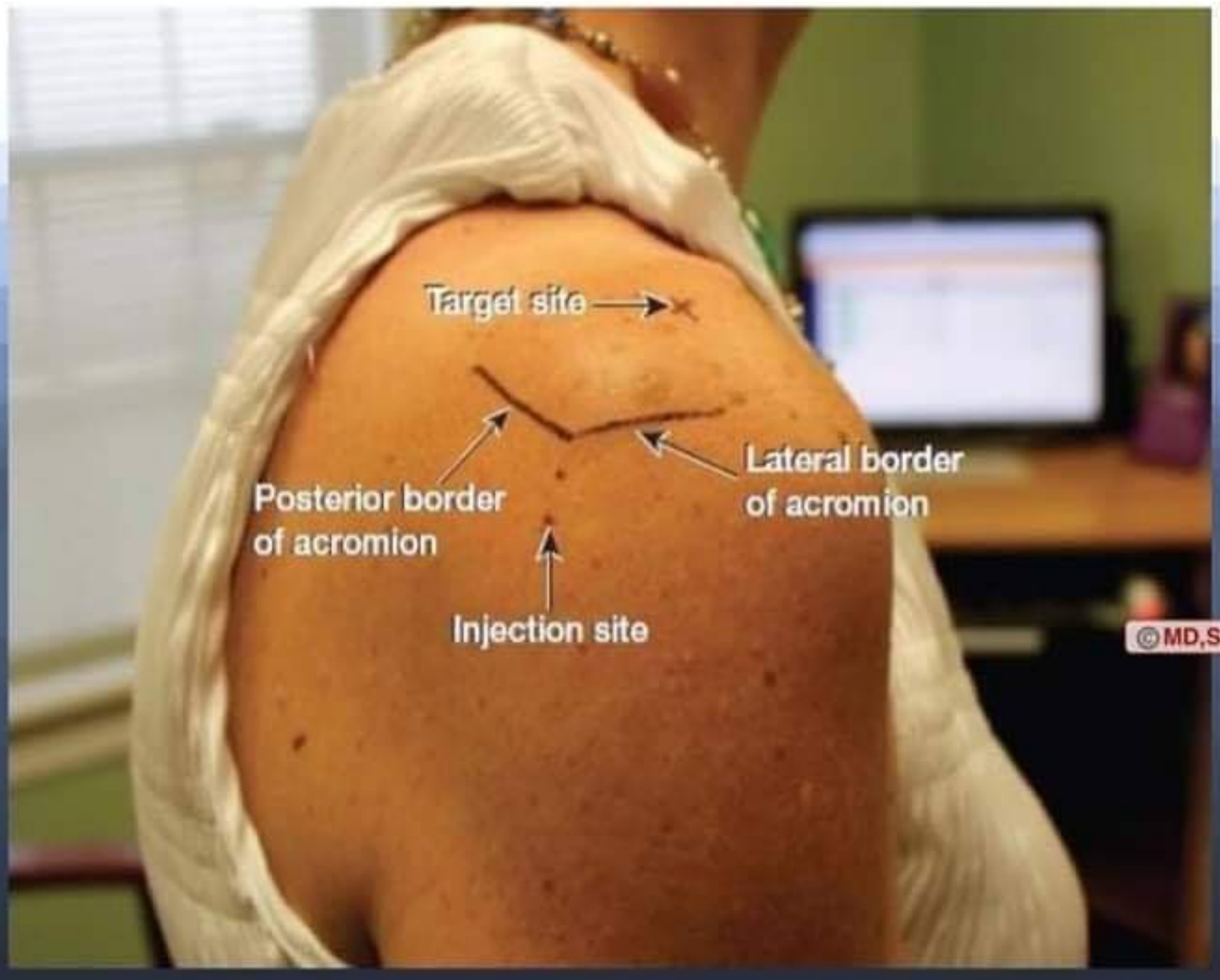
- After skin preparation, a syringe with 1mL of 1% lidocaine without adrenaline and 1mL of steroid solution (20-40mg of triamcinolone acetonide) is taken and needle positioned perpendicular to the target point
- Needle is introduced and advanced into the body of the muscle and solution injected.
- Instruct patient to massage area/move neck slowly through full ROM - distribution

Cervical Strain and Sprain - Aftercare

- Avoid excessive use of the neck over the next 2 weeks
- Consider the use of a cervical collar
- NSAIDS, muscle relaxants, ice and/or physical therapy as indicated
- Consider follow-up in 2 weeks

Subacromial space injection

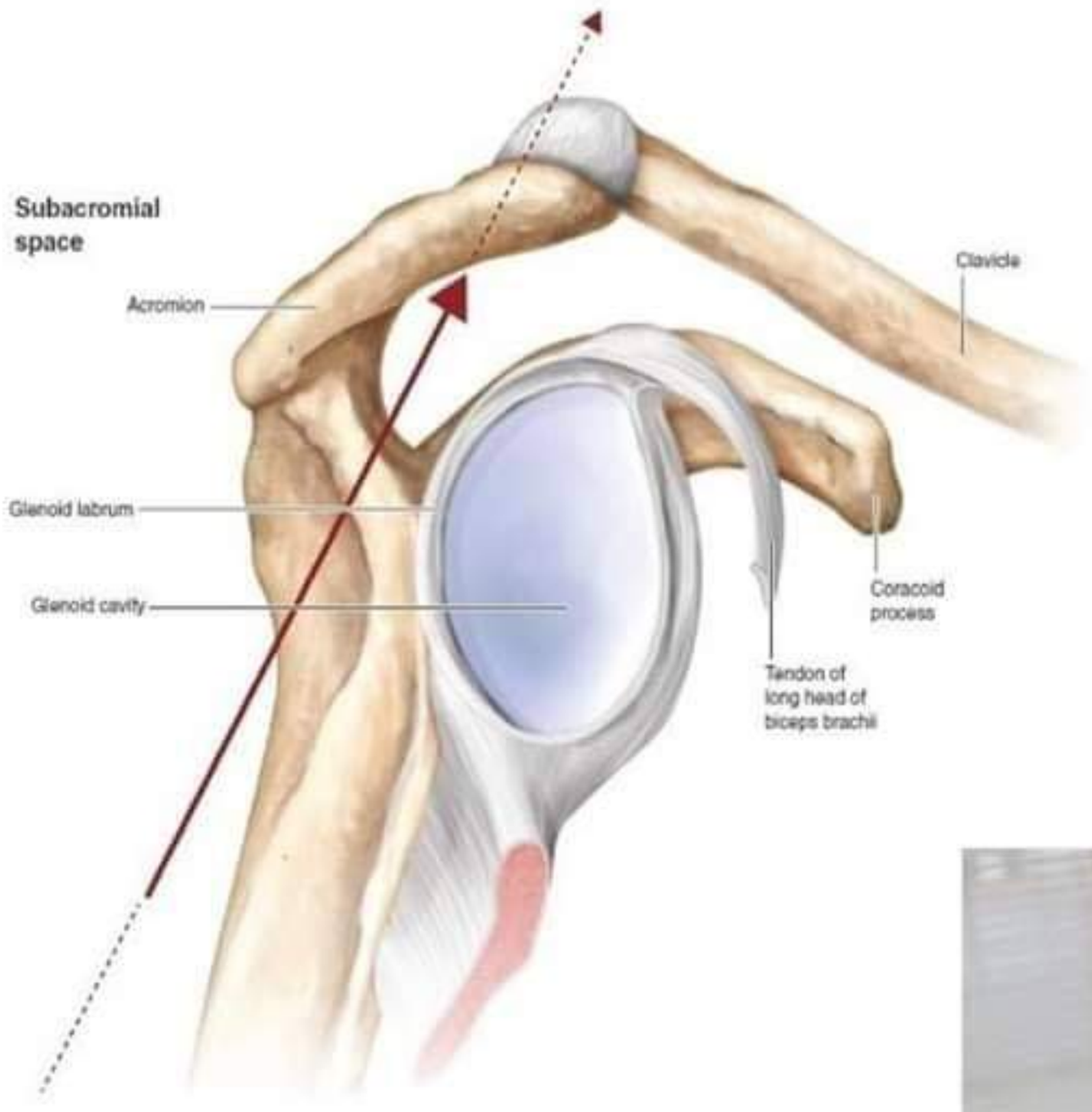
- Indications – Shoulder pain, rotator cuff sprain, Impingement syndrome and Rotator cuff tendinitis
- Position – Sitting on the examination table, patient's hands folded on lap with fingers interlaced. Clinician stands lateral, finds the lateral and posterior edge of the acromion and marks it, after which a vertical is dropped 2cm below the posterolateral corner and marked.

