

NATIONAL UNIVERSITY OF MEDICAL SCIENCE (SPAIN)

OESTEOPATHIC APPROACH TO PIRIFORMIS SYNDROME

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Hypothesis

My hypothesis is on how Osteopathic Manipulative Techniques can be an alternative to surgery for Piriformis Syndrome.

About Osteopathy

In the late 1800s, Osteopathy was founded by a physician and surgeon, Andrew Taylor Still in Kirksville, Missouri. He soon realised that medical treatments of his time were largely ineffective and in some cases harmful. He discovered that in order to achieve the highest form of health, all parts of the body should work harmoniously. He wanted to restore the human body to optimum health with minimum surgery and medicine (The Institute of Osteopathy, N.A).

Osteopathy is a system of diagnosis and treatments for a wide various range of medical conditions. The idea of Osteopathy is to work with the structure and function of the body. The principle is that the health of the body is based on the skeleton, muscle, ligaments and connective tissues functioning smoothly (General Osteopathic Council, 2019).

Origin and Function of Piriformis Muscle

The piriformis Muscle is located in the deep gluteal region. It belongs to one of the six short external rotators of the hip.

Origin: The Piriformis muscle arises from the anterior surface of the sacrum (between S2 and S4), between the sacral foramina. It laterally exits the bony pelvis through the greater sciatic foramen. It often attaches to the gluteal surface of the ilium, close to the posterior inferior iliac crest.

Insertion: It inserts onto the apex of the greater trochanter, posterosuperior to the insertion site of the conjoined tendon of gemellus superior, obturator internus and gemellus inferior.

Function: The piriformis muscle stabilises the hip joint by steadying the head of the femur inside the acetabulum of the hip bone. It is also responsible for laterally rotating the hip with extension and abducts the femur with hip flexion. Abduction of the flexed thigh is important in walking gait as it prevents falling, by shifting the body weight to the opposite side of the foot being

lifted off the ground. Being a lateral rotator muscle of the hip the piriformis muscle opposes medial rotation of the femur and hip (Ken Hub, 2016).

Sciatic Nerve

The sciatic nerve is approximately 2cm and it is a thick flat band. It is a major nerve of the lower limb. Before the sciatic nerve leaves the pelvis and enters the gluteal region through the greater sciatic foramen, it derives from the Lumbosacral Plexus. It sits inferiorly to the piriformis muscle and goes down in an inferolateral direction (Martin, 2019).

Origin: It originates from L4-S3 of the spine and it is a motor and sensory nerve.

Motor Functions: it innervates the biceps femoris, semimembranosus and semitendinosus, along with the hamstring portion of the adductor magnus

Sensory Functions: It has no direct sensory function but it indirectly innervates the skin of the lateral leg, heel, dorsal and plantar surfaces of the foot.

Piriformis Syndrome

Piriformis syndrome is a condition that develops due to the compression or irritation of the sciatic nerve near the piriformis muscle. The pain is increased by the contraction of muscle, direct pressure or prolonged sitting. There is a link between piriformis syndrome and sciatica (William, 2018). It is a peripheral neuritis of the sciatic nerve associated with abnormal conditions of the piriformis muscle. It is often misdiagnosed and goes unrecognized in clinical settings. Piriformis syndrome can be mistaken for other common somatic dysfunctions e.g. primary sacral dysfunction, lumbar radiculopathy, sacroiliitis, intervertebral discitis.

The typical cause for piriformis syndrome is macrotrauma to the buttocks, leading to muscle spasm, soft tissue inflammation, which would further lead to nerve compression on the sciatic nerve. Macrotrauma may also be caused from overuse of the piriformis muscle from long distance walking or running with negligence to proper postural mechanics. In some cases piriformis syndrome is

caused from wallet neuritis (repetitive trauma from sitting on hard surface). Muscular compression of small nerves and vessels, including the pudendal nerve (main nerve of the perineum) and blood vessels which exit at the medial inferior border of the piriformis, muscle may lead to local inflammation and congestion (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

There are two types of Piriformis syndrome:

Primary Piriformis Syndrome: is an anatomic cause, such as a split piriformis muscle, split sciatic nerve, or an anomalous sciatic nerve path. Fewer than 15% of diagnosed cases have primary piriformis syndrome.

