

Non-interventional treatment options for sacroiliac joint mediated pain: a review

A Greis, J Berk, AC Gellhorn*

Abstract

Introduction

The sacroiliac joint is a known source of lower back, buttock, groin and lower extremity pain. A number of non-interventional treatment options for sacroiliac joint pain exist, and most patients with sacroiliac joint pain are managed conservatively with a combination of oral medications, physical therapy and manual therapy. Sacroiliac joint belts and other lower extremity orthoses are often used to stabilise the joint, treat underlying biomechanical abnormalities and to facilitate the rehabilitation program. There are few studies that specifically evaluate non-interventional treatment of confirmed sacroiliac joint pain. This review discusses the theoretical basis and the evidence for available treatments for sacroiliac joint pain. Therapeutic exercise and manual therapy are supported by clinical trials, though the level of evidence supporting these interventions is low.

Conclusion

Sacroiliac joint mediated pain is a known entity that can cause discomfort in the low back, buttock, groin and/or lower extremity. It is often difficult to diagnose and symptoms may arise from both intra and extra-articular structures within the sacroiliac joint complex. Lumbopelvic biomechanics should be corrected with a focus on strength and flexibility. There is limited support for both physical therapy and manual therapy,

though studies to date have been small with methodological limitation.

Introduction

The sacroiliac (SI) joint is a potential source of low back, buttock, groin and lower extremity pain¹. Establishing the diagnosis of pain arising from the SI joint is complicated by the joint's proximity to other potential painful structures in the low back such as the lowest intervertebral discs and facet joints, which may produce similar clinical pain syndromes. Adding to the difficulty of establishing a clear diagnosis, the inability of physical examination and imaging studies to reliably confirm the SI joint as the source of pain may frustrate both patient and clinician. The aim of this review was to discuss non-interventional treatment options for SI joint mediated pain.

Discussion

Anatomy

The SI joint is a diarthrodial joint that joins the bony sacrum to the pelvis (Figure 1). Most anatomical descriptions of the joint describe an auricular shape, though significant variations

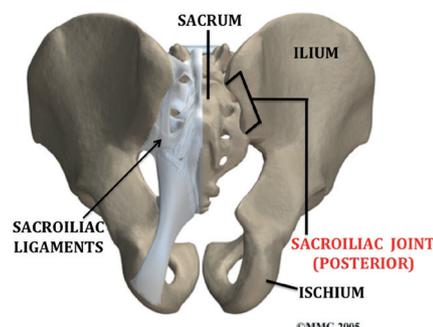


Figure 1: Posterior view of sacroiliac joint demonstrating both bony articulations and extensive ligamentous lattice overlying the joint.

in joint shape and orientation are common. Only the anterior 1/3 of the joint between the sacrum and the ilium is synovial; the remaining portion of the articulation is made up of strong and complex ligamentous connections. Ligaments supporting the SI joint are weaker in women, facilitating child birth. Muscular attachments to the ligaments supporting the SI joint include the gluteus maximus, piriformis and biceps femoris, and their actions may theoretically influence joint mobility.

In general, motion at the SI joint is minimal, as the joint is designed primarily for stability. The sacrum is wedge shaped and is essentially driven into the ilium by the weight of the trunk. Detailed motion studies of the SI joint have concluded that the joint moves minimally in all three axes, with total joint rotation rarely more than 1–2 degrees; translation rarely exceeds 1–2 mm^{2,3}.

With aging, the joint undergoes degenerative arthrosis manifested as increased surface irregularities and crevice formation. Degenerative changes are more pronounced on the iliac side of the joint than the sacral side. Joint motion is markedly restricted by the sixth decade, and widespread erosions and sclerosis is common by the eighth decade⁴.

Epidemiology

The SI joint is estimated to cause between 15% and 30% of cases of low back pain⁵⁻⁷, making it likely underappreciated as a source of low back pain. Since the majority of prevalence studies have used intra-articular anaesthetic blocks to establish the diagnosis of SI joint pain, the true prevalence may well be higher than the above

*Corresponding author

Email: gellhorn@washington.edu

UW Medicine Sports and Spine Physicians, Department of Rehabilitation Medicine, University of Washington, Washington, USA

estimates since extra-articular causes of SI joint pain such as ligamentous strain and enthesopathy would not be expected to result in a positive intra-articular anaesthetic block.

