Office Procedures
Practice Makes Perfect

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Essentials of Primary Care 2011

Outline

Injections
• Kinds of injections?
• Practical Tips for Injections in the Office
  – Upper extremity
  – Lower extremity

Fracture care
• X-ray reading
• Splinting and bracing

Outline

My take home tips on Injections:
1. Know your anatomy
2. Use both hands – sense of touch
3. Visualize things in 3D
4. Take your time

Outline

• Preparation
• Landmarks
• Common Injections
Case

Who? 52 year old female, event manager, used to do karate
What? L Knee Acute pain, locking and swelling
When? Left greater than right knee pain x 7 yrs, after kicked in kneecap during karate; Re-injured 1 week ago
How? Stepped off curb
Where? Pain diffusely especially posterior

LOOK
5’2”, 190 lbs
FEEL
• Large effusion
FEEL
• Tender over patella and medial > lateral joint line
MOVE
• ROM Left 10° to 105°; Right 0° to 140°
SPECIAL TESTS
• McMurray positive, pain with hyperflexion, Ligament stress tests negative
What to do?

• 20 gauge needle
• Aspirated 60 cc clear yellow fluid
• Injected 5 cc 2% Xylocaine, 3cc 0.25% bupivicaine, 2cc Aristospan (Triamcinolone)
• Patient pain free after injection
• Told temporary relief only
• Send fluid?
• Refer to Orthopaedics to consider surgery (TKR?)

Preparation

Needles
• 25 gauge – thinner, easier to insert, more resistance
• 22 gauge – My preferred needle
• 20 gauge – less resistance, easier to aspirate fluid

Syringes
• 3 – 10 mL syringe for injection
• 20 – 60 mL syringe for aspiration

Preparation

Solutions to be injected
• If using bottles that will be used more than once, swab top with alcohol
• Withdraw solution in proper order to avoid contamination of larger bottles

“Prep” materials (or prep trays)
• Betadine and gauze
• Alcohol swabs
• Bandaid

+/- topical anesthetic (i.e. ethyl chloride spray)

Steroid Agents

Rifat SF, Moeller JL, Postgraduate Medicine, 2001

<table>
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<tr>
<th>Agent</th>
<th>Relative anti-inflammatory potency</th>
<th>Relative mineralocorticoid potency</th>
<th>Solubility</th>
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<tr>
<td>Hydrocortisone acetate</td>
<td>1</td>
<td>2-3</td>
<td>High</td>
</tr>
<tr>
<td>Prednisolone tibutate</td>
<td>4</td>
<td>1</td>
<td>Medium</td>
</tr>
<tr>
<td>Methylprednisolone acetate</td>
<td>5</td>
<td>0</td>
<td>Medium</td>
</tr>
<tr>
<td>Triamcinolone acetoneidicetate</td>
<td>5</td>
<td>0</td>
<td>Medium</td>
</tr>
<tr>
<td>Betamethasone sodium phosphate and acetate</td>
<td>20-30</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td>Dexamethasone acetatesodium phosphate</td>
<td>20-30</td>
<td>0</td>
<td>Low</td>
</tr>
</tbody>
</table>
Knee Injections

My preferred solutions:
• 3 mL 1% lidocaine or bupivicaine with 2 mL 40 mg/mL methylprednisolone

HA injections
• 3 mL 1% lidocaine to localize joint
• Switch syringe to HA injection

Knee injections

• Superolateral approach preferred (93% accuracy vs. 71-75% bent-knee)

Know your anatomy
Knee Injections

Landmarks
• Superlateral quadrant of the patella (or supermedial)
• Aim toward center of the patella
• Use thumb to stabilize patella and identify lateral (or medial) edge of patella
Knee Injections

Bent Knee approach
- Patient supine or sitting with the knee at 90 degrees
Landmarks: tibial plateau and patellar tendon
- Insert needle lateral or medial to the patellar tendon 1 cm above the edge of the tibial plateau
- Angle needle at 30 - 45 degrees towards center of knee (notch)
- May need 3” needle (minimum 1 ½”)

“Obese” Knee Injections
- Bent knee approach if cannot palpate the patella well
- Use 3” spinal needle for injection
- Inject under fluoro or ultrasound guidance if available
- Recommend weight loss

