SACROILIITIS

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Epidemiology

• First described as a source of pain by Goldthwaite and Osgood in 1905

• Accounts for 15-25% of axial low back pain

• May rise to 20-80% in pregnant women
SI JOINT ANATOMY

- Largest axial joint
- Mainly supportive
- Sacral surface-hyaline cartilage
- Ilial surface-fibrocartilage
- Great variability in size, shape, contour
DEVELOPMENTAL ANATOMY

• Early life-planar surfaces
• Develop interlocking ridges $\Rightarrow$ stability with upright posture
• Anterior motion/rotation of the sacrum
SI JOINT ANATOMY

- Support structure, multiple wide ligaments
- Biomechanical studies: 2-18°
- Superior 2/3 fibro-cartilaginous, caudal 1/3 true joint
- Variability
- Innervation is from dorsal primary rami of L5-S3
  - Some authors suggest L4 (or even L3) and S4 contribute
Neuroanatomy

SPINAL CORD

DORSAL ROOT

VENTRAL ROOT

Dorsal root ganglion

Meningeal branch

Major vessels

Viscera

Medial branch

Lateral branch

Posterior primary division

White and gray rami communicantes

Sympathetic trunk ganglion

Anterior branch

Anterior primary division

Lateral branch
INNERVATION

- Extremely variable location
- Forms a mesh medial to SI joint
- Dorsal Ramus of L5
- Lateral branches S1 –S3 (+/- L4, S4)
Differential

- Discogenic pain
- Painful facet arthropathy
- Superficial structures
  - Ligaments
  - Tendons
  - Muscles
ETIOLOGY

- Mechanical dysfunction
- Inflammation
- Infection
- Trauma
- Degeneration
- Metabolic
- Neoplastic
Diagnosis

- Primarily by history and physical
- Can incorporate imaging (X-Ray/CT/MRI) although there are many false positives and negatives
- Diagnostic/therapeutic blocks

Symptoms
- Low back pain
- Radiation to buttocks, groin, post. thigh (rarely past knee)
- Often exacerbated by prolonged standing/sitting

Physical findings
- Poor inter-examiner reliability
- Can enhance specificity and sensitivity by combining tests
 PHYSICAL EXAM

Patrick’s/FABER

Gaenslen

Distraction

Compression

Thigh thrust
Yoemann’s test

Shear test

Gillet’s test (stork test)

Raj, 2008
Diagnostic Injections

- Local anesthetic alone
  - Duration of relief concordant with that of anesthetic action
  - Proper technique important
  - Single vs. 2 or more injections on separate occasions
    - LA’s of varying duration to help validate dx

- Local plus steroid
  - Diagnostic and therapeutic
  - Longer effect duration
  - Cannot test duration concordance

- Caveats
  - Gold standard but not validated
  - Extravasation of injectate very common
Sacroiliac Joint Injections
TREATMENT

- Surgical fusion
- Radiofrequency denervation
- Intra-articular injection
- Anti-inflammatory
- PT
PHYSICAL THERAPY

• Used extensively
• Home exercises
• Inserts for leg-length discrepancies
• Osteopathic/chiropractic manipulation may reduce pain, improve mobility
• Stabilization with bracing
• Pelvic stabilization exercises
THERAPEUTIC SI INJECTION

• Technique identical to diagnostic injection
• Addition of steroid
• Duration of effect difficult to predict
• Some support in literature, no RCT’s
• Many show prolonged benefit (6mo-1yr)
• Many practitioners use as combination dx/tx
**SI INJECTION: THE LITERATURE**

