Knee and Shoulder Injections

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Most common causes of shoulder pain

- Acute arthropathies (RA, PsA, other)
- Rotator cuff tendinitis
- Subacromial bursitis/impingement
- Frozen shoulder (adhesive capsulitis)
- Bicipital tendinitis
- Acromioclavicular joint OA
Pitfalls in Diagnosis

- Bronchogenic carcinoma of the apex of the lung (Pancoast tumor)
- Cervical spine disc lesions or nerve entrapments (C5)
- Heart problems
- Diaphragmatic problems
- Esophageal problems
- Polymyalgia rheumatica
Rotator cuff

Four scapulohumeral muscles (SITS)
- Subscapularis
- Supraspinatus
- Infraspinatus
- Teres minor

Primary function
- Centralize the humeral head, limiting superior translation during abduction
Subacromial bursa

- Extends under the acromion and coracoacromial ligament
- Serves as a gliding mechanism between the rotator cuff and coracoacromial arch
- **Subacromial bursitis**-reactive, part of the impingement process and rotator cuff tendinitis
Shoulder Anatomy
## Corticosteroids for Intra-Articular Injection

<table>
<thead>
<tr>
<th>Corticosteroids</th>
<th>Prednisone Equivalent (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamethasone sodium phosphate (6 mg/mL)</td>
<td>50</td>
</tr>
<tr>
<td>Dexamethasone sodium (4 mg/mL)</td>
<td>40</td>
</tr>
<tr>
<td>Dexamethasone acetate (8 mg/mL)</td>
<td>80</td>
</tr>
<tr>
<td>Hydrocortisone acetate (24 mg/mL)</td>
<td>5</td>
</tr>
<tr>
<td>Methylprednisolone acetate (40 mg/mL)</td>
<td>50</td>
</tr>
<tr>
<td>Prednisolone terbutate (20 mg/mL)</td>
<td>20</td>
</tr>
<tr>
<td>Triamcinolone acetonide (40 mg/mL)</td>
<td>50</td>
</tr>
<tr>
<td>Triamcinolone hexacetonide (20 mg/mL)</td>
<td>25</td>
</tr>
</tbody>
</table>
Supplies for a Subacromial Injection

- 25-g, 1 ½” needle
- 5cc or 10cc syringe
- 3cc-8cc 1% lidocaine
- 1cc triamcinolone (40mg/ml)
- Betadine or Chlorhexidine
- Alcohol pad
- Pen or end of Betadine swab for marking
- Sterile gloves
- Gauze
- Band-aid
- Ethyl Chloride spray if desired
Posterior lateral injection
Injection Procedure

- Palpate bony landmarks for site of needle insertion
- Mark injection site by indenting the skin with a retracted pen or needle cap
- Clean injection site with Betadine or Chlorhexidine, wipe once with alcohol to remove excess
- Do not touch the injection site after it has been cleaned - then can use sterile or non-sterile gloves
  Can use Ethyl Chloride to injection site prior to needle insertion to decrease pain
- Insert needle then inject while slowly pulling the needle back. If pulling back, no need to aspirate
Post-Injection Instructions

- Massage area and move joint through full range of motion
- If patient gets relief after injection, injection should be effective
- Can use ice packs or NSAIDs for pain relief for next 1-2 days
- Rehabilitation starting with range of motion can begin several days after injection (as tolerated)
- Most recommend no >3 injections/joint/year
- Allow 3-6 weeks to determine if injection is effective
Complications

- Skin or fat atrophy
- Altered skin pigmentation
- Infection-septic arthritis (1 per 15,000-50,000)
- Bleeding
- Nerve damage
- Systemic reaction
- Steroid flare-transient increased inflammation at site of injection
  - Starts 6-12 hours after injection and typically resolves by 72 hours
Knee Joint Injections
Indications

For Aspiration
- unexplained effusion
- possible septic arthritis
- relief of discomfort caused by an effusion

For Injection
- corticosteroid delivery for advanced OA or noninfectious inflammatory or crystal arthritis
- delivery of visco-supplementation therapy
Synovial Fluid Analysis