Secondary Piriformis Syndrome: it is a result of a precipitating cause, includes macrotrauma, microtrauma, ischemic mass effect and local ischemic (Verbruggen, N.A).

Pathological conditions of the sciatic nerve, chronic somatic dysfunctions, and compensatory changes resulting in pain, paresthesia, hyperparesthesia and muscle weakness might be the results of a delayed diagnosis.

Clinical symptoms of Piriformis Syndrome

Many with piriformis syndrome symptoms complain of pain over the buttock region, predominantly over the muscle attachments at the sacrum and medial greater trochanter. Symptoms which may be sudden or gradual, are occasionally presented with spasm of the piriformis muscle or compression of the sciatic nerve (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

The symptoms of Piriformis Syndrome include:

- Pain associated with sitting, standing or lying longer than 15 to 20 minutes
- Pain radiating from sacrum through gluteal region and down posterior aspect of thigh, usually stopping above knee.
- Pain improves with ambulation and worsens with no movement
- Pain when rising from seated or squatting position

- Change of position does not relieve pain completely
- Contralateral sacroiliac pain
- Difficulty walking (e.g. antalgic gait, foot drop)
- Numbness in foot
- Weakness in ipsilateral lower extremity
- Headache
- Neck pain
- Abdominal, pelvic and inguinal pain
- Dyspareunia in women
- Pain with bowel movements

The cause of stress on the sacrotuberous ligament is due to the spasm of the piriformis muscle and sacral dysfunction. The stress may further lead to the compression of the pudendal nerves or increased mechanical stress to the innominate bones, subsequently leading to pelvic and groin pain. Through compensation and facilitative mechanisms piriformis syndrome can lead to gastrointestinal disorders, headache, cervical, thoracic and lumbosacral pain.

Symptoms that relate directly or indirectly to muscle spasms, nerve compression and piriformis syndrome test:

- Tenderness in region of sacroiliac joint, greater sciatic notch, and piriformis muscle
- Palpable mass in ipsilateral buttock
- Traction of affected limb provides moderate relief of pain
- Asymmetrical weakness in affected limb
- Piriformis sign positive
- Lasegue sign positive
- Freiberg sign positive
- Pace sign(flexion, adduction and internal rotation test result) positive

- Battery test result positive
- Limited medial rotation of ipsilateral lower extremity
- Ipsilateral short leg
- Gluteal atrophy (chronic cases only)
- Persistent sacral rotation toward contralateral side with compensatory lumbar rotation

The sacral plexus that innervate the TFL, gluteus minimus & gluteus maximus, quadratus femoris, obturator externus and adductor magnus may also be irritated by the piriformis muscle. In majority of patients with piriformis syndrome, the sacrum is anteriorly rotated toward the ipsilateral side on a contralateral oblique axis, leading to compensatory rotation of the lower lumbar vertebrae in the opposite direction (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

Diagnosing Piriformis Syndrome

There is a controversy in diagnosing piriformis syndrome. Mainly due to the lack of scientific findings in regards to piriformis test. Doctors have debated over that it is both under and over diagnosed. Many doctors are able to diagnose piriformis syndrome base on clinical findings alone. Evidently there are two test that significantly identify piriformis syndrome.

1. Magnetic resonance neurography (MRI) – MRI looks for inflammation in the sciatic nerve
2. FAIR Test – **F**lexion, **A**dduction and **I**nternal **R**otation test. This movements will compress the sciatic nerve and flex the hip to stretch the piriformis muscle. It measures delays in the sciatic nerve signals due to its compression under the piriformis muscle (Villines, 2017).

There are several test that can help with diagnosing piriformis syndrome. Though there isn't one specific test, these test are helpful in clarifying clinical findings.

