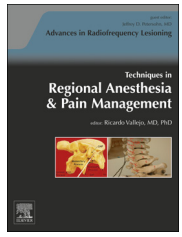
Techniques in Regional Anesthesia and Pain Management 19 (2015) 119–125

Available online at www.sciencedirect.com

ScienceDirect

www.elsevier.com/locate/trap



Radiofrequency ablation of the sacral lateral branches

Bruce Vrooman, MD, MS, FIPP, Victor Foorsov, MD*

Department of Pain Management, Cleveland Clinic, 9500 Euclid Ave, C25, Cleveland, Ohio 44195

ARTICLE INFO

Keywords:
Sacroiliac joint injection
Sacral lateral branch block
Radiofrequency ablation

ABSTRACT

The objective of this article is to recommend an approach to radiofrequency ablation (RFA) of the sacral lateral branches that is safe, effective, and simple to perform. To do so, one must identify the proper patient, perform a diagnostic block to confirm the sacroiliac joint as the pain generator, and then, after 2 successful blocks, move to RFA of the sacral lateral branches as the next step in treatment. The choice of an RFA technique is controversial. Here, an argument is made for moving to bipolar RFA of the lateral branches of S1-S3. If pain is refractory, then cooled RFA may be an appropriate next step in care.

Introduction

Sacroiliac (SI) joint (SIJ) pain is thought to contribute to between 13% and 30% of low back pain and can be as disabling and painful as other etiologies of low back pain.[1-3] This prevalence rate may be under-representative of the true rate and as a result, the diagnosis of SIJ pathology represents a significant challenge for the clinician. In fact, no clinical tests predicts the condition, and usually 3 or more tests may be needed to predict a positive response to a diagnostic block.[1,4]

The general consensus is that clinical tests are an inferior diagnostic tool when compared with joint injections as a means of identifying the SIJ as the pain generator. Intra-articular injections are considered by some to be the gold standard for diagnosis.[5] However, a diagnostic SIJ injection is perhaps, not as sensitive and specific as compared with diagnostic lateral branch blocks with local anesthetic. A study conducted by Dreyfuss et al demonstrated that multisite, multidepth blocks of the sacral lateral branches were 70% effective at physiologically blocking the lateral branches; however, the intra-articular portion was not effectively blocked owing to both ventral and dorsal innervation of the joint.[6] The authors suggested that lateral branch blocks may be considered to be a potentially valuable tool for diagnosis of extra-articular SIJ pain.[6]

If a diagnostic joint injection or diagnostic lateral branch blocks provide only short-term pain relief, the patient may be considered a candidate for procedures that may provide longer duration efficacy. These procedures include radiofrequency ablation (RFA) of the sensory nerves innervating the SIJ, phenol injection, and surgical fusion. Surgical intervention has many disadvantages, and phenol is considered too high a risk for nonmalignant pain. There have been many attempts to try to determine the best approach for RFA, ranging from conventional or "thermal" RFA, cooled RFA, and bipolar RFA of nerves from dorsal ramus of L4 and dorsal ramus of L5 to lateral branch block RFA of S1-S4. Given the varying degrees of efficacy from these multiple approaches, and limited controlled studies, insurance carriers have frequently denied allowing for this procedure, indicating that these procedures fall under the "experimental" category.

Dr Vrooman teaches at the SInergy cooled radiofrequency procedure on behalf of HalyardHealth.

*Corresponding author.
E-mail address: brucevrooman@gmail.com (B. Vrooman).

http://dx.doi.org/10.1053/j.trap.2016.10.003
1084-208X/

The purpose of this work is to explore treatment rationale addressing SIJ pain and dysfunction and to explore the decision-making process when considering a patient for SIJ or lateral branch RFA. In addition, this article would highlight the various techniques used by the authors when treating these patients.

Symptomatic etiology

Intra-articular

Osteoarthritis of the SIJ is associated with intra-articular pathology of the SIJ. In general, risk factors for primary osteoarthritis include increasing age, history of joint injury (trauma, repetitive stress, inflammation, etc.), and obesity.[7] Secondary osteoarthritis may occur as a result from a variety of other factors such as physical, chemical injury, metabolic diseases, and endocrine disorders.[7] Other intra-articular causes include rheumatoid arthritis and spondyloarthropathies such as ankylosing spondylitis and psoriatic arthritis.