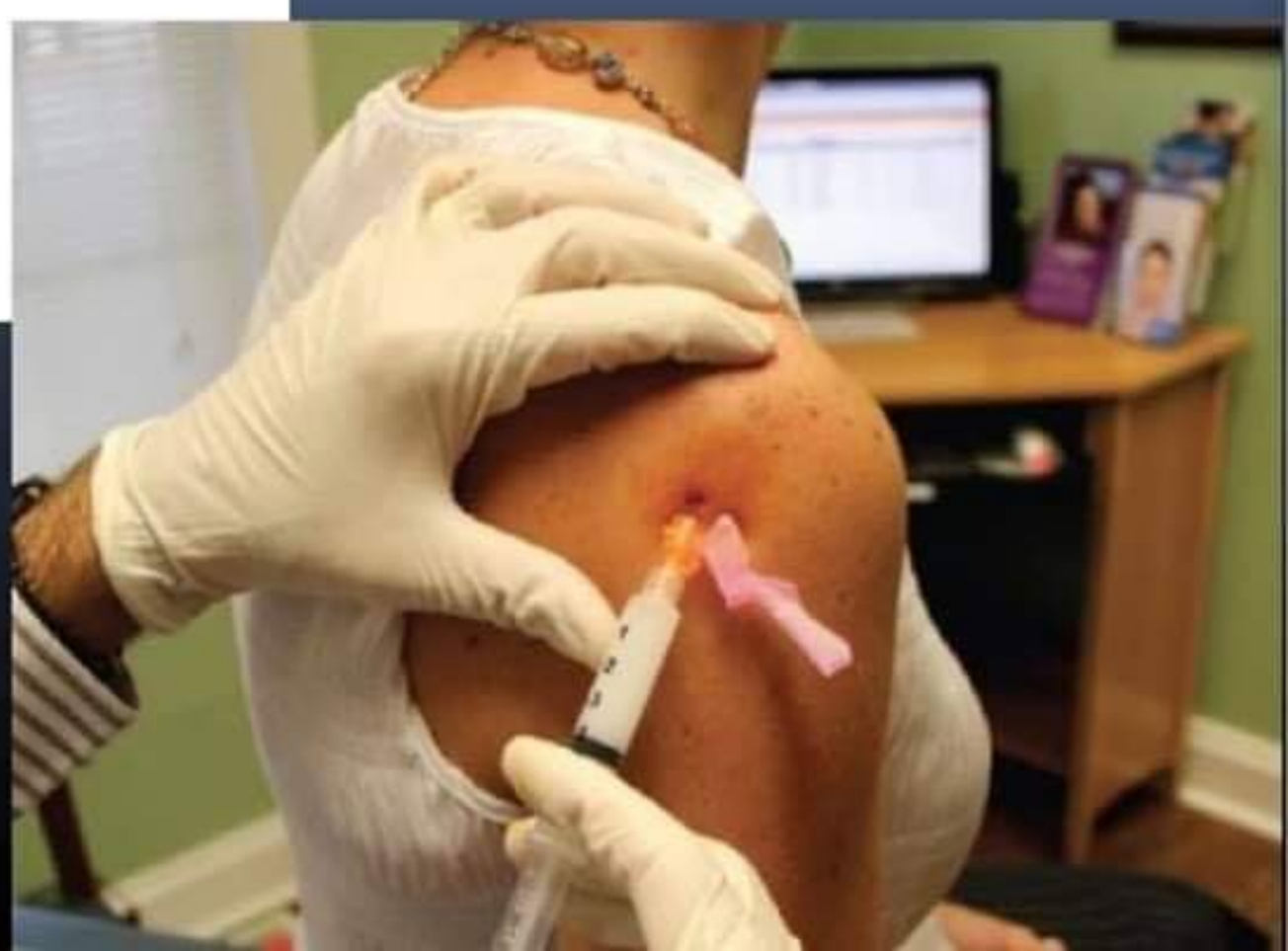


- Target site is identified by placing the index finger of non dominant hand over the superior aspect of the acromion just posterior to the AC joint

Subacromial space injection - technique

- Preparation, placement of 5ml syringe (containing 3ml of 1% Lignocaine and 1ml of steroid solution) with 25 gauge-2 inches needle at 30 degrees to the skin with direction cephalad towards acromion
- Advance the needle till it touches the target ie, the undersurface of the acromion.
- Inject the needle as a bolus into the subacromial space – without resistance
- After withdrawal – move shoulder through ROM





Subacromial space injection - Aftercare

- Avoid excessive use of shoulder
- Consider use of arm sling
- NSAIDS, Ice compression, physical therapy as indicated
- Follow up after 2 weeks

Glenohumeral joint injection

- Indications – shoulder pain, osteoarthritis, adhesive capsulitis
- Two approaches – anterior and posterior.

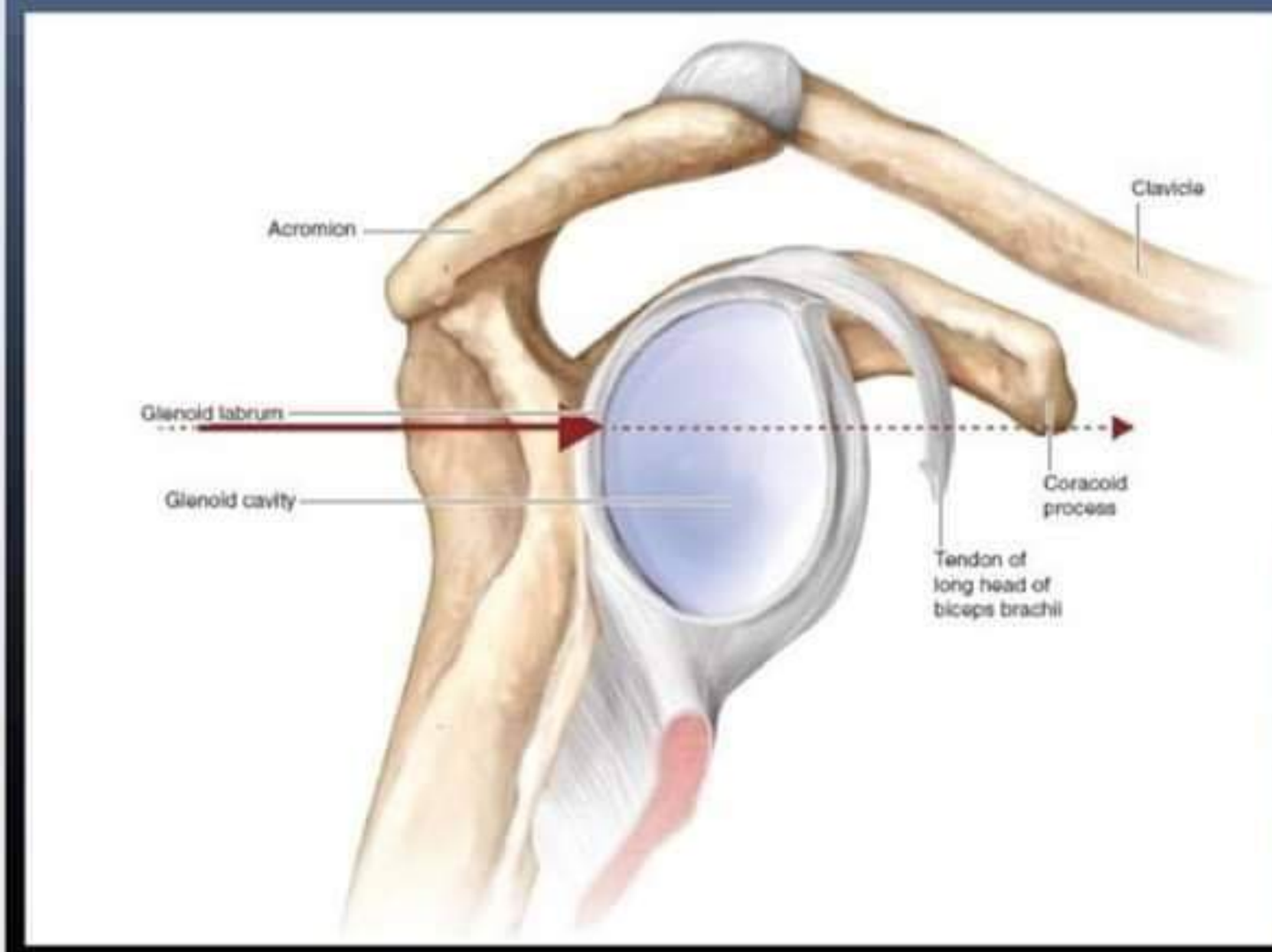
Glenohumeral joint injection – Posterior Approach

- Position – sitting with hands folded, fingers interlaced. Clinician stands lateral, lateral edge of acromion marked, posterior edge of acromion marked, vertical dropped from 2 cm and point marked.