Post injection
- Check pre and post injection pain levels with provocative tests and palpation (injection can be diagnostic)
- Lidocaine effect should be immediate and the steroid effect will occur in 6 - 24 hours
- Continue other treatments (i.e. stretching, NSAIDS, footwear, +/- nightsplint, etc.)
Post Injection

How long do you rest post-injection?
• Decrease physical activity for 5-10 days after injection

Steroid injections in OA knee

• Intra-articular steroid injection provides short-term benefit for OA knee (78% vs 45% (placebo)
• Long-term improvement (16-24 weeks) in 45% vs 21% (placebo)


Evidence Based CME

• Recommendation: Intra-articular steroid injection is beneficial for short term relief of osteoarthritis, demonstrating greater effects than placebo. The longer term effects of steroid injections lack evidence.

• http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD005328/pdf_fs.html

You want to inject what…?

Viscosupplementation
• The use of intra-articular injections of high elastoviscous solutions of hyaluronans or its derivatives indicated for treatment of osteoarthritis
• Hyaluronic acid (HA) obtained from rooster comb cells (or cultured bacteria)
What does it do?

- Improves viscosity
  - Increases molecular weight and quantity of HA synthesized by the synovium
- Decrease pain (mechanism uncertain)
- Decrease cytokines: Interleukin 1, PGE₂, MMP
  Altman et al., J Rheumatol, 1998
- HA decreases free radicals

What’s out there?

<table>
<thead>
<tr>
<th>Name</th>
<th>Molecular Weight of HA (kD)</th>
<th>Concentration of HA/mL</th>
<th>Dosage Schedule mLx#Wks</th>
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<tbody>
<tr>
<td>Synovial fluid (HA)</td>
<td>6,000-7,000</td>
<td>2-4 mg/mL</td>
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</tr>
<tr>
<td>Synvisc® (Hylan G-F 20)</td>
<td>6,000</td>
<td>8 mg/mL</td>
<td>2 x 3</td>
</tr>
<tr>
<td>Suplasyn®</td>
<td>500-730</td>
<td>10 mg/mL</td>
<td>2 x 5</td>
</tr>
<tr>
<td>Hyalgan®</td>
<td>600</td>
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<td>2 x 5</td>
</tr>
<tr>
<td>Euflexxa®</td>
<td>2,400-3,600</td>
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<td>2 x 3</td>
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<tr>
<td>ARTZ ®</td>
<td>600-800</td>
<td>10 mg/mL</td>
<td>2.5 x 3</td>
</tr>
<tr>
<td>Orthovisc®</td>
<td>1550</td>
<td>15 mg/mL</td>
<td>2 x 3</td>
</tr>
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</table>

Viscosupplementation for OA knee

- N=63 studies, poor quality
- Improvement from baseline 11-54% for pain, 9-15% for function at 5-13 weeks
- More prolonged effects than corticosteroids

How good is it?

- RCT Celestone vs. Synvisc (Hylan G-F 20)
- N = 100, no bone on bone OA
- Modest improvement
- No difference in WOMAC, Knee Society scale, VAS at 3 or 6 months
- Tx failures: 12/50 HA, 8/50 Steroid NS
- Side effects: 1 intra-articular swelling with HA


Side Effects

• Local transient reactions = 2 - 4%
• Usually intra-articular effusion within 2 days
• No infection from contamination

Contraindications

• Skin or joint infection
• Hypersensitivity to avian products (eggs)
• Massive effusion (rule out other pathology)

Application

• Mild osteoarthritis
• Don’t use if there is not an articular cartilage problem
• Co-morbidities affecting other co-morbidity
• Failure of oral medications
• Alternative to steroids
• Not a definitive treatment

What Can You Inject?

• Local Anesthetic
• Steroid
• Prolotherapy
• Platelet Rich Plasma
• Viscosupplementation
**ITB injection**

- 2-3 mL of local anesthetic
- 1 mL of steroid
- Aim for point of maximal tenderness
- Angle needle along length of ITB
- Bathe ITB, should have minimal resistance

- Risks of infection, fat atrophy, skin discoloration, sinus tract

**Tendons**

Which ones NOT to inject?

