Introduction to Joint Injection Skill Lab

Jarrod King, MD
Denver Health / University of Colorado, USA

Learning objectives

• To understand the differences of various corticosteroid solutions
• To understand the indications for injections around the knee, shoulder, elbow, foot and ankle
• To review the anatomy and approaches for knee and shoulder joint injections
Outline

- Corticosteroid solutions
- Knee injections
- Shoulder injections
- Elbow injections
- Ankle and foot injections

Excellent reference

- DVD with P.E. and procedure videos
- Exercise instruction sheets

Essentials of Musculoskeletal Care 4

John F. Sarwark, MD
Editor
Corticosteroids

- Depot formulation remains at the injected site for extended time period
- Limited systemic effects

Characteristics

<table>
<thead>
<tr>
<th>Corticosteroid</th>
<th>Relative Potency</th>
<th>Onset</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>1</td>
<td>Fast</td>
<td>Short</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>4</td>
<td>Fast</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Methylprednisolone (Depo-Medrol)</td>
<td>4</td>
<td>Slow</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>5</td>
<td>Moderate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Betamethasone (Celestone)</td>
<td>25</td>
<td>Fast</td>
<td>Long</td>
</tr>
</tbody>
</table>
Characteristics

<table>
<thead>
<tr>
<th>Solubility</th>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Equivalent Dose, mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most soluble</td>
<td>Betamethasone sodium phosphate</td>
<td>Celestone</td>
<td>0.6</td>
</tr>
<tr>
<td>Soluble</td>
<td>Dexamethasone sodium phosphate</td>
<td>Decadron</td>
<td>0.75</td>
</tr>
<tr>
<td>Slightly soluble</td>
<td>Prednisolone tebactate</td>
<td>Hydeltrasol</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Triamcinolone diacetate</td>
<td>Hydrocotone</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Methylprednisolone acetate</td>
<td>Depo-Medrol</td>
<td>4</td>
</tr>
<tr>
<td>Relatively insoluble</td>
<td>Dexamethasone acetate</td>
<td>Decadron-LA</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Prednisolone acetate</td>
<td>Prednalone</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Triamcinolone acetoneide</td>
<td>Kenalog</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Triamcinolone hexacetonide</td>
<td>Aristopan</td>
<td>4</td>
</tr>
<tr>
<td>Combination</td>
<td>Betamethasone sodium phosphate–</td>
<td>Celestone Solupan</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>betamethasone acetate†</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*† For example, 0.6 mg of betamethasone sodium phosphate is equivalent to 0.75 mg of dexamethasone sodium phosphate, which is equivalent to 5 mg of prednisolone.

Usual dosage methylprednisolone or equivalent

<table>
<thead>
<tr>
<th>Dose range (mg)</th>
<th>Anatomic site</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 10</td>
<td>Phalangeal joints</td>
</tr>
<tr>
<td>20 to 30</td>
<td>Wrist</td>
</tr>
<tr>
<td>20 to 30</td>
<td>Elbow and ankle</td>
</tr>
<tr>
<td>40 to 80</td>
<td>Shoulder, hip, or knee</td>
</tr>
</tbody>
</table>
Know your steroid

- Most use only one steroid
- Know it’s concentration
- Understand it’s characteristics and common dosages

Sites

- Extra-articular
- Intra-articular
Extra-articular injections

Indications

• Overuse syndromes
• Athletic injuries
• Selected neuropathies
• Bursitis
• Tendinitis

Common extra-articular injections

• Subacromial shoulder for rotator cuff tendinitis
• Lateral elbow for lateral epicondylitis (tennis elbow)
• Lateral wrist for de Quervain tenosynovitis
• Trigger finger
• Lateral knee for iliotibial band tendinitis
• Lateral hip for trochanteric bursitis
• Heel for plantar fasciitis
Joint injection / aspiration
Indications

**Diagnostic**
- Synovial fluid analysis
- Intra-articular fat indicating fracture

**Therapeutic**
- Corticosteroid injection
- Effusion removal

General principles

- Consent
  - Written or documented verbal
- Equipment
- Local anesthetic
- Corticosteroid
- Pre-procedure time out
- Post-Procedure care
Equipment

- Injections
  - 20 - 27 gauge needle
  - 1 - 10cc syringe
- Aspirations
  - 18 - 20 gauge needle
  - 3 to 50cc syringe for
- Anesthetic
- Gauze sponges, band-aid
- Access to equipment for allergy/anaphylaxis

Anesthesia options

- Nothing – “One quick stick”
- Ethyl chloride - “Cold spray”
- Lidocaine: 1% to 2%;
  - 1 - 2 min action onset
  - Duration 1 hour
- Bupivicaine: 0.25 to 0.5%;
  - 30 minute action onset
  - Duration 8 hours
Skin prep

- Sterile prep vs. alcohol prep
- Sterile gloves vs. non-sterile
  - Keep one hand sterile to palpate
- Increased sterility for intra-articular injections
- Indent skin at injection site prior to prep

Post-procedure care

- Evaluation of patient relief in the office
  - “What % is gone?”
- Discussion of steroid effects / expectations
- After injection pain management
  - Ice vs. short course NSAID
- Activity recommendations
  - Rest weight bearing joints for several days to a week
What to warn the patient

- Pain returns after local anesthetic wears off
- If pain is severe or increasing after 48hrs, seek medical care
- Warn of local side effects
Duration

- Duration of pain relief with intra-articular injections of corticosteroids ranges from 1 to 13 weeks
- Pain relief is longer and more effective in patients with RA than in patients with OA
- Pain relief may be enhanced with preliminary aspiration of any effusion