- Target site – coracoid process.

Glenohumeral joint injection – Posterior Approach

- Preparation, needle positioned perpendicular to the skin and directed anterior towards the coracoid process

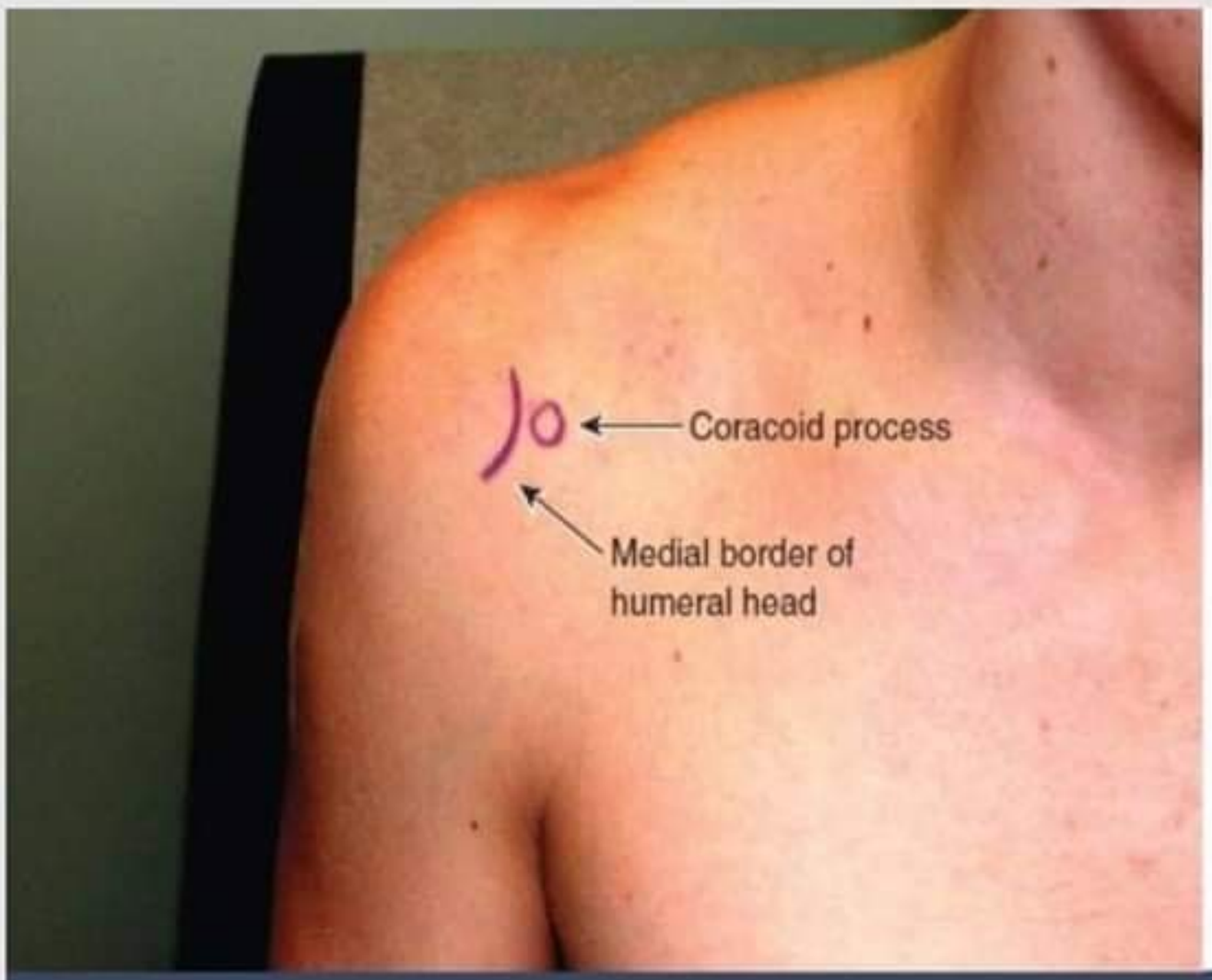


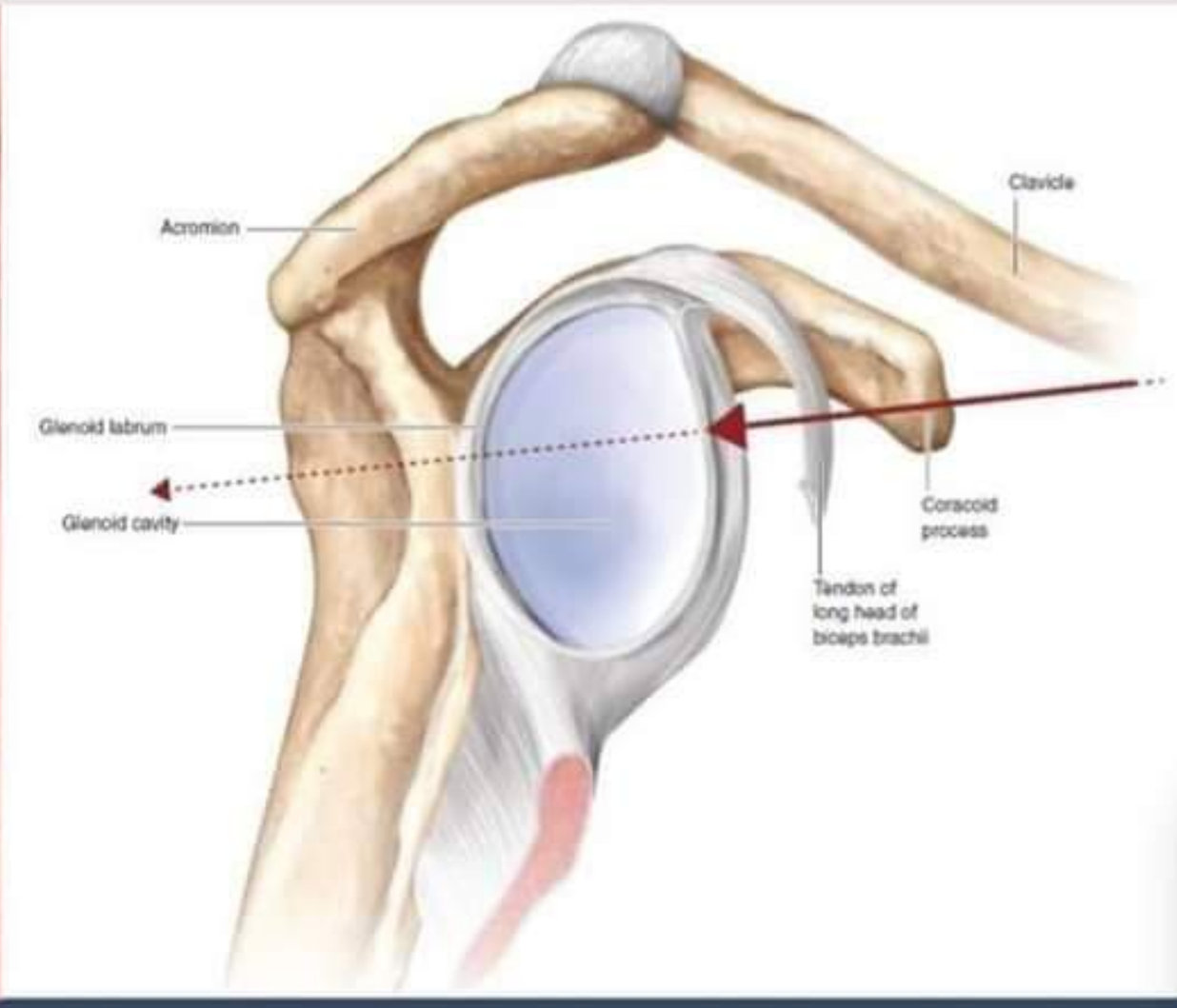
Glenohumeral joint injection – Anterior approach

- Position – Sitting or supine on examination table with hands folded, fingers interlaced and patient's head should be rotated away from the side being injected – minimizes anxiety and pain perception.