- Patellar tendon
- Achilles
- Posterior tibialis

- Not absolute

**What’s the Diagnosis?**

**Bursal Injections**

Examples: Olecranon, pre-patellar, pes anserine greater trochanteric (hip), (ganglion)

- Use large gauge needle if aspirating
  - (>20 gauge → Bigger is Better)
- If traumatic, perform within 72 hours or wait 6-12 weeks
- Keep steroid in a separate syringe if aspiration intended
- Traction skin on needle insertion to avoid fistula formation (Z-track)

Doses

- 1 – 2 mL local anesthetic
- 0.5 - 1 mL steroid solution
Plantar Fasciitis Injection #1

Patient Supine

Landmarks:
- Medial tubercle of the calcaneus (insertion of plantar fascia into the calcaneus) is usually the point of maximal tenderness
- Go 2 cm distal to the most tender point then aim needle toward tender point

Dose:
- 2-3 mL of 1% xylocaine and 40 mg of methylprednisolone

Complications (Steroid)
- Steroid flare 6-12 h (2-5%)
- Subcutaneous fat atrophy (<1%) – if < 5mm
- Fistulous tract formation
- Exacerbation of diabetes (rare)
- Cartilage damage
- Tendon rupture (<1%)
- Facial flushing (<1%)
- Allergic/hypersensitivity reactions

Plantar Fascia Injection #2

• Alternative Technique: Injection approach through the medial heel border posterior to the point of heel tenderness
• Avoid inferior approach

How much to inject?
- Small joints – 1-2 mL (total volume of fluid)
- Large joints – 5-10 mL
- Tendon, bursa – 2-3 mL

How often can you inject?
- Not based on evidence
- No more than 3 per year
- Per year?
- Ever?
Shoulder injection approach

- Lateral vs posterior
- 60% vs 80% accuracy (N.S.)


Shoulder Injection

Posterior approach

Landmarks
- Posterior and lateral borders of acromion
- Coracoid

Technique
- Insert needle at Posterior "soft spot"
- Aim parallel to angle of lateral acromion to reach subacromial bursa
- Aim towards coracoid to inject glenohumeral joint

Shoulder Injection

- 5 – 8 mL combination of local anesthetic solutions
- 1 – 2 mL steroid solution

My preferred solutions:
- 8 mL 1% lidocaine with 2 mL 40 mg/mL methylprednisolone
- (or 5 mL 1% lidocaine + 3 mL bupicaine + 2 mL steroid)
Shoulder Injection

Lateral approach

**Landmarks**
- Lateral border of the acromion

**Technique**
- Inject 3 mm below lateral border of the acromion
- Angle needle parallel to plane of the acromion

Shoulder injections

Cochrane review, 2005
- 26 trials, variable quality
- RCTs show subacromial injection slightly better than placebo for rotator cuff disease
- Intra-articular injections better than placebo in adhesive capsulitis

Buchbinder R, Green S, Youd JM. Corticosteroid injection for Shoulder pain, Cochrane Database of Systematic Reviews, 2003

Evidence Based CME

- Recommendation: Subacromial steroid injections for rotator cuff disease and intra-articular steroid injections for adhesive capsulitis provide beneficial but limited effects.


Acromioclavicular Joint Injection

- Inject vertically into the AC joint

- 2 mL Local anesthetic
  1 mL Steroid
Epicondylitis Injections
Lateral and Medial
- Use 25 (or 22) gauge needle
- 2 mL local anesthetic
- 1 mL steroid solution
- Insert needle toward point of maximal tenderness (tendon insertion into epicondyle)
- May fan injection around tendon insertion
- Do not inject if resistance

Dequervain’s Tenosynovitis
- Use 25 gauge needle
- 1 mL local anesthetic
- 0.5 mL steroid solution
- Insert needle between the Abductor Pollucis Longus and Extensor Pollucis Brevis tendons
- Inject into the sheath

Trigger Finger Injection
- Use 25 gauge needle
- 0.5 – 1 mL local anesthetic
- 0.5 mL steroid solution
- Identify nodule
- Insert needle onto nodule and pull back slightly
- Fan injection around the nodule

Need Guidance?
Ultrasound
- Shoulder
- Hip
- Bursas
- Plantar fascia
Fluoroscopy
- Hip flexor
- SI joint
- Lumbar facet
Biceps Tendon Injection