Orthopaedic test for piriformis syndrome:

Lasègue sign test – also referred to as the straight leg test:

With the hip flexed to an angle of 90 degree and knee extended, pressure is applied onto the piriformis muscle and its tendon. Localised pain or tenderness is often found in the vicinity of the greater sciatic notch. This test is performed with the patient lying supine on the examination table, with the examiner standing on the tested side, distal hand on the patient's heel and proximal hand on distal thigh. Doing so it helps to maintain the knee in extension. Examiner raises the leg of the patient slowly until ROM is obtained or tightness is noted. After which lower the leg slowly until tightness or pain dissipates, at this point dorsiflex the ankle and get the patient to flex the neck. Test is positive with pain (Verbruggen, N.A) (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

Friberg's Test:

This test triggers the pain/discomfort in the piriformis muscle by passively internally rotating the extended hip, while the patient is lying supine on the examination table. The purpose of this test is to provoke the compression of the sciatic nerve by stretching the piriformis muscle (Physiopedia, 2018).

Pace sign test:

The pace sign is used with the FAIR (Flexion, Adduction and Internal Rotation) test, its goal is to recreate the sciatic symptoms. With the patient lying on their side (Recumbent), the side with suspected piriformis syndrome facing up, knee flexed to an angle of 60-90 degree and hip flexed to an angle of 60 degree. With the hip stabilized, the examiner internally rotates and adducts the hip by applying a downward pressure to the knee. This test can also be performed with the patient supine or seated, knee and hip flexed, and hip medially rotated, while asking the patient to resist the examiners attempts to externally rotate and abduct the hip. The test is positive if sciatic symptoms are recreated (Verbruggen, N.A) (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

Amongst this test, neurophysiological testing has proved beneficial in diagnosing piriformis syndrome. Electromyography (EMG) is helpful in identifying intervertebral disc herniation from piriformis syndrome. Magnetic Resonance Imaging (MRI) can help in ruling out disc and vertebral conditions by looking for an enlargement in the piriformis muscle.

Differential Diagnosis

A complete medical history, physical, neurologic and radiologic assessment is vital for an accurate diagnosis of piriformis syndrome. Piriformis syndrome may mirror other somatic dysfunctions such as:

- Thrombosis of the iliac vein
- Trochanteric Bursitis
- Painful vascular compression syndrome of the sciatic nerve, cause by gluteal varicosities
- Herniated intervertebral disc
- Post-laminectomy syndrome or coccygodynia
- Posterior facet syndrome at L4-5 or L5-S1
- Unrecognized pelvic fractures
- Lumbar osteochondrosis
- Undiagnosed renal stones
- Lumbosacral radiculopathies
- Osteoarthritis (lumbosacral spine)
- Sacroiliac joint syndrome
- Degenerative disc disease
- Compression fractures
- Intra-articular pathology in the hip joint: labral tears, femuro-acetabular impingement (FAI)
- Lumbar spinal stenosis
- Tumours, cysts

- Gynaecological conditions
- Diseases such as appendicitis, pyelitis, hypernephroma, uterine disorders, prostate disorders and malignancies in pelvic viscera.
- Dysfunction, lesion and inflammation of sacroiliac joint
- Pseudoaneurysm in the inferior gluteal artery following gynaecological surgery
- Sacroiliitis
- Psychogenic disorders: physical fatigue, depression, frustration (Verbruggen, N.A)

Patients with piriformis syndrome usually have weakness and atrophy in the distal musculature. Sacroiliac joint dysfunction and other somatic dysfunction of the sacrum and innominates should be considered possible causes of piriformis syndrome. Thorough osteopathic structural examination can help determine these causes.

Osteopathic treatment for Piriformis Syndrome

The goal for an Osteopath dealing with a patient with piriformis syndrome is to restore the normal range of motion and decrease pain. Decreasing piriformis spasm can achieve these goals (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018) (Lewis, 2017).

As an Osteopath, throughout the patient's physical evaluation, a high index of suspicion for piriformis syndrome should be maintained. Early conservative treatment is the most effective treatment, as noted by Fishman et al. (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2018).