A retrospective evaluation of the cause of SI joint pain in injection-confirmed cases revealed that 44% of cases were related to a traumatic event (motor vehicle accident, fall onto buttocks), 21% were related to cumulative trauma such as repetitive lifting or altered gait mechanics, and 35% were idiopathic⁸. Mechanical SI joint pain also needs to be differentiated from sacroiliitis, which is a prominent symptom in seronegative spondyloarthropathies, most clearly and pathognomonic in ankylosing spondylitis⁹. The treatment of sacroiliitis related to spondyloarthropathy is outside the scope of this review.

Biomechanical abnormalities that increase the magnitude of force transmission through the SI joint can be conceptualised as risk factors for SI joint pain. These include leg length discrepancy, gait abnormality, lumbar fusion extending to the sacrum and scoliosis¹⁰⁻¹². Pregnancy is an additional risk factor for SI joint pain, as the SI ligaments become relatively lax during pregnancy to allow for parturition. The increased weight during pregnancy and the associated exaggerated lordosis further increase stresses through the joint. The SI joint is the most common cause of low back pain during pregnancy¹³.

Diagnosing SI joint pain can be challenging for several reasons. Medical history and physical exam alone cannot confirm SI joint pain. Often, the patient's presenting symptoms will mimic other sources of low back pain. Special physical exam manoeuvres that purport to stress the SI joint are poorly validated, though a composite of multiple SI joint tests may improve sensitivity and specificity. For example, in one report, when three or more of six diagnostic manoeuvres (distraction provocation test, thigh

thrust provocation test, Gaenslen's test, compression provocation test and sacral thrust test) were positive, a reported sensitivity of 93% and specificity of 78% were found, using SI joint anaesthetic injection as gold standard¹⁴. Other studies have not corroborated these findings¹⁵, though the cutoff for a positive diagnostic block (90% pain relief) may have been too stringent. Imaging studies of the SI joint can confirm a fracture (traumatic, stress/insufficiency), tumour, infection, osteoarthritis and suggest an inflammatory arthropathy but are often normal in symptomatic patients. Lumbar spine and pelvic imaging is more often helpful in ruling out other potential aetiologies of a patient's symptoms.

The gold standard for diagnosing intra-articular SI joint pain is a guided injection with positive response to a local anaesthetic. Because this is an invasive procedure, it is more commonly performed on patients who have moderate to severe pain and have failed more conservative treatment options. In this scenario, a combination of corticosteroid and local anaesthetic is injected into the SI joint for both diagnostic and therapeutic purposes. If a patient has a clinical history and physical exam that suggests SI joint pain, a negative response to a guided local anaesthetic injection, and/or normal lumbar and pelvic imaging studies, extra-articular SI joint pain or 'posterior pelvic pain' maybe a diagnosis of exclusion.

Non-interventional treatment options

No studies to date have evaluated conservative treatment for injection-confirmed SI joint pain. There are many non-interventional treatment options for SI joint mediated pain, and these are generally similar to treatment options for nonspecific low back pain. A majority of the clinical trials to date that study the

efficacy of non-interventional treatments have looked at patient populations with nonspecific low back pain. Although some patients who receive a diagnosis of nonspecific low back may have SI joint mediated pain, the two entities are not the same, therefore, only limited conclusions about the non-interventional management of SI joint pain can be made using these studies.

Clinical trials that evaluate non-interventional treatment of SI joint pain often use physical exam tests rather than diagnostic injections to make the diagnosis, which is problematic as discussed above. There are no studies that look at the treatment of extra-articular SI joint pain due to the lack of validated diagnostic tests to confirm this diagnosis. Because there are multiple structures within the SI joint complex that are capable of causing pain and numerous treatment options to consider, it is often challenging to choose the most appropriate treatment for a particular patient.

Medications

In the setting of acute SI joint pain, nonsteroidal antiinflammatory drugs (NSAIDs) and icing the area have been shown to be helpful. In a clinical practice guideline from the American Pain Society and the American College of Physicians regarding the use of medications in acute low back pain, there was good evidence of short-term pain relief with NSAIDs, acetaminophen and skeletal muscle relaxants. There was no difference between the different types of NSAIDs or between NSAIDs and other oral analgesics and muscle relaxants¹⁶. It is always important to consider the individuals' risk-to-benefit ratio when prescribing NSAIDs and consider pre-existing gastrointestinal and cardiac comorbidities. Non-narcotic medications such as tramadol maybe a good option for patients who cannot

Licensee OA Publishing London 2013. Creative Commons Attribution License (CC-BY)

tolerate NSAIDs or have moderate to severe pain. Narcotic medications can be considered in cases of severe pain but their benefit in the long-term management of chronic low back pain remains controversial¹⁷.