Glenohumeral joint injection – Anterior Approach

- Clinician stands lateral and anterior to affected shoulder. Coracoid process identified – injection point 1cm lateral to coracoid, marked.
- Lateral edge of acromion marked, posterior edge of acromion marked – vertical dropped from 2cm downwards – target point.
- Needle inserted perpendicular at the insertion point towards the target.





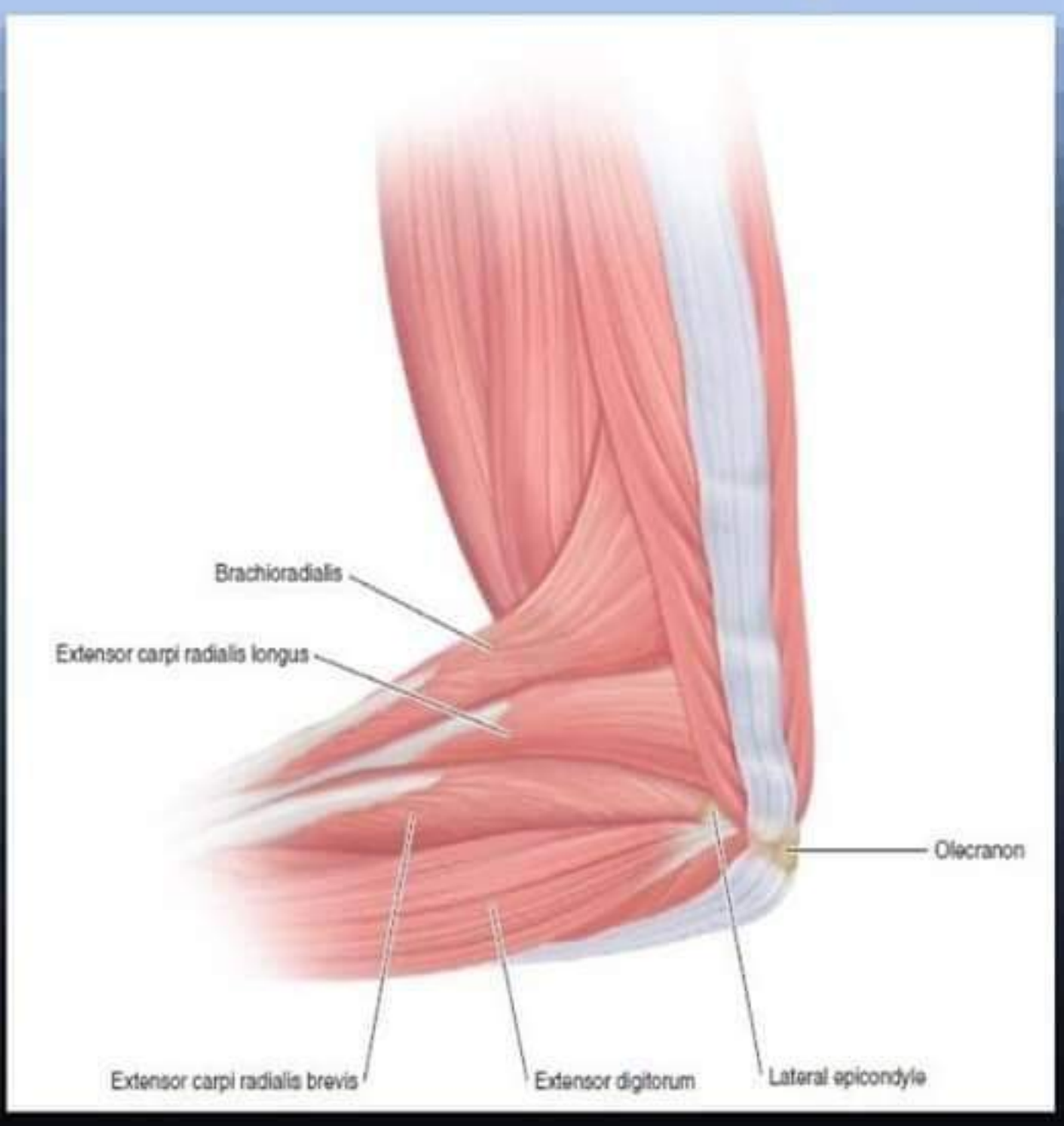
Glenohumeral joint injection - Aftercare

- Shoulder ROM to ensure distribution of the injected solution all over the joint
- NSAIDs, Ice compression and physical therapy
- Arm sling if required
- Follow up after 2 weeks

Acromioclavicular joint injection

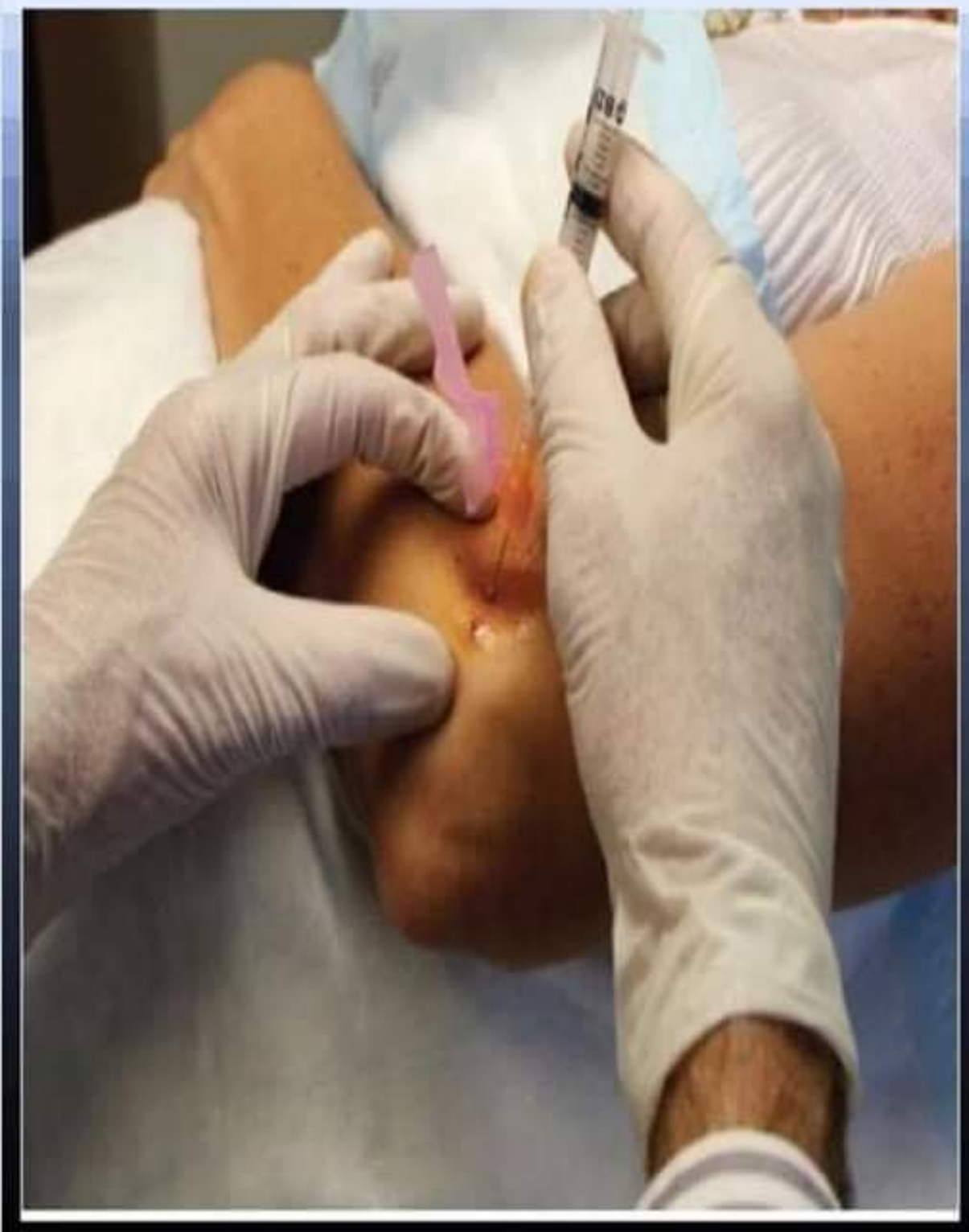
- Indications – AC joint pain, sprain, osteoarthritis, subluxation
- Patient made to sit/lie supine. Clinician stands anterior and lateral to the patient. Clavicle palpated from medial to lateral till a small tender depression is encountered.
- Needle positioned perpendicular to the point – inserted till a “drop” is felt. If not, then the needle is made to “walk”.