- Cell count
- Gram stain
- Bacterial culture
- Cell count
- Crystal analysis

Table 1 – Synovial fluid analysis

<table>
<thead>
<tr>
<th>Characteristic/ Nature of arthropathy</th>
<th>Normal</th>
<th>Noninflammatory</th>
<th>Inflammatory</th>
<th>Septic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear</td>
<td>Clear</td>
<td>Cloudy</td>
<td>Cloudy</td>
</tr>
<tr>
<td>Viscosity</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low (?)</td>
</tr>
<tr>
<td>WBC count (/μL)</td>
<td>&lt; 200</td>
<td>200 - 2000</td>
<td>2000 - 7500</td>
<td>&gt; 50,000</td>
</tr>
<tr>
<td>% PMN leukocytes</td>
<td>&lt; 25%</td>
<td>&lt; 50%</td>
<td>&gt; 75%</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>Crystals</td>
<td>Negative</td>
<td>Negative (?)</td>
<td>Negative/positive</td>
<td>Negative (?)</td>
</tr>
<tr>
<td>Culture</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
</tbody>
</table>

WBC, white blood cell; PMN, polymorphonuclear.
<table>
<thead>
<tr>
<th>Hyaluronic Acid</th>
<th>Dosage and Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Euflexxa</strong></td>
<td>20 mg (2 mL) once weekly for 3 wk</td>
</tr>
<tr>
<td><strong>Gel-One</strong></td>
<td>30 m (3 ml) single injection</td>
</tr>
<tr>
<td><strong>Hyalgan</strong></td>
<td>20 mg (2 mL) once weekly for 5 wk; some may benefit with a total of 3 injections</td>
</tr>
<tr>
<td><strong>Orthovisc</strong></td>
<td>30 mg (2 mL) once weekly for 3-4 wk</td>
</tr>
<tr>
<td><strong>Supartz</strong></td>
<td>25 mg (2.5 mL) once weekly for 5 wk</td>
</tr>
<tr>
<td><strong>Synvisc</strong></td>
<td>16 mg (2 mL) once weekly for 3 wk</td>
</tr>
<tr>
<td><strong>Synvisc-One</strong></td>
<td>48 mg (6 mL) single injection</td>
</tr>
</tbody>
</table>

Contraindications

- No absolute contraindications for suspected septic arthritis
- Joint prosthesis
- Established infection in nearby structures (e.g., cellulitis, septic bursitis)
- Disrupted skin barrier (e.g., psoriasis)
- Bleeding disorder
- Allergy to topical or injectable anesthetic
Quadriceps muscle
Femur (thigh bone)
Articular cartilage
Anterior cruciate ligament (ACL)
Lateral collateral ligament (LCL)
Posterior cruciate ligament (PCL)
Meniscus
Patellar ligament
Medial collateral ligament (MCL)
Patella (knee cap)
Tibia (shin bone)
Fibula
Prepatellar Bursa

- In front of the lower half of the patella, between the patella and the overlying skin

- **Causes:**
  - constant irritation of kneeling
  - trauma
  - gout
  - infection

- Fluctuant mass anterior to the patella
Pre-Patellar Bursitis
Pes Anserinus Bursa

- Deep to the pes anserinus, 2” below the knee joint margin
- **Bursitis** – overweight, middle-aged to elderly women, with obese legs and OA of the knee
Semimembranosus-Gastrocnemius Bursa

- Beneath the medial head of the gastrocnemius
- 40% of the population have a knee-joint-bursa connection
- One-way mechanism between the joint and bursa, activated from the knee effusion – **popliteal cyst (Baker’s cyst)**
Suprapatellar Bursa

- Between the front of the lower part of the femur and the overlying quadriceps tendon
- The largest of the bursae related to the knee
- Communicates with the synovial cavity of the joint
Methods of Aspiration/ Injection

- Suprapatellar approach
- Parapatellar approach
- Infrapatellar approach
Positioning

- Supra and parapatellar approach:
  - patient is supine with knee slightly flexed using a rolled towel underneath the knee

- Infrapatellar approach:
  - patient is sitting upright with the knee bent at 90° over the edge of the bed
Landmarks
Suprapatellar approach

- Superior aspect of the patella palpated
- Needle inserted 1 cm above & lateral/medial in a 45 degree angle

Fig. 2-5. Arthroscopy of the right knee, lateral approach to the suprapatellar bursa.
Parapatellar approach

- Insert the needle in the midpoint of either the medial or the lateral border of the patella.
- Needle perpendicular to the long axis of the femur.

Fig. 2-6. Arthrocentesis of the right knee, medial approach under patella.
Parapatellar approach
Infrapatellar approach

- Identify either side of the inferior border of the patella and the patellar tendon

- Insert the needle 5 mm below the inferior border of the patella and just lateral or medial to the edge of the patellar tendon