

Interventional Treatments for Sacroiliac Joint Pain

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Abstract

Sacroiliac joint pain is a common cause of low back pain and can be a diagnostic challenge. Interventional treatment may be considered after patients fail conservative/noninterventional treatments. This article provides a review of current interventional procedures for the treatment of sacroiliac joint pain including sacroiliac joint injection, noncorticosteroid injection and radiofrequency ablation.

Keywords

Sacroiliac Interventional procedures Pain, buttock Low back Sacroiliac joint pain Review

Introduction

Sacroiliac joint pain (SIJ) dysfunction is a relatively common cause of low back pain with a prevalence ranging from 10 to 27 % [[1–3](#)]. Making the diagnosis of SIJ pain/dysfunction is clinically challenging. Patients often experience pain in the lower back or back of the hips. The pain is typically worse in prolonged or sustained positions and relieved when lying down [[4](#)]. The International Association of Pain (IASP) has formulated criteria for the diagnosis of SIJ pain [[5](#)]. These include pain localized in the regions of the SIJ, reproducible by stress and provocation tests of the SIJ, and relieved by selective infiltration of the SIJ with a local anesthetic. In one study, Gaenslen's and sacral thrust tests had a specificity of 74 and 75 %, respectively [[6](#)]. Another study showed that the specificity of three or more positive provocation tests was 78 % [[7](#)].

Treatments for SIJ pain should include conservative measures such as relative rest, prn NSAIDs as needed and therapeutic exercises. Only after these conservative measures fail should one consider

interventional treatments. Practitioners who perform interventional procedures should have a firm understanding of the joint's underlying anatomy.

The SIJ is a true diarthroidal joint, with matching articular surfaces separated by a joint space containing synovial fluid and enveloped by a fibrous capsule [8]. Each articular surface of the joint has ridges and depressions to increase stability and reduce movement [9]. Primary stability, however, is attributed to the adjacent ligaments surrounding the joint [9]. These include the interosseous ligament (primary stabilizer), anterior and posterior SI ligaments, sacrospinous ligament and iliolumbar ligament [8]. The innervation of the SIJ is extremely complex, but primary innervation of the joint is from the S1–S3 dorsal rami and smaller contributions from the L4 and L5 dorsal rami [10, 11].

Image Guidance for Procedures

The SIJ's anatomy presents a clinical challenge for those attempting to perform percutaneous treatments. Image guidance is strongly recommended as SIJ injections have been found to be only 11 % accurate [12]. Sacroiliac injections have historically been performed using CT or fluoroscopic guidance as both have demonstrated accuracy rates greater than 90 % [13, 14]. Fluoroscopic guidance is more commonly used in interventional pain practice because of its lower radiation exposure, lower cost and similar accuracy when compared to CT guidance.

Ultrasound guidance during SIJ injections offers multiple potential advantages compared to fluoroscopic and CT guidance including real-time visualization of soft tissue structures and elimination of radiation exposure. However, recent studies have found that ultrasound-guided injections were significantly less accurate compared to fluoroscopic-guided injections (87.3 and 76.7 %) [15, 16]. Although accuracy rates will rise with physician experience, ultrasonographic imaging is limited by the bony anatomy of the SIJ [16].

Corticosteroid Injections

Corticosteroid injections have long been the mainstay of interventional treatment for SIJ pain. This therapy is offered with the goal of suppressing any intra-articular inflammation resulting from capsular synovitis, degenerative or inflammatory arthropathy. Extra-articular corticosteroid injections can also reduce inflammation of supporting structures such as the posterior interosseous ligaments.

Intra-articular

Intra-articular corticosteroid injections have been well studied as a treatment of inflammatory sacroiliitis, specifically in patients with seronegative spondyloarthropathy. The majority of patients have been shown to have >6 months of pain relief after one injection [17, 18]. For SIJ dysfunction without spondyloarthropathy, the results have been mixed. In a study by Pulisetti and Ebraheim [14], no short- or long-term therapeutic benefit was found for intra-articular corticosteroid injections. In contrast, Lilang et al. found that 67 % of patients obtained 6 weeks of >50 % pain relief after one intra-articular corticosteroid injection. Lilang's study found that patients needed multiple repeat corticosteroid injections to obtain longer lasting relief [19]. In this same study, intra-articular corticosteroid injections were not found to be effective in patients with a prior history of lumbar or lumbosacral fusions. The authors speculated that this lack of response might be a result of patients

developing a more severe and less steroid-responsive SIJ arthropathy in the setting of mechanical strain created by the fused lumbosacral segments [19].

