Percutaneous Sacroiliac Joint Fusion: Indications and Technique

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Sacroiliac joint (SIJ) pain is a common, although underdiagnosed cause of lower back pain. In the past, the surgical treatment for SIJ pain had been somewhat controversial and the indications for intervention rather unclear. The surgical treatment for SIJ dysfunction traditionally has been performed in an open fusion with a significant dissection and disruption of normal tissues to expose the joint and allow for arthrodesis. More recently, minimally invasive percutaneous techniques have been developed for SIJ fusion. A substantial body of evidence now supports the benefits of percutaneous SIJ fusion compared to nonoperative management for decreasing pain and improving quality of life. SIJ pain has been demonstrated to be responsible for 22% of low back pain and is found in 43% of patients who have previously undergone lumbar fusion. As of increased awareness of this pain generator, we can expect an increased recognition of its diagnosis. Thus, methods for SIJ fusion including percutaneous SIJ fusion, may become more utilized in the future. This overview will help to define the indications for SIJ fusion surgery and describe current techniques commonly used.

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Introduction

Low back pain is the second most common complaint in the primary care setting, as 85% of people experience low back pain at some point in life.¹ Determining the origin of low back pain can be challenging and relies upon a thorough history and physical examination. Approximately, 13%-30% of low back pain is believed to be related to sacroiliac joint (SIJ) pain. However, the diagnosis of this common condition is frequently overlooked. The reason for the wide discrepancy in percentages is likely related to the difficulty in the diagnosis of SIJ dysfunction.

The SIJ is the largest axial joint in the human body with an average surface area of 17.5 cm².² The joint is important for weight bearing, functioning as a triplanar shock absorber. It transmits loads from the upper body to the lower body. The intricate design of ligamentous structures allow for little motion within the SIJ. The anterior ligaments are short and strong, allowing little movement whereas at the same time providing significant stability. The posterior ligaments follow a basket weave pattern for increased strength as well as stability. The primary motion of the SIJ is referred to as nutation, which is a nodding type of motion. Rotation is usually limited to 1°-2° in males and 2°-4° in females.²

Sacroiliac joint (SIJ) pain is common, causing chronic low back pain, groin, buttocks, and even sciatic pain. SIJ dysfunction may be related to degenerative and inflammatory arthritis, posttraumatic arthritis, post-partum instability, iatrogenic from iliac graft harvest, an infectious etiology, and previous lumbar fusion (most commonly at L5-S1). In some regards, this history of prior L5-S1 fusion can be considered the most caudal extend of "adjacent segment disease." It has been shown that SIJ forces significantly increase in the face of posterior spine fusions.³ It is more often diagnosed in women vs men, and primarily posttraumatic with a mechanical fall being the inciting event, followed by motor vehicle accident and heavy lifting. In many cases, the primary cause cannot be elucidated.

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and an idiopathic onset is diagnosed. Symptomatic SIJ pain can mimic discogenic or radicular back pain related to the lumbar spine, which can lead to misdiagnosis as well as mistreatment. Furthermore, up to 40% of patients with prior lumbar or lumbosacral fusion have SIJ pain, and 75% of these patients have radiographic findings of SIJ degeneration within 5 years. However, it important to note the radiographic evidence of SIJ degeneration is not indicative of SIJ mediated pain. A recent study highlighted significant numbers of asymptomatic adults have notable SIJ degenerative changes.

SIJ Dysfunction Diagnosis

The diagnosis of SIJ dysfunction requires an exclusion of lumbar spine and hip pathology and includes a triad history of low back, hip, and gluteal pain, with or without associated neurological deficits. Groin pain is frequently associated with SIJ instability. Lower extremity pain, paresthesia, and weakness may be present, are typically unilateral, and can cause a sensation of leg instability (Fig. 1). Furthermore, patients with SIJ pain can present with disrupted sleeping patterns and persistent discomfort while sitting or standing for an extended amount of time.

There are several findings on physical examination that aide in the diagnosis of SIJ mediated pain. Physical examination findings of tenderness to palpation of the SIJ, as well as reproduction of pain with provocative maneuvers such as Gaenslen, Patrick’s, pelvic distraction and compression tests, and thigh thrust are useful in the diagnosis. The Fortin Finger Test is the most reliable and diagnostic maneuver for SIJ dysfunction. It is performed when asking a patient to localize their pain by pointing with a single finger to Fortin’s point. Fortin’s point, or sacral sulcus, can be found at the insertion of the long dorsal ligament inferior to the posterior superior iliac spine. The pain is then reproduced with palpation of this area.

Unfortunately, there is no single diagnostic imaging study to associate SIJ pain with specific pathological findings. However, magnetic resonance imaging of the lumbar spine may be necessary to rule out other pathologies when presenting with lumbar pain that localizes to the SIJ. A noncontrasted computed tomography (CT) of the pelvis is useful in demonstrating degeneration of the SIJ and primarily, for preoperative planning purposes. Single leg stance views of the pelvis (so-called Flamingo views) can be helpful to evaluate occult anterior pelvic ring instability. Inlet and outlet pelvis views are also obtained to evaluate pelvic symmetry and look for evidence of sacral dysmorphism. The presence of sacral dysmorphism affects placement of implants and should be recognized when present. Even a complete history, physical examination, and provocative maneuvers still may not consistently diagnose SIJ pain. Generalized pain behavior (eg, somatoform disorders and fibromyalgia) must be ruled out as well.

The current gold standard for diagnosis of sacroiliitis is an image-guided SIJ injection. The injection is performed for both diagnostic and therapeutic purposes and recommended when there is a positive history, positive Fortin Finger Test, negative lumbar and hip examination, and 3 of 5 provocative maneuvers eliciting SIJ pain. The injection must be performed with contrast image guidance to confirm that the dye and local anesthetics have infiltrated throughout the intraarticular region of the SIJ. If the patient notes substantial relief of low back pain within 15-30 minutes of the injection, it suggests that the SIJ may be the source of symptoms and is considered a positive response. There is no uniform agreement on the degree of pain relief for decision-making, however, many providers look toward 50% or greater pain relief. Some providers insist on multiple injections and others will also include a placebo in the mix. Therapeutic benefit may be achieved with concomitant injection of steroid and in some cases, may confer long standing pain relief. There is debate, however, when correlating injection response and outcomes with surgical intervention for sacroiliitis. Based on surgery in other joints, it is commonly believed that a period of 2-3 months should follow between a steroid injection into the SIJ and any fusion surgery.

Treatment Options for SIJ Pain

A positive response to a SIJ injection is helpful in determining whether additional treatment is necessary. Other treatment options include NSAIDs, pelvic floor physical therapy and core

![Figure 1](https://example.com/figure1.png)
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