Complications

- Very low complication rate
- Post-injection flare: 2 - 5%
- Iatrogenic joint injection: 1 in 3,000 - 5,000
- Tendon rupture: < 1%
- Hypopigmentation and fat atrophy
  - < 1%
  - Avoid injecting near skin
Post-injection flare vs. infection

- **Post-injection flare**
  - Reaction caused by development of steroid crystals or preservatives
  - Occurs 6-24 hrs after injection; may last 2-4 days
  - Consider aspiration to r/o infection if persists > 4 days

- **Infection**
  - Rare
  - Symptoms persist over 72 hours
  - Warmth, redness, streaking, fever
  - Confirmed by aspiration

Injection frequency

- No EBM guidelines
- **General Recommendations**
  - Large joints
    - Limit to 4 times per year
    - No more than 10 total
  - Small joints
    - Limit to 3 times per year
    - No more than 4 total
  - Steroid injections should be spaced at least 4 weeks apart
Knee Aspirations and Injections

Knee effusion aspiration

- Indications
  - Painful, tense effusion
  - Improve motion
  - Diagnosis (fluid analysis)
Knee effusion aspiration

- Pt supine, knee straight
- Lateral approach, just superior to patella
- Needle parallel to floor, directed medial
- Withdraw plunger until fluid encountered

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Knee joint injection

- With a marking pen, outline the landmarks for entry into the joint
- Understand that the knee joint will extend almost one handwidth above the superior aspect of the patella, especially when a joint effusion is present
Knee joint injection

- Typical entry will occur from the lateral aspect of the knee 1 cm superior and 1 cm lateral to the superolateral aspect of the patella.

Seated knee injection

- Seat with knee bent 90°
- Just above antero-lateral joint line
- Lateral to patellar tendon
- Needle parallel to floor
- Insert needle 1.5 - 2 inches deep
- Aim for center of knee
Knee joint injection

- Must go in 1.5 - 2 inches to get past the fat pad
Extra-articular Injections About the Knee

Pes bursa injection

- Sartorius, gracilis, and semitendinosus tendons coalesce to form pes anserinus
- 2-4 cm below joint line anteromedial
**Pes bursa injection**

- Needle inserted perpendicular to tibia into the point of maximal tenderness
- Touch bone, withdraw 1 mm and inject

**Iliotibial band injection**

- Needle is inserted at the point of maximal tenderness in the region of the lateral femoral condyle
Shoulder Injections

Subacromial injection

- Rotator cuff impingement
- Rotator cuff tendinosis
- Non-op rotator cuff tear
Subacromial injection

- Palpate distal, lateral, and posterior edges of acromion
- Insert needle just inferior to the posterolateral edge of the acromion, directed toward the opposite nipple

AC joint injection

- Indications:
  - Degenerative joint disease
  - Superior to inferior direction
Glenohumeral joint injection

- Indications:
  - Arthritis (Inflammatory or degenerative)
  - Adhesive Capsulitis
  - Difficult to enter joint
  - Consider fluoroscopic guidance

Glenohumeral joint injection
Posterior approach

- 2 cm inferior and 1 cm medial to posterolateral corner of acromion
- Thumb on joint line, finger on coracoid
- Needle horizontal to floor
- Aim needle towards coracoid
- Enter until hit bone, pull back 1mm and inject
Glenohumeral joint injection
Anterior approach

- 1 cm inferior and 1 cm lateral to coracoid
- Needle horizontal to floor
- Direct needle posteriorly, slightly laterally (direction of angle of acromion)
- Touch bone, withdraw 1mm, inject

Elbow Injections
Lateral epicondylitis
“Tennis elbow”

- Indication: lateral epicondylitis that fails to improve with conservative therapy

Lateral epicondyle injection

- Clinical anatomy/landmarks
  - Lateral epicondyle (humerus)
  - Radial head (feel with pronation/supination)
  - Extensor carpi radialis brevis
Lateral epicondyle injection

- Flex elbow 90°
- Area of maximal tenderness
- Angle needle proximally, using lateral epicondyle as a “backstop”

Medial epicondylitis “Golfer’s elbow”

- Same technique, medial side
Olecranon bursitis aspiration

- **Indications**
  - Therapeutic: Persistent, painful swelling
  - Diagnostic: r/o infection
  - Likely to recur

- **Technique**
  - Sterile prep
  - 18-20 gauge needle

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Elbow joint injection

- **Center of triangle formed by**
  - Radial head
  - Olecranon
  - Lateral epicondyle
Foot and Ankle Injections

Plantar fascia injection

- Recalcitrant pain following long conservative treatment
- Palpate the calcaneus medially where it begins to curve upward.
- Insert 21-gauge needle into this area, which is approximately 2 cm from the plantar surface of the foot
**Plantar fascia injection**

- Advance the needle until it hits bone
- Walk needle tip distally along the bone
- Advance needle to its hilt and inject 3 mL of the anesthetic corticosteroid mixture
- Inject the remaining 2 mL while withdrawing the needle about 2 cm
- Then withdraw the needle completely

**Morton’s neuroma**

- Most commonly between 3rd and 4th toes
- Indication: pain refractory to conservative treatment
- Inject between MT heads, go half-way
  - Aspirate to r/o vascular placement
  - Inject
Ankle joint

- Anterior, lateral to Tibialis Anterior tendon

1st MTP

- Diagnostic indication
  - Aspiration - ? Gout
- Therapeutic indication
  - OA
- Technique
  - Distract joint
  - Enter dorsally or medially
References


Thank You