Tennis Elbow – Lateral Epicondylitis



- Supine with head of bed elevated 30 deg.
- Affected elbow slightly flexed.
- Wrist in neutral to slightly pronated position with elbow supported with towels and patient's head turned away

Lateral Epicondylitis



- Preparation, needle (5ml syringe containing 1mL of lignocaine + 1mL of steroid solution) placed perpendicular to the entry point – directed medially towards lateral epicondyle

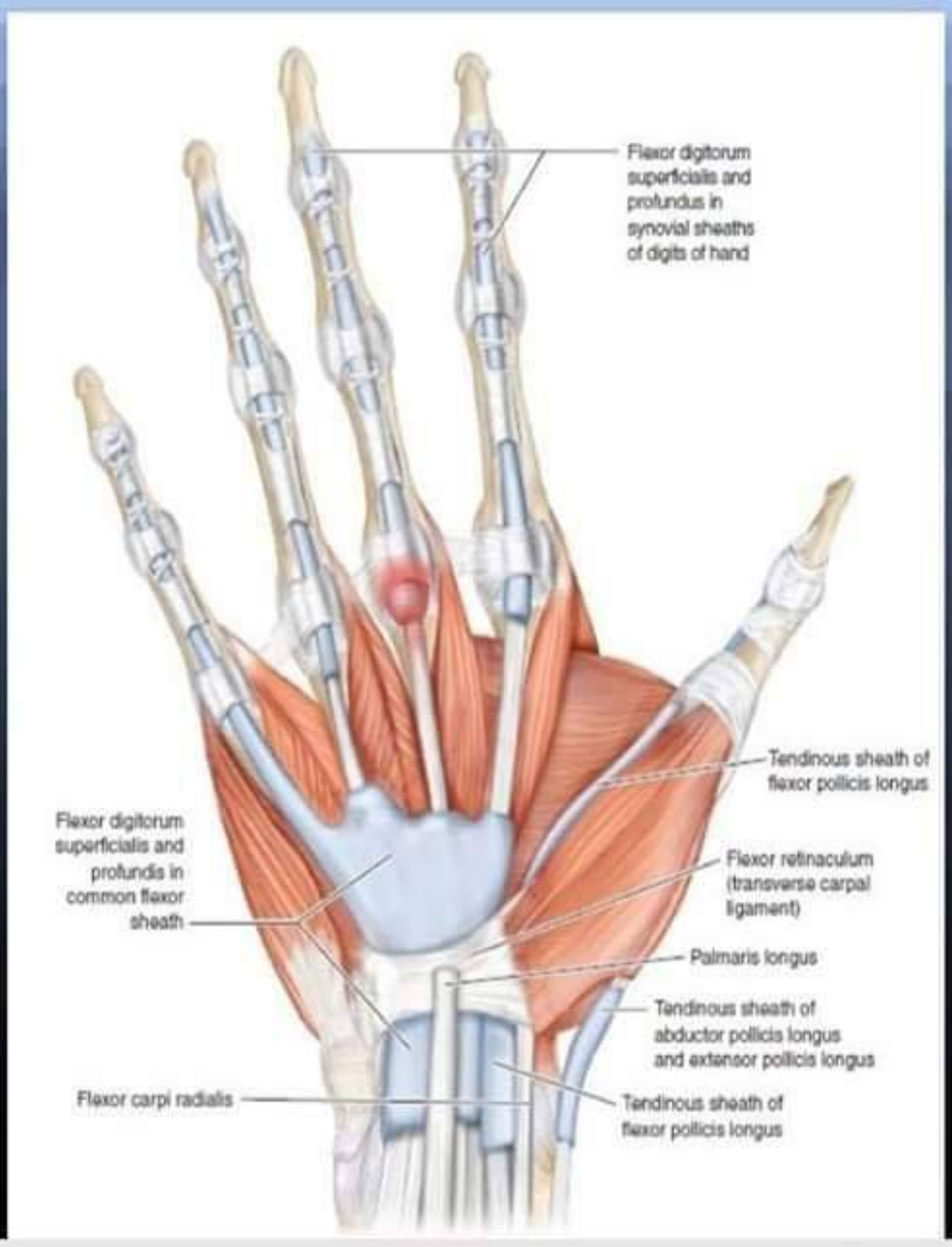
Lateral Epicondylitis

- Needle advanced to the bone of the lateral epicondyle and then withdrawn 1-2mm
- "Pinch" technique then performed followed by injection of the solution

Lateral Epicondylitis Injection -Aftercare

- Immediately after injection – Elbow ROM
- Use of elastic compression bandage
- Avoid excessive elbow and wrist movement
- Follow up after 2 weeks

Trigger Finger – Stenosing tenosynovitis



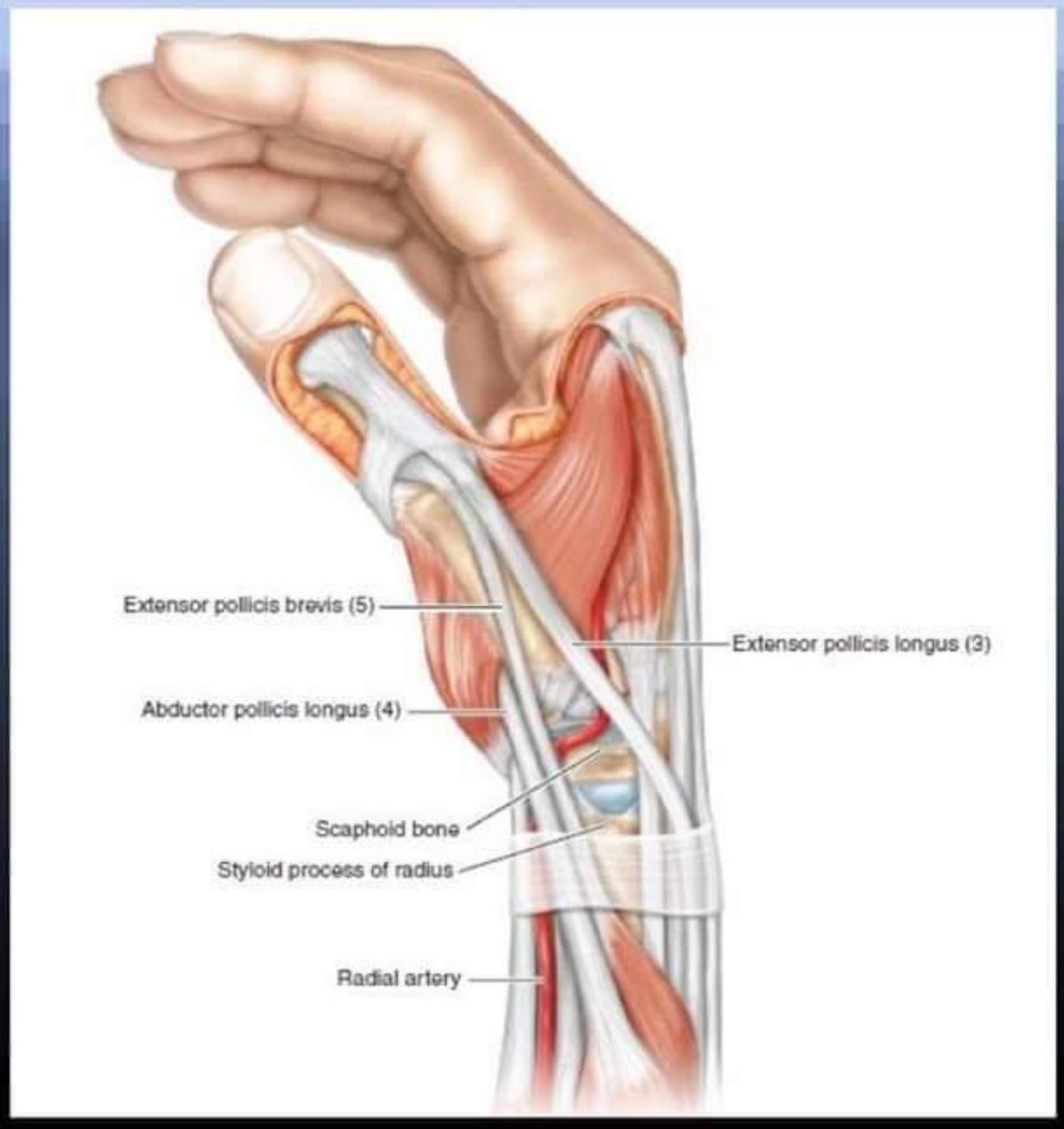
- Tendinosis of the flexor tendons of the digits with nodule formation.
- Supine, wrist in neutral and fully supinated.
- Mark the tender nodule and 1cm distal to it – entry point.