**Table 4. Clinical Studies Evaluating Corticosteroid Injections for Sacroiliac (SI) Joint Pain**

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study type</th>
<th>Number and type of patients</th>
<th>Treatment</th>
<th>Primary outcome</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maugars et al, 1992 (107)</td>
<td>Prospective observational</td>
<td>24 patients w/sacro-</td>
<td>42 corticosteroid injections without LA. 18 patients underwent bilateral injections, 6 unilateral.</td>
<td>67% of joints experienced &gt;80% pain relief; 19% &lt;50%-80% improvement; 14% had &lt;50% pain relief. Mean duration of improvement 8.4 +/- 1.2 months.</td>
<td>Dx made by PI and radiologic studies. Fluoroscopy used to guide injections. Good pain relief was correlated with shorter duration of symptoms.</td>
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<td>Bollow et al, 1996 (78)</td>
<td>Prospective observational</td>
<td>66 patients w/spondylarthropathy</td>
<td>103 corticosteroid injections without LA. Use an average of 10 mL of superficial LA per joint before creating procedure.</td>
<td>92.5% of patients had significant improvement of pain after a mean of 1.7 wk. Mean duration of pain relief 10 +/- 5 months.</td>
<td>Dx made by PI, CT used to guide injections. No difference in Schmor's sign or range of motion before and after treatment. ESR and CRP decreased after rx.</td>
</tr>
<tr>
<td>Braun et al, 1996 (34)</td>
<td>Prospective observational</td>
<td>30 patients w/spondylarthropathy</td>
<td>54 corticosteroid injections without LA.</td>
<td>Close improvement in pain and MRI demonstrated inflammation in 82% of patients, lasting 8.9 +/- 5 months.</td>
<td>Dx made by PI and contrast enhancement on dynamic MRI. CT used to guide injections. No difference in Schmor's sign before and after rx. Both ESR and CRP decreased after rx.</td>
</tr>
<tr>
<td>Maugars et al, 1996 (33)</td>
<td>Placebo-controlled double-blind</td>
<td>10 patients w/spondylarthropathy, 15 joints. Pt w/degenerative SI joints and complete arthritis excluded.</td>
<td>13 total injections. 6 were injected with corticosteroid without LA and 7 with normal saline. 6 of 7 placebo pts were injected with steroid at 1 month.</td>
<td>5 steroid points had good or very good pain relief at 1 month vs. 1 in placebo group. Overall, 12/14 SI joints had good or very good results at 1 month, 8/14 at 3 months and 7/12 at 6 months.</td>
<td>Dx made by PI and radiologic studies. Fluoroscopy used to guide injections. One pt developed aseptic necrosis of bone that lasted 3 weeks.</td>
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<td>Lounderback et al, 1999 (35)</td>
<td>Randomized, controlled study</td>
<td>20 pts w/sacro-</td>
<td>20 pts underwent unilateral, paravertebral injection. 10 pts received corticosteroid without LA; 10 pts received normal saline with LA.</td>
<td>At 2-month follow-up, VAS pain scores decreased significantly in the steroid but not saline group.</td>
<td>Injections were paravertebral, not intra-articular. Dx made by PI and radiologic studies. Fluoroscopy used to guide injections.</td>
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<td>Dussault et al, 2000 (77)</td>
<td>Retrospective chart review</td>
<td>24 pts w/pain</td>
<td>Total of 31 joints injected with corticosteroid and LA. 4 subjects underwent bilateral injections, 3 repeat injections.</td>
<td>Pain decreased by &gt;80% in 5 joints, by 50%-70% in 11 joints and &lt;50% in 10 joints. More than 50% relief was obtained in 25% of joints with normal radiographs in 62% of joints with degenerative joint disease, and in the only pt with asyndromic spondylitis.</td>
<td>Injections done by radiologists with fluoroscopic guidance. In 1 pt the joint could not be penetrated and 2 pts developed lower extremity weakness.</td>
</tr>
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Cohen, 2005
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<tr>
<th>Study Authors and Year</th>
<th>Study Design</th>
<th>Number of Patients</th>
<th>SI Injections</th>
<th>MRI Use</th>
<th>Findings</th>
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<td>Pereira et al., 2003</td>
<td>Prospective Observational</td>
<td>12 patients with spondylarthropathy (3 with ankyllosing spondylitis) and buttock pain</td>
<td>24 injections with corticosteroid without LA, 9 pts had bilateral injections</td>
<td>MRI used to guide injections. In 1 pt, adequate needle position was not obtained due to software failure. Three months after injection there was a significant decrease in marrow edema in 2 pts, a marked decrease in 5 pts and a moderate decrease in 3 pts.</td>
<td>Clinical improvement noted in 10 patients, with a mean pain-free period of 9.6 months.</td>
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<td>Ogla et al., 2001</td>
<td>Prospective Observational</td>
<td>10 patients with sacroiliitis (9 bilateral)</td>
<td>21 injections with corticosteroid without LA, 9 pts had bilateral injections.</td>
<td>MRI used to guide injections. Subchondral marrow edema resolved on follow-up MRI minimally in 5 pts, partially in 3 pts and completely in 3 pts. Dx made by history and FE. All pts had normal imaging studies. MRI used to guide SI joint injections.</td>
<td>Good to excellent pain relief in 8 of 10 pts lasting a mean of 13.5 months. The 2 non-responders suffered from lumbar pain and reactive depression.</td>
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<td>Karabacakoglu et al., 2002</td>
<td>Prospective Observational</td>
<td>20 patients with low back pain</td>
<td>Total number of injections not noted. Used corticosteroid with LA.</td>
<td>60% of patients had significant short-term pain reduction after injections.</td>
<td>15 of 17 patients reported good relief 1 month after injection, with 2 reporting fair relief.</td>
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<tr>
<td>Luik-Kainen et al., 2002</td>
<td>Randomized, Controlled Study</td>
<td>24 pts without spondylarthropathy</td>
<td>All pts underwent unilateral, percutaneous injections. 13 pts received corticosteroid and LA, with 11 pts receiving normal saline and LA.</td>
<td>MRI used to guide injections. Injections were percutaneous, not intraarticular. Dx made by FE. No pt had radiologic evidence of sacroiliitis. Fluoroscopy used to guide injections.</td>
<td>At 1-month follow-up, VAS pain scores decreased significantly more in the steroid group than in the saline group.</td>
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<tr>
<td>Katz et al., 2003</td>
<td>Retrospective Chart Review</td>
<td>34 pts with low back pain after lumbar spinal fusion to the sacrum</td>
<td>Total number of injections not noted. Used corticosteroid with LA.</td>
<td>MRI used to guide injections. Injections were percutaneous, not intraarticular. Dx made by FE. No pt had radiologic evidence of sacroiliitis. Fluoroscopy used to guide injections.</td>
<td>59% (n = 20) of pts had &gt;75% pain relief 15-45 minutes after injections and were thus diagnosed with SI joint pain; 11 of the 20 experienced &gt;75% relief lasting &gt; 2 wks, while 9 had moderate pain relief.</td>
</tr>
<tr>
<td>Fischer et al., 2003</td>
<td>Randomized, Controlled Study</td>
<td>89 children with juvenile spondylarthropathy. 56 were responders to NSAIDs (control group) and 33 were non-responders (treatment group).</td>
<td>Treatment group rec'd corticosteroid without LA injections plus NSAIDs (27 bilateral injections). The control group was continued on NSAIDs without injections.</td>
<td>MRI used to guide injections. One-third of patients who rec'd injections demonstrated continued joint destruction despite absence of subjective complaints.</td>
<td>87.5% of children who rec'd injections reported significant decrease in their pain complaints over the 20-month follow-up period (mean VAS pain score decreased from 6.5 to 1.8). The control group showed similar improvement in pain scores, with no difference between groups.</td>
</tr>
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PERIARTICULAR INJECTION