When your patient comes to see you, it is always beneficial for you, as an Osteopath, to watch how your patient walks when they walk towards you. Early assessment of their walking gait can help you better understand the patient's condition and what they are trying to describe to you. Though at times the walk towards you might be brief, you can always do a thorough gait assessment during your session.

History taking

In order to better aid your diagnosis, you should obtain as much information as you can from your patient. Age, past or present health complications, surgery, lifestyle (active or sedentary), smoking, alcoholic, are they on any medications. When it comes to the patient describing his/her condition, questions such as: location of pain, duration of pain, grade of pain (1-10), past trauma, are there any other complications that arise when pain started (headache, sleep loss, loss of appetite etc.), passive and active movement that trigger pain. Such questions can help benefit in your diagnosis.

Physical assessment

It is always crucial to perform physical assessment before you start working on the patient. Doing so gives you a better understanding of the patient's condition. Physical assessment such as: physical test specific to patient's condition, gait test, musculature asymmetry, ROM test, etc. Doing such test gives you a better lead on how an osteopath such structure a treatment for the patient.

Treatment

Osteopaths have a wide range of treatment techniques to use from, choosing the right techniques to treat a specific condition and structure a treatment plan can benefit the patient a lot. In this context we are talking about Piriformis Syndrome and how osteopathic manipulative techniques (OMT) can prove beneficial.

The two most widely used indirect OMT techniques in piriformis syndrome cases. Both techniques involve in removing as much tension from the piriformis muscle as possible.

1. Counterstrain technique – the patient is asked to lie in a prone position with the affected side at the edge of the examination table, then bringing the patients affected leg over the table, placing the knee and hip into flexion with abduction and external rotation at the hip. Bringing the patient into this position should reduce the tenderness in the piriformis muscle, then applying pressure to one of three tender points (the mid-pole sacrum, piriformis muscle and posteromedial trochanter) for 90 seconds. Bring the leg back up onto the

table, it is crucial that at this point the patient does not engage any muscle and assist you in bringing the leg back onto the table, if they do it cancels out any therapeutic effects. When leg is back on the table recheck the piriformis muscle for tenderness.

2. Facilitated Positional Release – this technique can be performed in the same position, with compression through the long axis of the femur, shortening the piriformis muscle even further and applying pressure to the piriformis muscle but for only 3-5secs. Bring the leg back up onto the table, it is crucial that at this point the patient does not engage any muscle and assist you in bringing the leg back onto the table. If they do, it cancels out any therapeutic effects. When leg is back on the table recheck the piriformis muscle for tenderness (Lewis, 2017).

Direct OMT techniques that are most useful in treating piriformis syndrome:

1. Muscle energy technique – This technique is used to reduce the spasm in the piriformis muscle, associated dysfunction of the sacrum and pelvis. The most important part of this technique is for the patient to understand the required amount of force required and direction of force.
2. Articular technique – to increase the range of motion, advancing and retreating for the restrictive barrier till you are able to advance from the barrier.
3. Still technique – bringing the joint away from its restrictive barrier in a relaxed form. With the patient relaxed and passive, compression is applied with an arching motion to the level of dysfunction and moved towards the restrictive barrier.
4. High velocity/ Low amplitude technique – HVLA is usually performed to correct associated somatic dysfunction in the sacrum and pelvic for piriformis syndrome.

Post Treatment/ Homework

Prescribing exercises and stretches to your patient can really help with a steady progression and should be done religiously daily. The ultimate goal for exercises and stretching is symptom elimination, increased range of motion of the surrounding joints and muscle, increasing strength in supporting muscle groups.

Stretches

1. Glute stretch
2. Standing hamstring stretch

Exercises

1. Plank
2. Side plank
3. Clam exercise
4. Prone hip extension with bend leg (Relayhealth, 2014)

Conclusion

Piriformis syndrome can be quite a complex condition given that the sciatic nerve sits just posterior to it. Proper assessments and tests should be performed to get a more accurate diagnosis. OMT can be used as an alternative to surgery and pharmaceutical drugs. Educating patients about proper gait and biomechanics is beneficial as it helps with them recovering faster and living a better and more confident life.

Appendix

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