Trigger Finger injection

- Needle positioned 45 deg to skin, directed proximally, advanced till the needle tip meets the nodule.
- Move finger through ROM to ensure distribution.
- Avoid excessive handgrip activities

De Quervain's Tenosynovitis

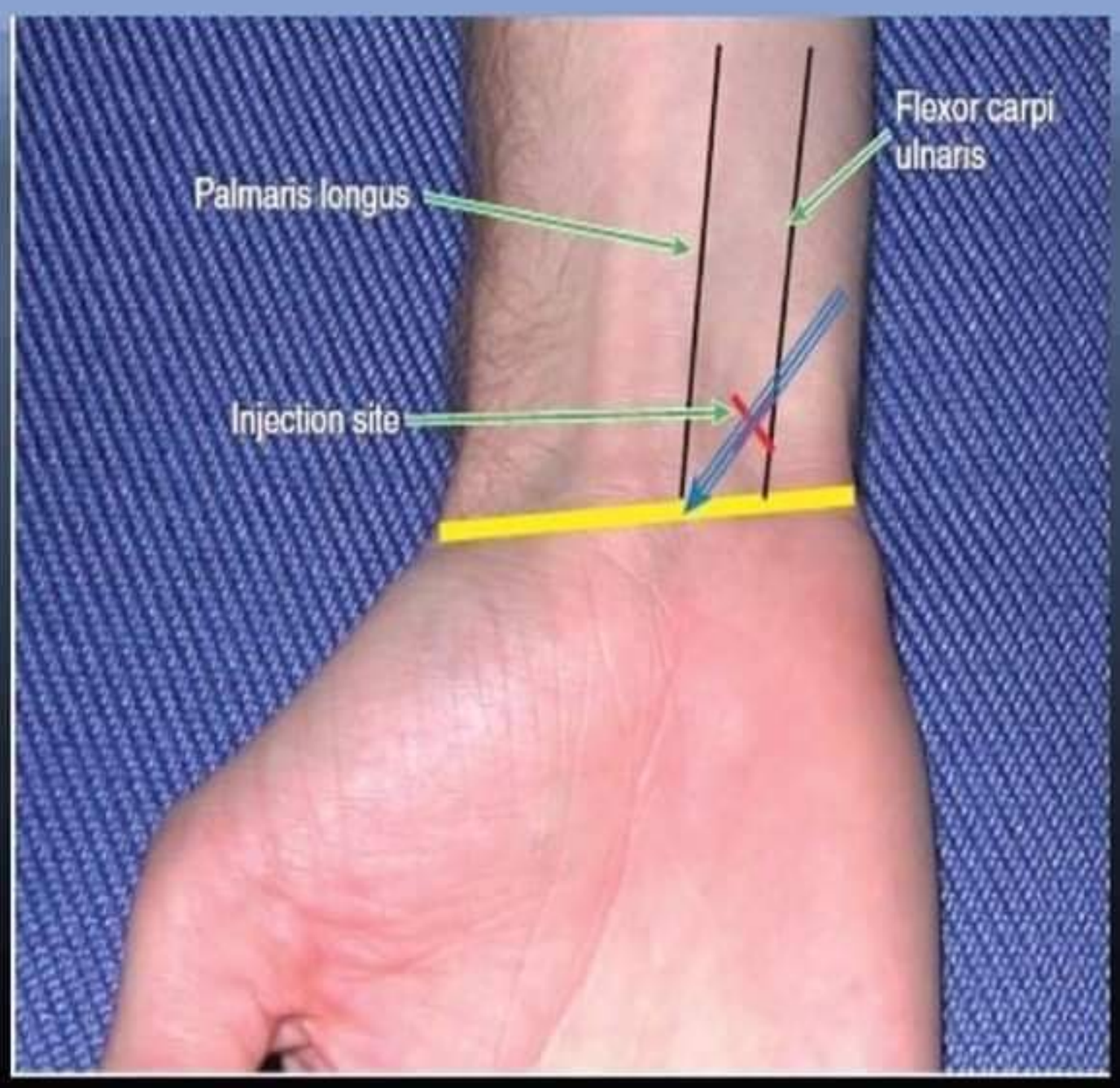
- Stenosing tenosynovitis of the first dorsal compartment of the radial side of the wrist – APL, EPB
- Tender point identified in between APL and EPB – entry point



De Quervain's Tenosynovitis

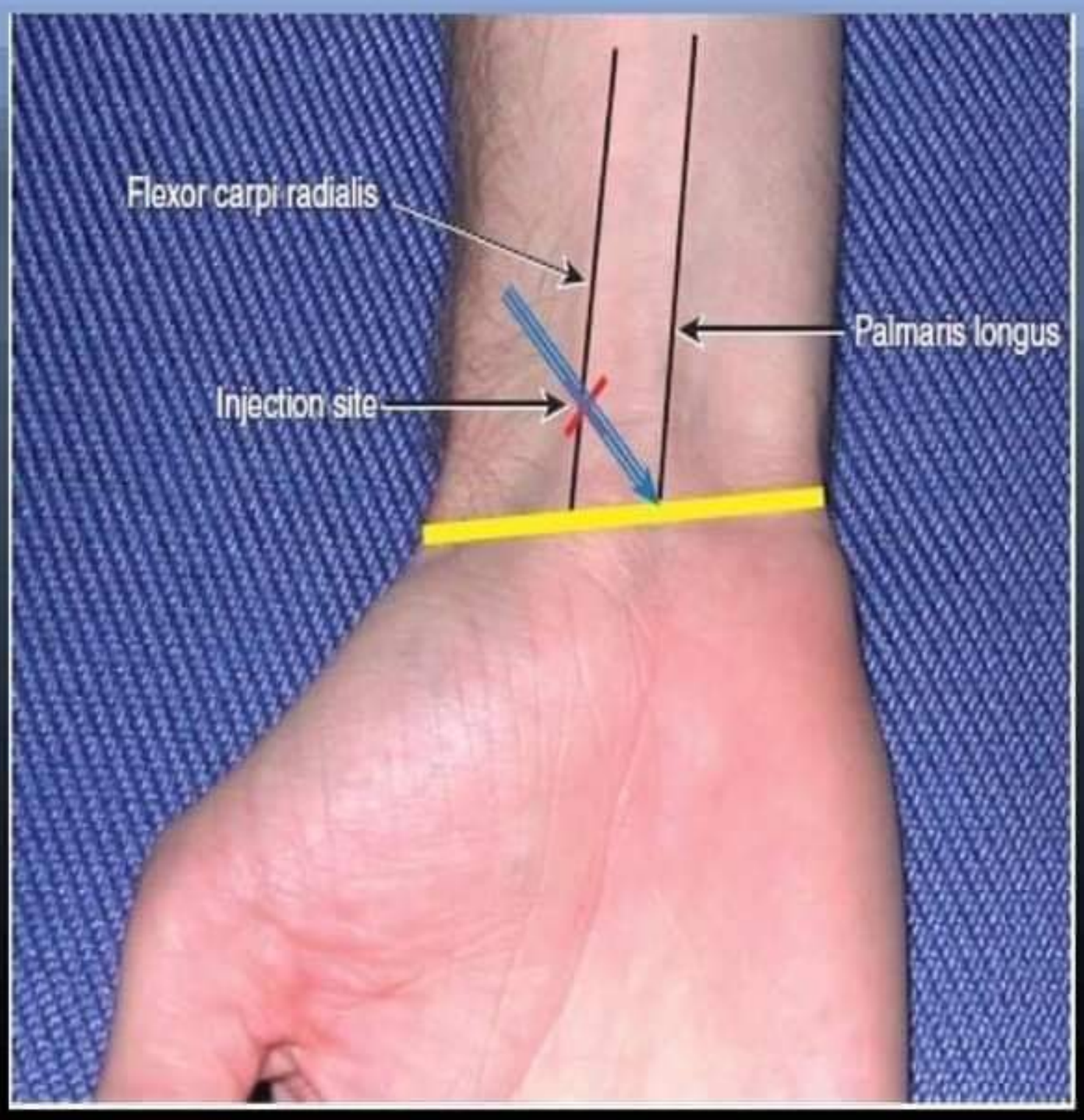
- Needle inserted at tender point, positioned proximally 45 degrees – advanced towards the convergence of the tendons and injected
- Ensure no excessive wrist flexion or pronation by preferably using wrist thumb spica splint.