Extra-articular

Extra-articular sources of pain include enthesopathy, fractures, ligamentous injury, and myofascial pain.[8]

Pain referral patterns

A study by Fortin et al[9] was able to determine that a specific region 10 cm caudal and 3 cm lateral to the posterior superior iliac spine (PSIS) was associated with pain related to SIJ dysfunction. A study examining pain referral patterns resulting from SIJ pathology have reported findings of 94% buttock pain, 72% lumbar pain, 50% with pain into the lower extremity, 28% pain below the knee, and 14% to the groin.[10] There is great variability of pain referral patterns from SIJ dysfunction, and thus limits their use for diagnostic purposes.

Anatomy

Bony
The SIJ is a diarthrodial joint, with the sacral and ilial hyaline cartilage surfaces forming a union with using the fibrous capsule.[11] The sacral auricular part is generally concave and the iliac portion is generally convex.[12] The sacrum locks and wedges itself into the ilium by means interdigitating symmetrical grooves and ridges[13] and its "Keystone-like" bony anatomy of the sacrum, wedging itself into the pelvic ring further contributes to stability.[12] Roberts et al[14] also delineated various areas of the SIJ into superior, middle, and inferior aspects. A typical SIJ intra-articular injection delivers injectate primarily to the inferior aspect of the joint, although spread of the injectate may occur throughout the joint.

Ligamentous
The most significant ligament contributing to stability is the interosseous sacroiliac ligament. This ligament lies dorsally and deep within the narrow recess between the sacrum and ilium. Other ligamentous contributors include the anterior SI ligament, dorsal SI ligament, sacrospinous ligament, and sacrotuberous ligament.

Muscle and fascia
Unlike other joints, muscles do not directly impart stability on the SIJ. Contractions of erector spinae and multifidi muscles at the sacral level impart some degree of stabilizing action on the joint using direct attachment and tension of the various layers of the posterior lumbar fascia.[12]

Innervation
This topic has been studied, however, consensus regarding specific innervation patterns for the SIJ remains elusive. Ventral innervation of the SIJ has been described from branches of the ventral rami of L5 and S2.[15] Dorsal innervation patterns have been traditionally described to range from L3-S3; however, emphasis on the principle segments are L5-S2 dorsal rami.[16] S1 and S2 lateral branches have been found to contributed to SIJ innervation in all specimens in a cadarveric study conducted by Roberts et al, whereas the S3 lateral branch contributed in 88% of specimens, L5 in 8% of specimens, and S4 in 4% of specimens.[14] This study also highlighted that the L5 dorsal ramus usually courses near the lateral border of the S1 posterior sacral foraminal aperature (PSFA), and hence intervention at this location would also likely affect the L5 lateral branch. S1-S3 lateral branches may also contribute to the posterior sacral nerve (PSN), which variably innervates the middle and inferior aspect of the joint. The superior aspect of the joint was found to be innervated by branches of S1.[14]

Biomechanics

The sacrum is the fundamental link between the forces transmitted between the 3 large lever arms of the lumbar spine and the 2 lower extremities and acts as the dampener of these forces. It is motions are small and passive; however, its role at lessening the twisting forces through the pelvic ring are essential[16] while efficiently transmitting forces required for functional activity such as locomotion. Additional recognition should be given to the concept of adjacent segment syndrome in which restriction of single motion segment induces compensatory increase of movement within an adjacent motion segment. A typical example is the fusion of lumbar segments induces compensatory increases in motion of adjacent lumbar segments as well as within the SIJ.

Diagnosis

A variety of special tests for SIJ dysfunction have been accepted in typical clinical practice. A nonexhaustive list includes Yeoman, Gillet, SI shear, Gaenslen, Faber-Patrick, and Thigh Thrust test. Studies have demonstrated that 3 or more of these tests should be positive to be suggestive of SIJ dysfunction based on physical examination alone.[4,17] A systematic review by Simopoulos et al concluded that the evidence for the diagnostic accuracy of SIJ injections is good, the evidence for provocation maneuvers is fair, and evidence for imaging is limited.[18]