Modalities

Passive modalities such as transcutaneous electrical nerve stimulation, ultrasound, heat and cryotherapy are often used as part of an initial physical therapy program. Although modalities may help some patients with SI joint pain, there is insufficient literature on this topic to comment definitively on their use in this subset of patients with low back pain. When helpful in relieving pain they should be part of a more active program emphasising progressive return to activity and exercise.

Physical therapy

Relative rest and activity modification are often used to assist in pain management. It is important to recognise activities that aggravate symptoms, which may include bending, twisting, sitting, running and single leg stance activities. Once the initial pain is under better control, the goal is to correct the underlying functional biomechanical deficits and restore normal pain free motion. The pelvis and SI joints function to transfer forces between the trunk and lower extremities via a complex network of muscular and ligamentous attachments. Muscles that attach to the sacrotuberous ligament, such as the gluteus maximus and in some people the long head of biceps femoris, have been shown to dynamically influence movement and stability of the SI joints¹⁸. In addition, delayed firing of the multifidus and gluteus maximus muscles has been observed on the symptomatic side of patients with SI joint pain¹⁹. Contraction of the transversus abdominis has been shown to decrease the laxity of the SI joint²⁰. Therapeutic exercise can

be used to correct muscular imbalances in strength and flexibility and improve force transfer, decreasing stress on the pelvis and lumbar spine.

Commonly seen patterns of dysfunction in patients with SI joint pain include tightness of the iliopsoas, rectus femoris, adductors and hamstring muscles with weakness in the gluteal, lower abdominal and hamstring muscles. From a biomechanical perspective, a shortened iliopsoas muscle leads to an anteriorly rotated ilium which lengthens the hamstring and gluteal muscles, putting them at a mechanical disadvantage to contract and stabilise the SI joint. Once proper muscle lengthening has occurred, it is possible to strengthen the inhibited muscles via neuromuscular re-education and closed kinetic chain exercises²¹. Progression to lumbopelvic core stabilisation and multiplanar strengthening exercises will assist in return to normal functional activities.

Although there is a theoretical basis for the treatments discussed above, there is limited high level evidence to date for the utility of physical therapy in the treatment of SI joint pain. Since physical therapy can encompass many different types of interventions, further research is warranted to look at specific exercises and their effect on patients with SI joint pain.

Manual therapy

Manual mobilisation of the SI joint is often used to compliment a therapeutic exercise program aimed at helping to decrease pain and correct biomechanical dysfunction. These techniques are commonly used by osteopathic physicians, chiropractors and physical therapists who treat patients with low back pain. Manipulation of the SI joint usually refers to high velocity/low amplitude thrust manoeuvres, which have been shown to decrease pain and disability in patients with SI joint pain.

A recent study using a combination of six physical exam tests to form the diagnosis of SI joint pain found two different manipulative therapy techniques significantly improved pain and functional disability in patients diagnosed with SI joint pain at one month but that neither technique was more effective than the other²². A chiropractic randomised clinical trial using a similar criteria for diagnosis found both manual and mechanical force manipulation to be effective in reducing pain and disability in patients with SI joint pain within one week after treatments but did not find one technique to be more effective than the other²³. Both of these studies had a small sample size, no control group and no long-term follow up. Therefore, although spinal manipulation may help decrease pain and disability in patients with SI joint pain in the short term, the quality of evidence is low and there is no evidence for sustained benefits. Future clinical trials using diagnostic injections to confirm intra-articular SI joint pain, specific SI joint manipulation techniques, a control and sham manipulation group, larger sample sizes and long-term follow up are recommended.

Other manual therapy techniques include myofascial release, muscle energy, stain/counterstain (trigger point release) and acupuncture. There have been no clinical trials to date that assess their efficacy in treating SI joint pain.

Acupuncture

Acupuncture is one of the oldest forms of therapy, with roots in ancient Chinese philosophy. It is based on the concept that vital energy (qi) courses through the body along distinct pathways or meridians, which when imbalanced results in disease manifestation²⁴. Needling of specific combinations of points along these meridians is believed to restore balance in the body and thereby relieve

symptoms. Despite lacking a clear understanding of its physiologic mechanism of action, acupuncture is utilised in the treatment of a wide range of conditions. While there are no clinical trials assessing the use of acupuncture for the treatment of SI joint pain in the general population, much has been written investigating the efficacy of this treatment modality in the low back pain population. Acupuncture has been found to be effective for symptom relief, but not more than conventional therapies or 'sham acupuncture'²⁴⁻²⁶.