• Hypothesize that posterior interosseous ligaments contribute more to SIJ pain than joint itself

• Middle section-includes axial posterior interosseous ligament which is susceptible to degenerative changes

• Some studies-articular vs. articular + periarticular→greater improvement w/latter
RADIOFREQUENCY ABLATION

• Recall innervation of SI joint
• Recall innervation of SI joint
• Predominantly dorsal innervation
INNERVATION
• Recall innervation of SI joint
• Predominantly dorsal innervation
• From L5 dorsal ramus, S1-3 lateral
Radiofrequency Ablation

- Precede by diagnostic injection
- Must cover L5-S3 dorsal primary rami
- Bipolar RF energy to create strip lesion
- “Leapfrog” technique OR
- Single, multi-electrode probe

Rathmell, 2006
LEAPFROG TECHNIQUE

Burnham, 2007
SINGLE PROBE TECHNIQUE

- 3 electrodes on 1 probe
- Single puncture (plus one for L5)
- Orientation parallel to sacrum
- 3 monopolar and 2 bipolar lesions
RFA-CAVEATS

• Does not effect ventral innervation if present

• Lesioned nerves innervate other structures
  • Ligaments
  • Muscle

• Muscle spasm post-procedure
Patient Experience

• Sacroiliac Joint Injection
  • Done in fluoroscopy suite
  • Patient prone
  • Local anesthetic with small 30g needle
  • About 10 minutes

• Radiofrequency Ablation
  • IV sedation and local
  • About 1hr
  • Post-procedure muscle spasm common, easily treated with muscle relaxants (diazepam)