Osteopathic Treatment for Sacroiliac Joint Dysfunction and Piriformis Syndrome: Understanding the Differences and Connections between the Two

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Osteopathy focuses on identifying the root cause of a complaint and providing treatment in order to restore the body to optimal function and movement patterns. Osteopathic practitioners take a detailed patient's history and assess symptoms by using palpation and physical evaluation tests in an attempt to determine the underlying condition and treat that condition accordingly. There are some instances, however, where diagnosis can be a challenge and where conditions may overlap or contribute to one another. It is therefore important for an osteopath to understand differential diagnoses of a patient's complaint in order to fully understand the condition.

Pain is a complex, multifaceted perception that varies in strength, quality, duration, location, and unpleasantness. Research has enabled us to recognize that pain is better described as an experience influenced by many factors, and not simply or directly related to the nature and extent of tissue damage (McGrath, 1994). An osteopath understands that pain is subjective and thus treats holistically, tailoring the therapy to the individual's pain presentation. A pain scale is established with the patient upon initial meeting and is re-established after each treatment and with each visit.

Sacroiliac (SI) Joint Dysfunction and Piriformis Syndrome are typically considered two different conditions that present with very similar symptoms in patients. A complete history and physical assessment of a patient is essential for accurate diagnosis. When a patient complains of pain in the sacroiliac region or in the buttock region, it is important to evaluate for both SI joint dysfunction and piriformis syndrome. It is also important to evaluate for both conditions if the patient complains of low back pain or sciatica. The SI joint is a frequent source of low back pain and referred leg pain and is indicated in approximately 30% of patients with chronic low back pain (Stuber, 2007). Piriformis syndrome is responsible for approximately 6% of low back pain cases and frequently goes unrecognized or misdiagnosed in clinical settings as it mimics other conditions (Mitra et al., 2014).

The SI joint is stabilized by the small pyramidal-shaped piriformis muscle, which originates on the anterior sacrum, the margin of the sciatic foramen, the capsule of the sacroiliac joint and the sacrotuberous ligament. It inserts on the superior medial greater trochanter. It is therefore a theoretical consideration that the two conditions may have a relationship. Piriformis syndrome may mimic other conditions or alternatively, it may be a comorbid condition (Mitra et al., 2014). When irritated, the piriformis muscle causes pain in the buttock. Travell and Simons (1983) suspect SI joint pain may cause piriformis guarding and lead to piriformis syndrome. Therefore, sacroiliac joint dysfunction, sacroiliitis and somatic dysfunction of the sacrum and innominates should be considered as possible causes or effects of piriformis syndrome (Boyajian-O'Neill et al., 2008). The anatomical connectedness of the SI joint and the piriformis muscle makes it challenging for an osteopath to diagnose either SI joint dysfunction or piriformis syndrome. A thorough osteopathic structural examination combined with radiographic imaging should be completed in order to accurately diagnose which condition is occurring, or if they are concurrent.

Sacroiliac joint dysfunction is a term used to describe pain felt from the SI joints or the surrounding myofascia, neural structures, connective tissue or ligament structures. It is known to present individuals with lumbar pain, in the area of the sacroiliac joint that may radiate into the groin and toward the knee. Many patients describe SI joint dysfunction symptoms identically to that of sciatic symptoms however this phenomenon is currently unexplained (Visser et al., 2013). The SI joint connects the hip bones to the sacrum. The sacrum

is a triangular bone that sits between the coccyx and the lumbar spine. The SI joint is supported by a group of muscles that help to deliver forces to the pelvic bones. Some of these muscles, such as the gluteus maximus, piriformis and biceps femoris, are functionally connected to SI joint ligaments, so their actions can affect joint mobility (Cohen, 2005). There are a number of factors and activities that can contribute to SI joint dysfunction. Pregnancy may be a factor in the development of SI joint problems later in life. An individual with a leg length discrepancy may end up having SI joint pain due to abnormal alignment. The exact cause leading to a painful SI joint is often undetermined; however, a direct trauma to the SI joint, such as a motor vehicle accident or a fall could most certainly injure the area. The force of the accident or fall can cause a twisting motion to the pelvis and may injure the ligaments around the SI joint.

SI joint dysfunction usually presents with low back pain below the level of the L5 spinous or transverse process. The pain can radiate down the iliac crest and sacrum to the buttock, to the posterior thigh and the posterior knee. It can present with pain in the sciatic distribution. The pain often occurs with static standing, bending forward, putting on shoes or socks, crossing the leg, rising from chair, and rolling in bed. The patient feels relief with continuous change in position.

