JOINT INJECTION WITH STEROIDS

I. Indications

Joint injection with corticosteroids usually (but not always) is only palliative, helps only locally, and is temporary. Common indications include:

1. Rheumatoid arthritis- Joint injection is not usually a primary therapy in RA, for the simple reason that most RA patients have too many joints involved to allow injection therapy to be an efficient method of treatment. Injections in RA are used as an adjunct to systemic therapy, when the patient has one or a few joints which are just not doing quite as well as would be liked.

2. Spondyloarthropathies (AS, Reiter’s, psoriatic arthritis)-Injections can be used as primary therapy in this family of diseases, since their associated arthritis is often mono/oligoarticular, and since there are no clearcut guidelines for therapy if NSAIDs are ineffective.

3. Crystal-induced arthritis- Intraarticular steroids can be useful in gout, pseudogout, and other crystal arthritis, particularly when NSAIDs or systemic steroids are contraindicated. This is based on clinical experience, since there are few if any controlled clinical trials. Keep in mind that the differential diagnosis of an acute inflammatory monoarthritis is gout, pseudogout, and septic arthritis: so always be alert for the possibility of gout or pseudogout with a concomitant septic joint.

4. Osteoarthritis- Steroids can improve the symptoms of OA, particularly in the presence of large effusions, and/or if the WBC count of the effusion is on the high side. Steroid injections probably work both through non-antiinflammatory pharmacological effects on synovial fluid formation and resorption, and because OA, even though a “non-inflammatory” arthritis, often has a component of mild
inflammation. Unfortunately, the benefits are transient, and injections in OA typically help for only 1-2 months or so at best. The best evidence for benefit is in the knee; the jury is still out on the shoulder; it does not appear that injection of the basilar joint of the thumb (1CMC) helps reliably.

II. Contraindications to joint injection

1. Infection in or near the joint.
2. Concurrent bacteremia or infection away from the joint.
3. Existing severe joint destruction or unstable joint - corticosteroid injection may decrease pain, allowing increased use of the joint and further joint damage, or may inhibit maintenance of joint integrity and repair.
5. Failure of previous intra-articular steroids.
6. Multiple recent injections.
7. Prosthetic joints? - definite increased risk of infection.

III. Beneficial effects of injection to be expected are:

1. Improvement in 1-7 days
2. Improvement lasting 2 weeks to 12 months or more
   - OA of knee: likely to help but transient: peak at 2-4 weeks, benefit up to 8 weeks
   - RA: likely to help, sometimes significantly, sometimes for months (occasionally 6+ months).
3. Efficacy depends on:
   type of arthritis: degree of inflammation vs. degeneration
   definite injection into joint
   joint injected
   preparation used
   joint protection
IV. **Adverse effects**

1. **Iatrogenic infection**— extremely low incidence (1 in 10,000?), but definite; association with atypical mycobacterial infections.
2. **“Steroid arthropathy”**— progressive joint deterioration due to inhibition of cartilage repair, ischemic necrosis, periarticular osteopenia; whether this occurs in humans is unknown, and the risks of this probably do not outweigh the steroid inhibition of inflammatory joint destruction.
3. **Post-injection flare**— may happen more with certain drugs (Aristospan?); may happen more with soft tissue injections rather than joint injections.
4. **Tendon rupture/soft tissue atrophy/nerve damage**— if the joint is missed.
5. **Systemic absorption**— general improvement of inflammatory arthritis; very rare cases of HPA suppression, transient Cushing’s, ischemic necrosis, uterine bleeding, pancreatitis.

V. **Preparations Available**

1. Types of steroids preparations: there is very little “hard” data to decide on which drug to choose, dose, or frequency.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Conjugate</th>
<th>Trade Name</th>
<th>Cortisol Equivalents</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>acetate</td>
<td>Decadron</td>
<td>30</td>
<td>short</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decadron-LA</td>
<td>30</td>
<td>long</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>phosphate</td>
<td>Celestone Soluspan</td>
<td>25</td>
<td>short/long</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td></td>
<td>Depo-Medrol</td>
<td>5</td>
<td>long</td>
</tr>
<tr>
<td>Prednisolone</td>
<td></td>
<td>Hydeltra-TBA</td>
<td>4</td>
<td>long</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>acetonide</td>
<td>Kenalog</td>
<td>5</td>
<td>long</td>
</tr>
<tr>
<td></td>
<td>diacetate</td>
<td>Aristocort</td>
<td>5</td>
<td>long</td>
</tr>
<tr>
<td></td>
<td>hexacetonide</td>
<td>Aristospan</td>
<td>5</td>
<td>very long</td>
</tr>
</tbody>
</table>

The duration of action is largely determined by salt of the steroid preparation and by the mechanical properties of the material. There is no consensus as to the “best” steroid preparation.