Carpal Tunnel Syndrome – Traditional Approach



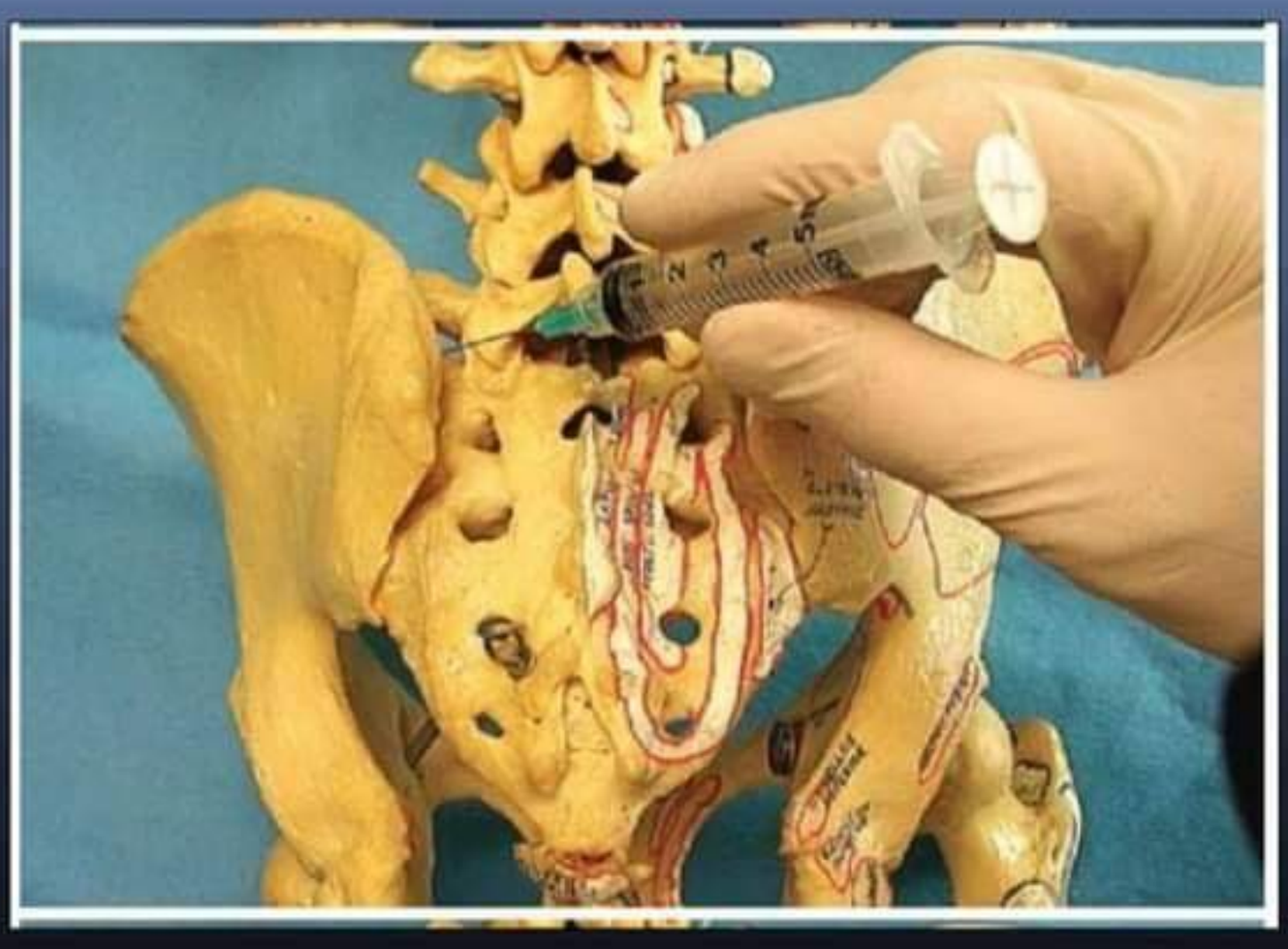
In the traditional approach, the distal palmar crease is identified, the palmaris longus-distal crease intersection identified and a point 1cm proximal and 1cm ulnar to the intersection is marked – the entry point. Needle tip at 30 deg to skin directed to base of thumb

Carpal Tunnel Syndrome – FCR approach



- Needle inserted 1cm proximal to the distal palmar crease at the ulnar border of the FCR
- Tip directed ulnarly and distally

Sacroiliac joint injection

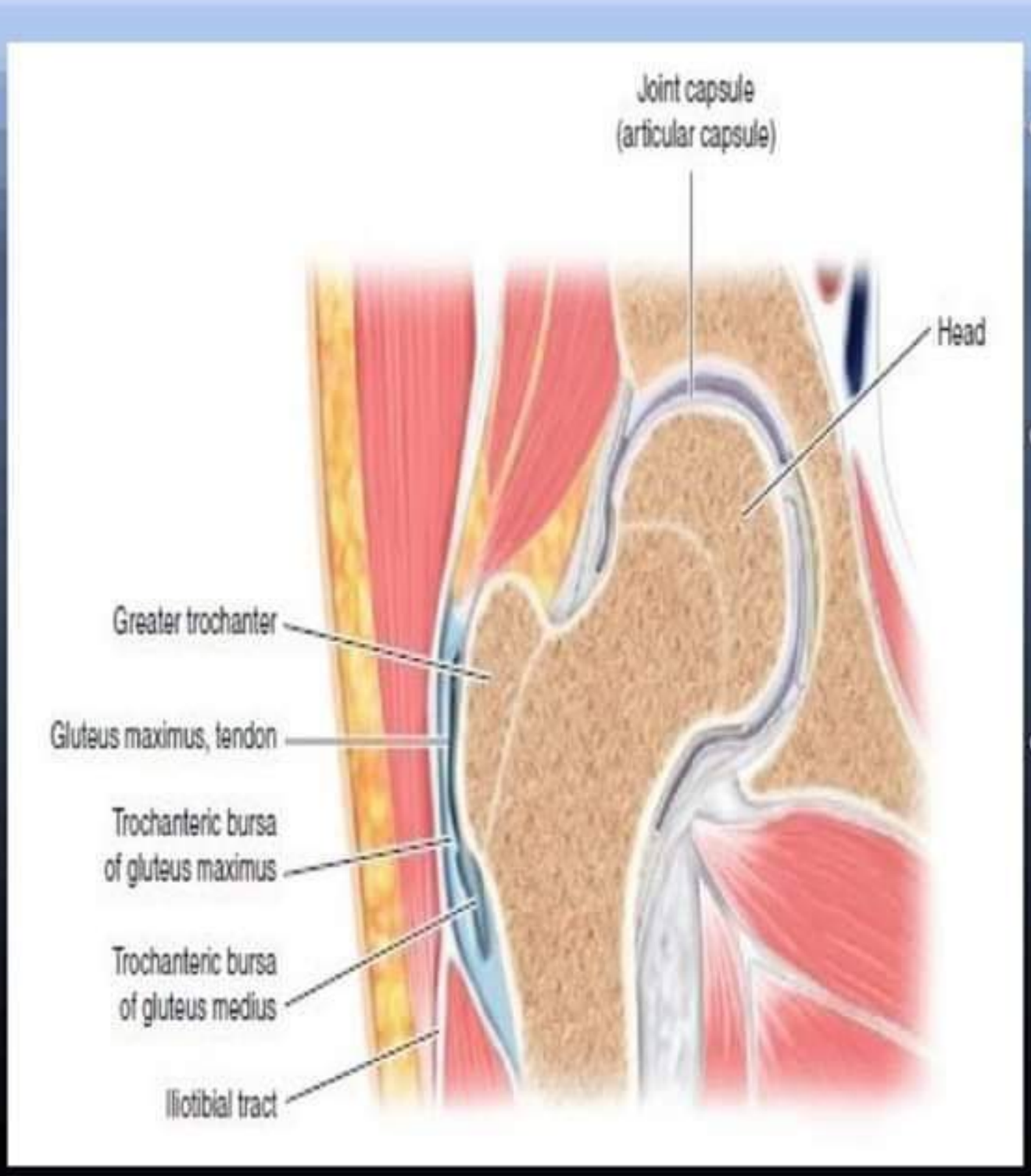


- Indications – Sacroilitis, pain, arthritis
- Patient stands with back flexed forward 45 deg with hands on examination table. Tender point identified by clinician.