SI joint belts

Although there are no studies assessing the effectiveness of lumbar supports for the treatment of chronic low back pain²⁷, SI joint belts are sometimes used in the clinical setting to provide additional compression and stability to the region and provide some proprioceptive feedback to improve muscle control. In a cadaver study, SI joint belts were shown to decrease SI joint rotation by 30%²⁸. Different from common lumbar orthoses, SI joint belts are worn lower, across the base of the sacrum and at or just inferior to the anterior superior iliac spines. In 25 pregnant women with pelvic girdle pain, an SI joint belt resulted in decreased SI joint mobility²⁹. In general, bracing for SI joint pain should be limited to use during activities that aggravate symptoms.

Orthotics

Although the use of orthotics in treating SI joint pain has not yet been reported in the literature, addressing anatomic or functional leg length discrepancies and other lower limb pathology can assist a rehabilitation program and improve lumbopelvic biomechanics. Lower limb anatomical abnormalities may effect force transfer up the kinetic chain and increase shearing at the SI joint. Shoe lifts should be used cautiously and be implemented in conjunction

with a muscle strengthening and rebalancing program. It has been recommended to use a lift that is at least half of the leg length discrepancy to start and increase as necessary and tolerated. Compensatory gait mechanics should be gradually altered in order to prevent an exacerbation in symptoms somewhere in the pelvis or lower limb.

Other lower limb orthotics, particularly at the foot, ankle and knee should be considered when there are kinetic chain abnormalities that could be affecting force transfer at the SI joint. Examples include an ankle-foot orthoses for a foot drop and knee unloader brace for osteoarthritis or an excessive valgus deformity at the knee. Both will affect gait mechanics and potentially alter force transfer across the SI joint.

Conclusion

SI joint mediated pain is a known entity that can cause discomfort in the low back, buttock, groin and/or lower extremity. It is often difficult to diagnose and symptoms may arise from both intra and extra-articular structures within the SI joint complex. Management of SI joint pain is usually conservative. An understanding of lumbopelvic biomechanics will assist the practitioner in developing an effective rehabilitation program that is focused on muscle balancing of the trunk and lower extremities and correcting kinetic chain abnormalities. Physical therapy and manual therapy have been shown to improve pain and function in patients with chronic nonspecific low back pain, but clinical trials that investigate specific treatment options for SI joint pain with sufficient inclusion criteria are currently lacking. Future studies that both confirm SI joint pain and rule out other more common causes of low back and buttock pain are clearly needed in order to compare the efficacy of non-interventional treatments for SI joint pain.

References

- Slipman CW, Jackson HB, Lipetz JS, Chan KT, Lenrow D, Vresilovic EH. Sacroiliac joint pain referral zones. *Archiv Phys Med Rehab*. 2000 Mar;81(3):334-8.
- Sturesson B, Selvik G, Udén A. Movements of the sacroiliac joints: a Roentgen stereophotogrammetric analysis. *Spine*. 1989 Feb;14(2):162.
- Jacob HAC, Kissling RO. The mobility of the sacroiliac joints in healthy volunteers between 20 and 50 years of age. *Clin Biomech (Bristol, Avon)*. 1995 Oct;10(7):352-61.
- Bowen V, Cassidy JD. Macroscopic and microscopic anatomy of the sacroiliac joint from embryonic life until the eighth decade. *Spine*. 1981 Nov-Dec;6(6):620-8.
- Schwarzer AC, Aprill CN, Bogduk N. The sacroiliac joint in chronic low back pain. *Spine*. 1995 Jan;20(1):31.
- Maigne JY, Aivaliklis A, Pfefer F. Results of sacroiliac joint double block and value of sacroiliac pain provocation tests in 54 patients with low back pain. *Spine*. 1996 Aug;21(16):1889-92.
- Bernard TN, Kirkaldy-Willis WH. Recognizing specific characteristics of non-specific low back pain. *Clin Orthop Relat Res*. 1987 Apr;(217):266-80.
- Chou LH, Slipman CW, Bhagia SM, Tsaor L, Bhat AL, Isaac Z, et al. Inciting events initiating injection-proven sacroiliac joint syndrome. *Pain Med*. 2004 Mar;5(1):26-32.
- Braun J, Sieper J. The sacroiliac joint in the spondyloarthropathies. *Curr Opin Rheumatol*. 1996 Jul;8(4):275.
- Schuit D, McPoil TG, Mulesa P. Incidence of sacroiliac joint malalignment in leg length discrepancies. *J Am Podiatr Med Assoc*. 1989 Aug;79(8):380-3.
- Herzog W, Conway PJ. Gait analysis of sacroiliac joint patients. *J Manipulative Physiol Ther*. 1994 Feb;17(2):124-7.
- Katz V, Schofferman J, Reynolds J. The sacroiliac joint: a potential cause of pain after lumbar fusion to the sacrum. *J Spinal Disord Tech*. 2003 Feb;16(1):96-9.
- Berg G, Hammar M, Möller-Nielsen J, Lindén U, Thorblad J. Low back pain during pregnancy. *Obstet Gyn*. 1988 Jan;71(1):71.
- Laslett M, Aprill CN, McDonald B, Young SB. Diagnosis of sacroiliac joint pain: validity of individual provocation