2. **Dose**— There is likewise no consensus as to the proper amount of steroid to be injected. Larger doses may produce a very prolonged effect, but may also lead to “steroid arthropathy”. In general, the larger the

<table>
<thead>
<tr>
<th>Size of joint</th>
<th>Example</th>
<th>Amount of Kenalog</th>
</tr>
</thead>
<tbody>
<tr>
<td>large</td>
<td>knee, ankle, shoulder</td>
<td>20-60 mg</td>
</tr>
<tr>
<td>medium</td>
<td>elbow, wrist</td>
<td>10-30 mg</td>
</tr>
<tr>
<td>small</td>
<td>MCP, IP, MTP</td>
<td>&lt;5-15 mg</td>
</tr>
</tbody>
</table>
dose used, the more aggressive the joint protection should be, and the less frequent the injections. **Remember these drugs come in different concentrations** (e.g. triamcinolone acetonide/Kenalog as 10 mg/ml and 40 mg/ml): as a clinician think in terms of milligrams, not milliliters.

3. Frequency of injection- There isn’t much data to reliably help us decide on the frequency of injection. Frequent injections probably control inflammation better and help protect the cartilage from the damage of inflammation, but probably increase the risk of steroid-induced cartilage breakdown and other kinds of joint deterioration. A few studies suggest that osteoarthritic knees tolerate injections without apparent damage every 3 months for 2 years; RA joints injected 4 times a year have less damage from RA. “Eminence-based recommendations” suggest that the frequency of joint injection should be kept to a minimum to avoid the potential risk of steroid arthropathy, probably no more often than 3 (maybe 4?) times a year or so at the most.

4. Joint protection- After injections, joints should be “protected” to limit steroid induced deterioration, and to give the steroid a chance to work. With non-weight bearing joints this means avoiding trauma (e.g. hammering) and perhaps using a splint; weight bearing joints should be rested as much as possible, using at least a cane or crutches. The protection should last for at least several days, and preferably several weeks.

5. Use of anesthetic mixed with steroid for injection- Local anesthetic mixed with the steroid may give some transient relief of pain, may allow better diffusion of steroid throughout the area and avoid very high local concentrations of the steroid (particularly important in soft tissue injections more than joints). However, the preservatives (mostly parabens) found in most local anesthetics can cause flocculation of the steroid into a whitish solid, and it’s not clear whether the steroid still works. Mixing together material from 2 different vials could introduce yet another potential source of bacterial contamination. Relying on relief of pain as proof that the injection was in the proper place is inaccurate, too delayed to be of any value, and really shouldn’t be necessary in joint injection. Clinical practice is varied and not evidence-based. I tend to not include local anesthetic with the steroid in joint injections; I do tend to mix anesthetic with steroid in soft tissue injections.

**Techniques of Arthrocentesis**

I. **Materials**

<table>
<thead>
<tr>
<th>Antisepsis</th>
<th>Anesthesia</th>
<th>Syringes/needles</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>povidone/iodine or chlorhexidine swabs</td>
<td>1% lidocaine in insulin/TB syringe</td>
<td>10 ml syringe (1-60 ml)</td>
<td>EDTA tube (lavender) syringe itself</td>
</tr>
<tr>
<td>1 alcohol swab</td>
<td>(ethyl chloride spray)</td>
<td>20-22G long needles</td>
<td>heparin tube (green) sterile container</td>
</tr>
<tr>
<td>(sterile gauze)</td>
<td>(nothing)</td>
<td>16-27 G</td>
<td></td>
</tr>
</tbody>
</table>
Have a hemostat available in case needle breaks off at hub, or you want to switch syringes in midst of aspiration/injection.