Pain referral patterns for the SI joint have been described as diverse and broad. Referral patterns include the buttocks, groin, and the lower limbs. Pain from SI joint dysfunction is commonly deep to the buttock region (Poley & Borchers, 2008). Although SI joint pain referral patterns are challenging to understand, there have been several attempts to identify them. In an early study, Fortin et al. (1999) performed provocative SI joint injections using contrast and lidocaine on 10 asymptomatic volunteers. Sensory changes were localized to the ipsilateral medial buttock inferior to the posterior superior iliac spine in 6 of the 10 subjects. In a follow-up study, 16 individuals with chronic low back pain whose pain closely resembled the pain referral patterns obtained in the first study underwent provocative SI joint injections with contrast and lidocaine. All 16 individuals experienced pain during the injection. Fourteen of the patients experienced pain relief after deposition of the lidocaine and 10 patients reported a 50% pain reduction (Cohen, 2005).

A study by Slipman et al. (2000) was conducted to determine the pain referral patterns in 50 patients with injection-confirmed SI joint pain. In contrast to the findings by Fortin et al. (1999), they found the most common referral patterns for SI joint pain to be radiation into the buttock (94%) followed by lower lumbar region (72%), and then lower extremity (50%). The consistent factor for identifying patients with SI joint pain is a unilateral pain pattern localized below the L5 spinous process (Cohen, 2005).

Visser et al. (2013) performed a study to compare the clinical features of patients with sacroiliac joint-related sciatica-like symptoms to those with true sciatica from nerve root compression. They also investigated the necessity for radiological imaging in patients with sciatica-like symptoms derived from the SI joint. They concluded that sciatica-like symptoms derived from the SI joint can clinically mimic a radiculopathy and it is essential to perform a thorough physical examination of the spine, SI joints and hips with additional radiological tests.

As stated previously, pain referral patterns of the SI joint are various and numerous. It is therefore the job of the practitioner to perform thorough physical investigation as well as

radiographic testing in an attempt to determine if pain is coming from the SI joint solely or if the referral patterns are involving other structures.

Piriformis syndrome is a neuromuscular condition characterized by hip and buttock pain and has a very similar resemblance to that of sciatica. Although piriformis syndrome presents almost identical to sciatica, it is not considered true sciatica. Piriformis syndrome is also known to present patients with symptoms similar to that of sacroiliac joint dysfunction, lumbar radiculopathy or innominate dysfunction. The condition can be divided into two types, primary and secondary based on the source of its aetiology. Primary piriformis syndrome has an anatomic cause, such as a split piriformis muscle, split sciatic nerve, or an anomalous sciatic nerve path. Secondary causes occur as a result of trauma or ischemia, leading to compression of the sciatic nerve (Vassalou, Katonis, & Karantanas, 2018). Common macrotrauma causes of secondary piriformis syndrome include car accidents, sports injuries or falls that cause injury to the buttocks. Microtrauma injuries include overuse of the piriformis muscle or direct compression. Sitting for prolonged periods of time, can cause tightening of the muscle or sitting with a wallet in rear pocket are examples of direct compression (Boyajian-O'Neill et al., 2008).

Piriformis syndrome usually presents with pain and/or paresthesia radiating from sacrum through the gluteal area, down to the posterior aspect of the thigh and stopping above the knee. Pain is felt on the contralateral sacroiliac joint, which can create an initial suspicion of SI joint dysfunction. Piriformis syndrome pain presents while sitting, standing, or lying longer than 15 to 20 minutes but improves with ambulation (Boyajian-O'Neill et al., 2008). It is important to note the similarities in pain presentation and occurrence with those of SI joint dysfunction. Piriformis pain is often felt when rising from seated or squatting position; however, change of position does not relieve pain completely, unlike the relief felt with change of position in SI joint dysfunction.

In most cases of piriformis syndrome, the sacrum is anteriorly rotated toward the ipsilateral side on a contralateral oblique axis, resulting in compensatory rotation of the lower lumbar vertebrae in the opposite direction. It is this sacral rotation that often creates ipsilateral physiologic short leg (Boyajian-O'Neill et al., 2008). Leg length discrepancy requires investigation to distinguish between physiologic or anatomic causes (Mitra, et al., 2014). Patients with piriformis syndrome typically exhibit weakness in distal musculature and may experience gluteal atrophy in chronic cases.

Differential Diagnosis:

SI joint dysfunction differential diagnosis includes piriformis syndrome, trochanteric bursitis, myofascial pain, lumbosacral radiculopathy, disc herniation and bulge, facet syndrome, hip fracture, spondylolysis, spondylolisthesis, ankylosing spondylitis, and diffuse idiopathic skeletal hyperostosis (Poley & Borchers, 2008).

