The Sacroiliac Joint

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KEYWORDS

• Sacroiliac joint • SI joint • SIJ • Sacroiliac joint fusion • Low back pain

KEY POINTS

- The sacroiliac joint is a common cause of low back pain and should be included in the diagnosis.
- Nonoperative treatment of sacroiliac pain is expensive and surgical treatment is cost-effective in appropriately selected patients.
- High-quality clinical trials have demonstrated statistically and clinically significant improvement compared with nonsurgical management in appropriately selected patients.
- Spinal fusion to the sacrum increases degeneration of the sacroiliac joint.

The sacroiliac (SI) joint connects the spine to the pelvis and transmits the load of the body to the lower extremities (Fig. 1). It has a synovial portion and a large ligamentous area.[1] It has a unique pattern of motion called nutation counternutation (Fig. 2). The sacrum essentially flexes and extends. The iliac wings oscillate in the opposite direction to the sacrum. The normal motion is only 2.5°.[2,3] The surface of the joint is convoluted and provides a relatively large surface area for the volume of space it occupies. The SI joint is innervated.[4] The pattern of innervation is debated but can be from both dorsal and ventral. It has pain sensing nerve endings within the joint.[5]

Somewhere between 15% and 30% of low back pain may well arise from the SI joint.[6–9] The pattern of SI joint pain has significant overlap for spine-based pain and hip-based pain, making the differential diagnosis critical. It seems that some of the failures from low back pain surgery come from wrong diagnosis, such as a positive MRI finding that is actually asymptomatic.[10,11] Also with advances in hip arthroscopy, clinicians are beginning to understand more about pain generators within the hip. Unfortunately, imaging studies alone do not differentiate spine, hip, or SI pain. There can be abnormalities in any of the 3 areas but they may or may not be symptomatic.[12]

The diagnosis of the SI joint as a pain generator is based on physical examination of the SI joint and confirmatory diagnostic injection.[13,14] Similarly, the hip and spine need to be ruled out as pain generators. The physical examination maneuvers most commonly relied on for diagnosing the SI joint as a pain generator include flexion abduction external rotation (FABER) (Fig. 3), thigh thrust (Fig. 4), pelvic gapping (Fig. 5), pelvic compression (Fig. 6), and Gaenslen test (Fig. 7). If 3 of these are positive, then the pretest probability that a diagnostic injection will be positive is approximately 85%. Additional helpful physical examination findings are the Fortin finger test in which the patient points to the posterior superior iliac spine (PSIS) at the place where it hurts, tenderness to palpation over the PSIS, an ipsilateral positive Trendelenburg test (while standing on 1 leg the contralateral pelvis drops instead being able to be maintained horizontal), and pain over the PSIS with resisted supine active straight leg raise test.

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Fig. 1. Three-dimensional (3D) view of pelvis and SI joints.

Examination of the hip should include range of motion, especially internal rotation; femoral acetabular impingement testing; and a loaded grind or scour test. Palpation of the greater trochanter for tenderness is also crucial. Asking patients if it is their typical pain, as opposed to just asking if it is painful, helps to focus on their particular pain generator. Piriformis syndrome can present with symptoms in the same area. Spine examination typically involves formal neurologic testing of L4-S1, rotation plus extension, palpation for midline and facet tenderness, and palpation of the lateral border of the quadratus lumborum, looking for muscle spasm.

Plain radiographs are the starting point for imaging. A true anteroposterior (AP; Ferguson view) of the sacrum and a lateral of the pelvis are the best views for imaging the SI joint. In addition, an AP of the pelvis that includes the hips helps to rule out obvious hip osteoarthritis. An AP and lateral of the lumbar spine may point to obvious spinal pathologic conditions, such as spondylolisthesis or flatback syndrome with a pelvic incidence lumbar lordosis mismatch. The next step in imaging is probably an advanced axial imaging study of the pelvis and perhaps lower lumbar spine. This is primarily to rule out other unusual problems, such as tumors, infection, or stress fractures (**Fig. 8**). The final step is confirmatory diagnostic injection. This needs to be image-guided with contrast, demonstrating that the injection is into the intra-articular portion of the joint. If the injection is extra-articular or if it rapidly extravasates via an incompetent anterior joint capsule, interpretation of the pain response is very difficult. It is also useful to have the patients hold their pain medication and to do provoking activities before the injection. If the injection is equivocal or difficult to technically accomplish, then a computed tomography (CT)-guided injection can facilitate accessing the joint and ensuring that the injection is intra-articular. There is debate about what constitutes a positive response, but the best clinical trial data available suggest that a 50% response is predictive of patients who will respond to surgical management.[15] Having the patient do provoking activities after the injection is also very helpful to confirm or refute the joint as the pain generator. It is also common to need to inject the hip joint to rule it out as the pain generator. Ruling out the spine is more difficult. The role and benefit of intra-articular steroids in SI joint injections is less clear. The rate of usage of injections has markedly increased.[16]

Fig. 2. Nutation of the sacrum. Nutation is essentially flexion of the sacrum (*arrow*) while counternutation is extension. The iliac wings are simultaneously counter-rotating.

Nonoperative management of the SI joint is commonly used but the response rate and durability are less clear. Physical therapy for a core stabilization type of approach can potentially be helpful. Manual therapy, be it administered by osteopathic or chiropractic techniques, can be helpful. The use of an SI belt can also be helpful. It is unclear what role medications play in terms of relief of pain. Certainly, for patients with a spondyloarthropathy, medications can make a significant difference. The last line of nonoperative management is radiofrequency ablation (RFA). There have been several trials looking at RFA.[17] The response rate and durability are variable, perhaps depending on the technique used (and the number of dorsal rami ablated), as well as the variability of the patient response.

SI joint pain can be profoundly debilitating. In terms of the burden of disease, it is as equally debilitating as hip and knee osteoarthritis that requires total joint arthroplasty, and spinal stenosis and spondylolisthesis that requires surgical management.[18,19]