II. Technique
1. Make sure the joint is relaxed and in a comfortable, stable position.
2. Mark the landmarks with the closed end of a ball-point pen.
3. Clean with betadine or chlorhexidine, 1 alcohol swab.
4. Make a skin wheal with lidocaine; infiltrate the subcutaneous tissue through the wheal.
5. Advance needle, aspirating as it’s advanced, feeling for “pop” as needle enters joint cavity.
6. For joint aspiration and synovianalysis: aspirate fluid; if none is obtained try “milking joint”
7. For joint injection: aspirating joint and seeing fluid confirms needle is placed in joint; if diagnosis is uncertain (particularly if there is any suspicion of infection) consider aspirating enough fluid to examine). Steroid mixture should go into the joint with minimal pressure on plunger.

III. Landmarks for joint aspiration/injection
A. Glenohumeral joint (“shoulder joint”)
   1. anterior- shoulder externally rotated; landmark 1 cm inferior and 1 cm lateral to coracoid, in groove just medial to humerus; needle directed slightly superiorly and laterally.
   2. posterior- shoulder internally rotated; landmark at middle of lateral third of scapular spine, immediately beneath spine; needle directed anteriorly.
   3. lateral- shoulder neutral; landmark over supraspinatus tendon just underneath acromion; needle directed deeply under acromion (basically just a bursal injection, but go deeper).
B. Acromioclavicular- directly into groove at lateral end of clavicle from superiorly, medial to acromion.
C. Sternoclavicular- directly into groove at medial end of clavicle, lateral to sternum.
D. Elbow
   1. elbow flexed at 45-75 degrees; landmark just posterior and distal to lateral epicondyle into groove palpated; needle directed either perpendicular to skin or toward head of radius.
   2. elbow completely extended or flexed; needle directed in bulge visible just lateral to olecranon, between lateral epicondyle and head of radius.
E. Wrist
   1. wrist very slightly flexed; landmark just distal and ulnar to radial tubercle; needle directed perpendicular to skin.
   2. wrist very slightly extended; landmark slightly distal and ulnar to above site, in depression that appears when wrist is extended (just distal to lunate); needle directed perpendicular to skin.
F. 1st CMC- thumb flexed across palm; landmark in groove at base thumb, directed toward proximal fourth metacarpal; avoid pollicis longus tendon.

G. MCP/IP- joint line is distal to “knuckle” usually about at distal skin crease; enter to either side of extensor tendons, avoiding digital artery and nerve; joint can be widened by gentle traction on digit.

H. Knee
   1. medial- knee fully extended and quadriceps/patella relaxed; landmark at junction of medial joint line and patella (at intersection of “T” formed); needle directed at 30-45 degree angle from horizontal, slightly superiorly; as further help, fluid can be pushed from the suprapatellar pouch and the patella rocked by pushing down of lateral border.
   2. lateral- basically the same as medial approach, but using lateral joint line and patellar border.
   3. suprapatellar- as above, but needle directed from laterally directly into distended suprapatellar pouch.
   4. infrapatellar- knee flexed and hanging free over table; landmark immediately below patella on either side of patellar tendon; needle directed superiorly and slightly medially (this approach is better for injection than for aspiration).

I. Tibiotalar
   1. anteromedial- ankle slightly plantar flexed; landmark between medial malleolus and extensor hallucis longus; needle directed slightly laterally and superiorly.
   2. anterolateral- landmark 1-2 cm anterior from lateral malleolus; needle directed slightly medial and superiorly; risk hitting dorsalis pedis artery.

J. Subtalar- ankle relaxed, subtalar slightly inverted; landmark just beneath lateral malleolus or over sinus tarsi; needle directed perpendicularly to skin.

K. Tarsal- needle directly into area of maximal tenderness or palpable joint line; may require fluoroscopy.

L. 1st MTP- Joint line is not where the “joint” is biggest: the “biggest” part of joint is the head of the 1st metatarsal bone. The joint line is distal to where joint is biggest. Slightly flex toe down, and feel from medially/superiorly just distal to the biggest part of “joint”; use other side as an example.

Joint aspiration/injection of the hip, the SI joints, any deep axial joint, and probably the temporomandibular joint should be reserved for experienced operators, or with use of fluoroscopy.