Periarticular

As mentioned above, the ligamentous structures surrounding the SIJ are its primary stabilizers, with the posterior interosseous ligament being of greatest importance. These ligaments can become inflamed; therefore, some practitioners recommend periarticular corticosteroid injections.

Luukkainen et al. [20, 21] evaluated the role of periarticular corticosteroid injections in patients with and without seronegative spondyloarthropathies. These studies found periarticular injection of methylprednisolone with anesthetic to be superior to saline injection in the short term (1–2 months), but no long-term follow-up was performed. Borowsky and Fagen [22] showed that patients receiving both intra-articular and periarticular injections fared better than those receiving only intra-articular injections. However, only 31 % of the patients receiving the combination of injections experienced at least 3 months of pain relief [22].

A systematic review by Hansen et al. [23•] concluded that the evidence was poor for intraarticular or periarticular corticosteroid injections in the treatment of SIJ pain. The authors of this article agree with this conclusion, especially in the setting of a noninflammatory sacroiliac pain

Noncorticosteroid Injections

Prolotherapy (injection of dextrose solution) into the SIJ or its supporting structures is intended to strengthen the joint and its supporting fibrous structures [24]. Kim et al. compared the benefits of intraarticular prolotherapy to intra-articular corticosteroid. In this study, dextrose injections were found to provide improved analgesia compared to corticosteroid; however, more frequent prolotherapy treatments were needed compared to corticosteroid [25]. Further studies should assess the long-term safety of repeated prolotherapy injections, the volume of dextrose solution and the number of injections to establish long-term SIJ pain relief.

Lee et al. [26•] evaluated the efficacy of periarticular injections of botulinum toxin versus triamcinolone injections. At 1 month there was no significant difference in analgesia between the two groups; however, at 2 and 3 months the botulinum group showed significantly lower pain scores. There were some key study design flaws, and additional investigations are needed prior to concluding this is an efficacious treatment.

Platelet-rich plasma therapy has shown promising results in the treatment of intra-articular arthritic conditions [27, 28] and chronic tendonopathies [29, 30], but there have been no controlled studies regarding its effect on SIJ pain.

Radiofrequency Treatments

As mentioned above, the SIJ has complex innervation, making radiofrequency (RF) neurotomy of the joint difficult. Numerous techniques have been attempted including conventional RF, pulsed RF and cooled RF. Radiofrequency targets most commonly include the dorsal rami at L4, L5, S1, S2 and S3. Radiofrequency should only be attempted after failing noninterventional treatments and obtaining positive diagnostic blocks at the intended radiofrequency sites.

Conventional radiofrequency treatments consist of creating a thermal lesion for 90 s at 80 °C. This is intended to induce coagulative necrosis in the targeted nerve tissue [31]. Multiple studies have examined conventional lesions [32–36], but there has been significant variability in treatment temperature, duration and probe position. As expected, variable outcomes were also noted. In one of the best designed studies, Cohen et al. [34] found a 57 % success rate (>50 % pain relief) of the radiofrequency-treated group at 6 months.

The exact method of action of pulsed radiofrequency ablation is unknown but is believed to be nondestructive when compared to conventional RF [31]. Pulsed RF utilizes intermittent high “bursts” of radiofrequency current in order to disrupt electrical signaling along the treated nerve [31] without causing thermal lesions. In a study by Vallejo et al. [37], patients underwent pulsed RF along the lateral branches of L4–S3. In that study, 73 % of patients obtained good or excellent relief (>50 or 80 % reduction in VAS) with clinical effect lasting from 6 to 32 weeks.

To circumvent anatomical variation in innervation, some investigators have employed internally cooled radiofrequency ablation. This technique increases the ablative/treated area compared to traditional radiofrequency by ablating at a cooler temperature (60 °C) for a longer period (150 ms). In the only randomized placebo-controlled trial solely evaluating cooled radiofrequency ablation of the S1–S3 lateral branches, Patel et al. [38•] found a significant improvement in pain and function in the treatment radiofrequency treatment group compared to the sham group. However, no significant differences were noted between the groups at 6 or 9 months.

Radiofrequency treatment for SIJ pain is promising, but studies remain limited and published results have been variable. Further studies comparing different RF lesion temperatures, techniques and durations are needed.

Conclusion

SIJ pain is a common cause of low back pain and can be a diagnostic challenge. Interventional treatment may be considered after patients fail conservative/noninterventional treatments. At this time, evidence is limited for most interventional treatments for SIJ pain.