Sacroiliac joint injection

Needle placed at a 30-degree angle laterally, relative to the sagittal plane, and 15 degrees inferiorly, relative to the transverse plane, with the tip of the needle directed toward the sacroiliac joint.

Trochanteric bursitis



- Patient lies in lateral decubitus over the unaffected hip
- Area of maximal tenderness over the GT – entry point
- Needle inserted perpendicular towards the trochanter, withdrawn 1-2mm and solution injected

Trochanteric bursitis

- After injection – move hip through full ROM or massage to distribute the solution.
- Consider fanning the injection for wider coverage.

Knee joint injections

- Indications – Knee pain, sprain, osteoarthritis (primary, secondary, post-traumatic)
- Four approaches commonly used - the extended-knee lateral suprapatellar, extended-knee lateral midpatellar, flexed-knee anteromedial, and flexed-knee anterolateral portals.

Knee joint injections

Knee joint – Lateral Suprapatellar Approach

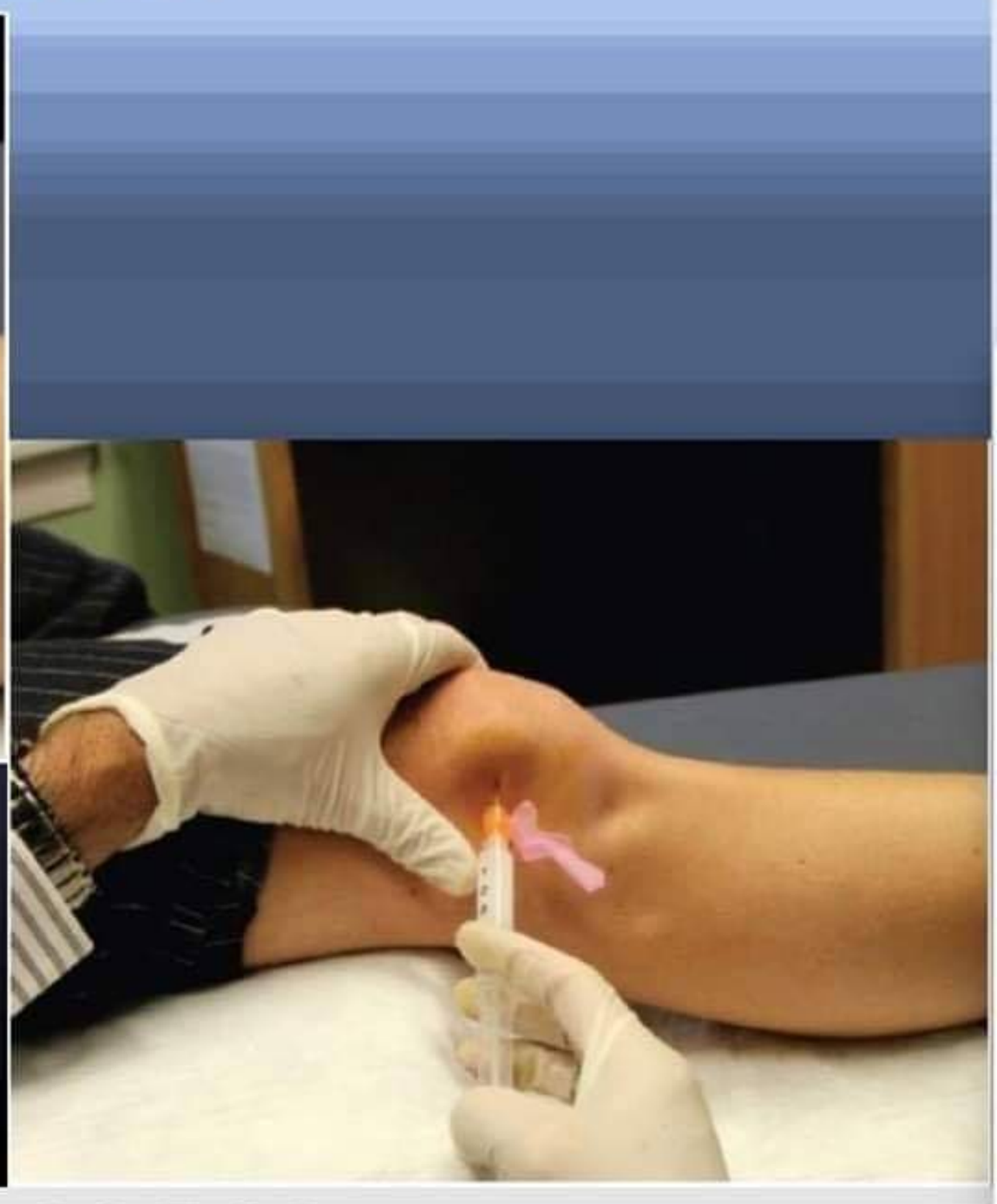
Supine, knee extended, or slightly flexed and supported with folded towels - clinician stands lateral to the affected knee. Superior aspect of the patella located – line drawn vertically 1 cm superior to the proximal margin of the patella - line horizontally along the posterior edge of the patella. Position the 18-gauge, 1½ in. needle and syringe perpendicularly to the skin, parallel to the floor, at a right angle to the other two previously drawn skin lines and with the tip of the needle directed medially.

Knee joint – Lateral Suprapatellar Approach

Knee joint – lateral midpatellar approach

Locate the lateral aspect of the patella, then the patient relaxes the quadriceps muscles, pressure applied to the medial aspect of the patella in order to displace it laterally - sulcus at the midpatella that develops between the lateral undersurface of the patella and the lateral femoral condyle. Position the 18-gauge, 1½ in. needle and syringe over the previously marked injection site in a medial direction and with the needle tip angled up underneath the patella and over the lateral femoral condyle.

Knee joint – lateral midpatellar approach



Knee joint – anteromedial and anterolateral approaches

Palpate the anterior aspect of the knee to locate the patellar tendon.

At the midpoint of the tendon, move about 1 cm medially or laterally. There is usually a depression at that spot – mark the entry point.

Position the 18-gauge, 1½ in. needle and syringe perpendicular to the skin with the tip of the needle directed at a 45-degree angle into the center of the knee.

Knee joint – anteromedial and anterolateral approaches

Knee joint – anteromedial and anterolateral approaches

Morton's Neuroma

Compression of the interdigital nerves in the foot can result in a painful condition referred to as a Morton neuroma - repetitive compressive injury causing inflammation, perineural fibrosis, and enlargement of the interdigital nerve

Morton's Neuroma

- Patient supine, knees flexed, ankle slightly plantar flexed. Most tender point palpated in between heads of metatarsals (sometimes nodule felt) – point of entry.
- Needle directed directly between the metatarsals – injected as a bolus. Massaged once injected.

Plantar fasciitis

Repetitive motion injury with inflammation in the origin of the plantar aponeurosis at the medial tubercle of the calcaneus - usually caused by an excessive pronation of the foot—especially in persons with pes planus.

Plantar fasciitis

Identify the point of maximal tenderness over the plantar aspect of the foot - usually just medial of midline over the medial tubercle of the calcaneus. Then draw a vertical line down the posterior border of the tibia and a horizontal line one fingerbreadth above the plantar surface - the point where these two lines intersect over the medial aspect of the foot is the entry point.

Plantar fasciitis

- Needle directed perpendicular to the skin laterally
- Advanced towards medial tubercle of calcaneus