Piriformis syndrome differential diagnosis includes all other causes of low back pain and sciatica such as sacroiliac joint dysfunction, spinal stenosis, facet syndrome, trochanteric bursitis, pelvic tumor, endometriosis and various other conditions that can irritate the sciatic nerve (Mitra, et al., 2014).

It is important to note the differential diagnoses for SI joint dysfunction and piriformis syndrome are of each other.

Tests:

There are a wide array of tests osteopaths may perform in order to identify SI joint dysfunction or piriformis syndrome. Sensitivity and specificity are key statistical measures used to approximate diagnostic accuracy and to determine the likelihood ratios of a positive or negative test. Sensitivity is the proportion of patients with the suspected condition who have positive tests. Specificity is the proportion of patients without the suspected condition who have negative tests (Laslett et al., 2008).

The complexity of SI joint diagnosis makes it challenging for practitioners. Theoretically, excessive or restricted motion at the SI joint can alter the mechanics of the spine and pelvis causing pain. However, studies have shown that the movement of the SI joint is so minimal it would be virtually impossible for a practitioner to detect. Sturesson et al. (2000) measured multiple SI joint movements in patients diagnosed with SI joint pain. Movements in all planes were found to be very small, with translations never exceeding 1.6 mm, and rotations being limited to 3 degrees. There were no differences between symptomatic and asymptomatic joints, which led the authors to conclude that motion analysis was not useful for identifying painful SI joints in most patients.

Palpation tests involve the use of deep thumb pressure, applied directly over the SI joints. A positive test renders tenderness over the affected SI joint, which should then be correlated with other provocative tests. The Cluster of Laslett is a group of four provocative tests used for SI joint pain. The four tests are the Sacroiliac Distraction Test, the Thigh Thrust Test, the Sacroiliac Compression Test and the Sacral Thrust Test (Laslett et al., 2008). These tests are used to help implicate the SI joint as a contributor to a patient's pain experience as they each produce a specificity and sensitivity greater than 60% (Stuber, 2007). No single test is individually sensitive or specific enough to diagnose SI joint dysfunction (Poley & Borchers, 2008). Therefore, test clustering is a systematic process, whereby a group of special tests are used together to aid in clinical decision making. Assessment of symptoms in the SI joint region should involve the pain provocation tests in combination with motion palpation and pelvic position tests.

Two of the most common motion palpation tests for assessing SI joint dysfunction are FABER/Patrick's Test and Gaenslen's Test. Other tests include Lewin-Gaenlen Test, Yeoman's Test, Hibb's Test, Minnel's Test, and the Belt Test. When several types of motion palpation tests are included with clusters of provocative tests, the highest level of accuracy was found in determining if pain was coming from the SI joint (Laslett et al., 2008).

Despite the numerous diagnostic tests, clinical studies have shown that extensive medical history taking and physical examination findings are not consistently capable of identifying dysfunctional SI joints as the pain generators. The most accurate detection tests for diagnosing SI joint dysfunction as the cause for nonspecific low back pain are sacroiliac joint anesthetic blocks that use computed tomography (CT) or fluoroscopic-guided injections. These are considered the gold standards for detecting SI joint dysfunction (Poley & Borchers, 2008). For an osteopath to definitively determine SI joint dysfunction as the root cause of a patient's symptoms, it is recommended to perform a thorough physical examination in combination with radiological tests.

Diagnosing piriformis syndrome is also a challenge for the practitioner as it is hindered by a lack of agreed upon clinical criteria and a scarcity of established investigations (Vassalou, Katonis, & Karantanas, 2018). The ability to recognize piriformis syndrome requires an understanding of the structure and function of the piriformis muscle and its relationship to the sciatic nerve (Boyajian-O'Neill et al., 2008). The physical assessment should include musculoskeletal system examination with attention to the lumbar spine, sacrum and pelvis. It should identify any leg length disparities, should examine the neurological system and should include appropriate diagnostic tests (Mitra, et al., 2014).

Palpation testing in the region of the sacroiliac joint, the greater sciatic notch, and the piriformis muscle will elicit tenderness. There will be a palpable mass in ipsilateral buttock and traction of the affected limb should provide moderate pain relief. There will also be noticeable weakness in affected limb (Boyajian-O'Neill et al., 2008).

The FAIR Test is a common test to determine piriformis syndrome. Fishman et al. (2002) found the FAIR Test to have sensitivity and specificity of 88.1% and 83.2%, respectively. The FAIR Test result is positive if sciatic symptoms are recreated. Other tests include the Piriformis Sign, the Lasègue Sign, the Freiberg Sign, and the Beatty Test. According to Vassalou, Katonis, and Karantanas (2018) the combination of a positive active piriformis test and a seated piriformis stretch test has been reported to show the highest sensitivity and specificity regarding the diagnosis of sciatic nerve entrapment.