Knee Injection

Fluoroscopic guidance
- Hip flexor
- SI joint
- Lumbar facet
- Shoulder

Courtesy of Dr. Ron Adler, Hospital for Special Surgery, 2005
Outline

• ABC’s of X-ray reading
• Definitions for describing a fracture
• Common fractures
• Emergency situations

Reading an MSK X-ray ABCS

• P - Patient
• Q - Quality of the film
• R - R or L
• S - Series (Films performed)
• T - Time/Date of x-ray

Reading an MSK X-ray ABCS

• Describe the type of film
  • A – alignment
  • B – Bone
  • C – Cartilage
  • S – Soft tissues

Plane
  • AP / PA = Coronal
  • Lateral = Sagittal
  • Oblique

How to Describe a Fracture

1. Number of fragments
   • Simple – two fragments
   • Comminuted – more than two fragments

[Image of comminuted fracture]
How to Describe a Fracture

2. Infection risk?
   • Open (Compound) – open wound
   • Closed

How to Describe a Fracture

3. Direction of the fracture
   • Transverse
   • Oblique
   • Longitudinal
   • Spiral

How to Describe a Fracture

4. Problems?
   • Displacement
   • Angulation
   • Shortening
   • Rotation
   • Intra-articular

   • Think of each problem - May have more than one
   • Convention is describing the relationship of the distal fragment relative to the proximal fragment

Complications

Short
   • Neurovascular injury
   • Compartment syndrome
   • Infection with open fracture
   • Fat embolism
   • Bleeding / hypovolemia

Long
   • Arthritis
   • Malunion
   • Nonunion
   • Avascular necrosis
   • Contracture
Avulsion Fractures

- Base of 5th avulsion #
- Due to pull of peroneus brevis
- Most common foot fracture (90%)

Treatment
- May treat conservatively as a sprain
- Usually heals in around 6-12 weeks

Tumor

Benign
- Well circumscribed

Malignant
- Cortical disruption
- Irregular
- Beware PATHOLOGIC FRACTURE!!

Benign Bone Tumor

Salter Fractures (Physeal Injury)

Complications
- Neurovascular injury
- Compartment syndrome
- Growth disturbance
- Associated ligament injury

Treatment
- Closed reduction and cast immobilization x 4 to 6 weeks
- Needs to be followed for growth disturbance
Bone Response to Stress

- Complete Fracture
- Stress Fracture
- Stress injury
- Stress reaction
- Accelerated remodeling
- Normal remodeling


Diagnosis

- X-ray
  - Periosteal thickening (takes > 2 weeks to appear)
  - Fracture line
- Bone Scan
- MRI

Traction vs. Compression Stress Fractures

- Tibia –medial, anterior*
- Foot – metatarsal shafts or base of 5th metatarsal (metaphysis – Jones fracture*)
- Spine – Spondylolysis L5 pars interarticularis*
- Pelvis – pubic rami, ischial tuberosity
- Femoral neck*
  - * denotes high risk of non-union

How to talk to Ortho

- Which films
- Which bone?
- Location on the bone
  - Distal, proximal
  - Epiphysis, metaphysis, diaphysis
- Direction of the fracture
- Complicating factors?
- When was the fracture?
- Patient co-morbidities
Taping, bracing, and protection

- Know how to tape, pad, and protect common injuries
- Know how to provide early therapeutic treatment

Can the Athlete Play Safely?

- Make a working diagnosis
- Is there potential for worsening injury?
- Is there potential for a new secondary injury
- MD or trainer decides: CAN THE ATHLETE PLAY SAFELY?
- If there’s a medical problem and you can’t clear them, put your foot down

Can the Athlete Play Effectively? Pain-Free?

- Athlete, coaches and medical staff decide can the athlete play effectively
- Athlete needs to indicate can he/she play relatively pain free

Return to play

- Can the patient play safely?
- Can the patient play effectively?
- Can the patient play relatively pain free?
Thank You!

Colles

Smiths

Pelvic
Scaphoid

- May go on to non-union
- Treat with immobilization for 8-12 weeks
- May require ORIF

Boxer’s

LisFranc

Jones Fracture

- May go on to non-union
- Treat with immobilization for 8-12 weeks
- May require ORIF
Supracondylar Fracture

Radial Head

Ankle

• Joint Models (as many as possible)
• Syringes and needles
• Pens and alcohol swabs
• Splinting materials (? SAM splints)

• Need live demo model – shorts and no socks