Competing interests: none declared. Conflict of interests: none declared. All authors contributed to the conception, design, and preparation of the manuscript, as well as read and approved the final manuscript. All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

Licensee OA Publishing London 2013. Creative Commons Attribution License (CC-BY)

FOR CITATION PURPOSES: Greis A, Berk J, Gellhorn AC. Non-interventional treatment options for sacroiliac joint mediated pain: a review. *OA Musculoskeletal Medicine* 2013 May 01;1(1):10.

- tests and composites of tests. *Man Ther.* 2005 Aug;10(3):207–18.
15. Dreyfuss P, Michaelsen M, Pauza K, McLarty J, Bogduk N. The value of medical history and physical examination in diagnosing sacroiliac joint pain. *Spine.* 1996 Nov;21(22):2594–602.
 16. Chou R, Huffman LH, American Pain Society, American College of Physicians. Medications for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline. *Ann Intern Med.* 2007 Oct;147(7):505–14.
 17. Deshpande A, Furlan A, Mailis-Gagnon A, Atlas S, Turk D. Opioids for chronic low-back pain. *Cochrane Database Syst Rev.* 2007 Jul;(3):CD004959.
 18. Vleeming A, Van Wingerden JP, Snijders CJ, Stoeckart R, Stijnen T. Load application to the sacrotuberous ligament; influences on sacroiliac joint mechanics. *Clin Biomech.* 1989 Nov;4(4):204–9.
 19. Hungerford B, Gilleard W, Hodges P. Evidence of altered lumbopelvic muscle recruitment in the presence of sacroiliac joint pain. *Spine.* 2003 Jul;28(14):1593–600.
 20. Richardson CA, Snijders CJ, Hides JA, Damen L, Pas MS, Storm J. The relation between the transversus abdominis muscles, sacroiliac joint mechanics, and low back pain. *Spine.* 2002 Feb;27(4):399–405.
 21. Prather H, Hunt D. Conservative management of low back pain, part I. Sacroiliac joint pain. *Dis Mon.* 2004 Dec;50(12):670–83.
 22. Kamali F, Shokri E. The effect of two manipulative therapy techniques and their outcome in patients with sacroiliac joint syndrome. *J Bodyw Mov Ther.* 2012 Jan;16(1):29–35.
 23. Shearar KA, Colloca CJ, White HL. A randomized clinical trial of manual versus mechanical force manipulation in the treatment of sacroiliac joint syndrome. *J Manipulative Physiol Ther.* 2005 Sep;28(7):493–501.
 24. Furlan AD, van Tulder M, Cherkin D, Tsukayama H, Lao L, Koes B, et al. Acupuncture and dry-needling for low back pain: an updated systematic review within the framework of the cochrane collaboration. *Spine.* 2005 Apr;30(8):944–63.
 25. Haake M, Muller HH, Schade-Brittinger C, Basler HD, Schafer H, Maier C, et al. German acupuncture trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups. *Arch Intern Med.* 2007 Sep;167(17):1892–8.
 26. Brinkhaus B, Witt CM, Jena S, Linde K, Streng A, Wagenpfeil S, et al. Acupuncture in patients with chronic low back pain: a randomized controlled trial. *Arch Intern Med.* 2006 Feb;166(4):450–7.
 27. Middelkoop M, Rubinstein SM, Kuijpers T, Verhagen AP, Ostelo R, Koes BW, et al. A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. *Eur Spine J.* 2010 Jan;20(1):19–39.
 28. Vleeming A, Buyruk HM, Stoeckart R, Karamursel S, Snijders CJ. An integrated therapy for peripartum pelvic instability: a study of the biomechanical effects of pelvic belts. *Am J Obstet Gynecol.* 1992 Apr;166(4):1243–7.
 29. Mens JMA, Damen L, Snijders CJ, Stam HJ. The mechanical effect of a pelvic belt in patients with pregnancy-related pelvic pain. *Clin Biomech (Bristol, Avon).* 2006 Feb;21(2):122–7.