There are a plethora of tests that can be used to aid in diagnosing both SI joint dysfunction and piriformis syndrome. It is up to the practitioner to choose the tests that render the highest accuracy for each condition. By learning of the sensitivity and specificity of each test, the practitioner can be better equipped at providing a more accurate diagnosis. It is also recommended the practitioner order radiological imaging in combination of physical examination tests for a more precise diagnosis.

Treatment:

Osteopathic treatment aims to correct the underlining pathology and alleviate the symptoms. An osteopathic practitioner will treat holistically, gearing the treatment to the individual.

For SI joint dysfunction, the practitioner should implicate the SI joint as a source of pain through provocative tests, identify associated dysfunctions, and correct these abnormalities for symptom resolution. Dysfunction of the SI joints may cause dysfunction in the pelvis resulting in autonomic imbalances, biomechanical motion issues, and circulatory problems. SI joint dysfunction is complex, as evidenced by the multiple diagnosis and treatment approaches that are used by osteopaths and no single approach can cover all the possible somatic dysfunction (Glover et al., 2018).

Non-interventional management of SI joint pain should ideally address the underlining pathology. For example, in patients with true or apparent leg length discrepancy, orthotics may be prescribed to more equitably distribute the load from the SI joints. SI joint pain resulting from altered gait mechanics and spine misalignment, osteopathic therapy has been reported to reduce pain and improve mobility. There are, however, no prospective, controlled studies supporting these modalities (Cohen, 2005). Evidence supporting any one therapy for SI joint dysfunction is limited by the lack of controlled outcome studies.

A study by Mooney et al. (2001) found that 5 women with injection-confirmed SI joint pain had hyperactivity of the ipsilateral gluteus muscles and contralateral latissimus muscle compared with 15 asymptomatic control patients. All 5 patients achieved a significant reduction in pain and a return to normal patterns after a 2-1/2 month exercise program. It could be argued that osteopathic treatment that focuses on the hyperactivity or spasm of the gluteus muscles and latissimus dorsi muscle could benefit these patients as well.

Osteopathic manual therapy can help to balance or align the sacrum, pelvis and lumbar asymmetries by using muscle energy techniques, joint mobilization, trigger point release, myofascial release, strain counter strain, and soft tissue mobilization as well as reduce any spasm from contributory musculature around the SI joint.

Piriformis syndrome responds well to manual therapy. Fishman et al. (2002) reported that early conservative treatment of piriformis syndrome is very effective and that more than 79% of patients exhibited symptom reduction with use of nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, rest, and ice. The goals of osteopathic manipulative treatment for patients who have piriformis syndrome are to restore normal range of motion and to decrease pain. These goals can be achieved by decreasing piriformis spasm. The piriformis responds well to direct, aggressive myofascial release. Indirect osteopathic manipulative techniques have been used to treat patients with piriformis syndrome as well. The two indirect techniques most commonly used for the management of piriformis syndrome are counterstrain and facilitated positional release. Both techniques involve the principle of removing as much tension from the piriformis muscle as possible. Three tender point locations can be addressed with counterstrain at the mid sacrum, piriformis muscle, and posteromedial trochanter (Boyajian-O'Neill et al., 2008).

Stretching the piriformis muscle and strengthening the abductor and adductor muscles should be included in treatment plans. A beneficial approach to correcting piriformis syndrome would combine muscle stretches, soft tissue, myofascial, muscle energy techniques and thrust techniques to address all dysfunctions in the patient. (Boyajian-O'Neill et al., 2008)

Osteopathic manual therapy for piriformis syndrome should combine a variety of modalities including myofascial release, massage, passive stretching, joint and spinal mobilization and cranial osteopathy. Appropriate exercises should also be prescribed and education should be provided to avoid habits or activities that have created the imbalance.

In conclusion, an osteopathic practitioner is presented with a challenge when a patient complains of lower back, buttock, sacroiliac or sciatic pain. It may be difficult to define where pain referral patterns arise and whether they are attributed to only one condition. Even with a variety of tests aimed at determining the cause of a complaint, there can be a multitude of factors that can result in an inconclusive assessment. It is therefore imperative for the practitioner to take

a detailed history and use a combination of palpation, provocative and motion testing as well as radiographic imaging by means to diagnose accurately. The literature has shown the complexity of assessing and diagnosing SI joint dysfunction and piriformis syndrome and there needs to be further studies aimed at understanding each condition separately and how they are related.

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