Review Article

Tale of Two Non-Discogenic Pains, Sacroiliac Joint and Piriformis Syndromes – A Less Travelled Clinical Entities

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Received on 7.6.2018; accepted on 9.9.2018

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ABSTRACT

Both Sacroiliac Joint Syndrome (SIJS) and Piriformis Syndrome (PS) give rise to sciatica like symptoms and are the causes of low back pain due to its close proximity to the sciatic nerve. Clinical diagnosis of these two conditions are often compounded by the high degree of similarities in their clinical presentations making the diagnosis more speculative than confirmatory in our day to day practice. This is further complicated by non-availability of a reliable test that can confirm as well as distinctly distinguish the diagnosis of both the conditions.In the literature different theoretical basis are separatively given regarding causes of PS and SIJS, but are never discussed colectively which is usually seen in daily clinical practices. The review has emphasized to provide a bseline collective of most of pathogenetic and anatomic factors because of which one syndrome can give rise to another or vice-versa. Therefore the objective of the present review is to update what is known about the clinical characteristics and probable pathogenetic mechanisms of above syndromes for further understanding of the interrelations between PS and SIJS.

Keywords: low back pain, sacroiliac joint syndrome, sciatica, piriformis syndrome.

الملخص

كل من متلازمة المفصل العجزي الحرقفي (SIJS) ومتلازمة الكمثرية (PS) يؤدي إلى عرق النسا وأسباب آلام أسفل الظهر بسبب قربها من العصب الوركي. غالبا ما يضاعف التشخيص السريري لهاتين الحالتين من الدرجة العالية في أوجه التشابه في الأعراض السريرية مما يجعل التشخيص غير حقيقي اكثر منه تشخيصا تأكيديا في الممارسة اليومية. كما أصبح التشخيص اكثر تعقيدا بسبب عدم توفر الاختبارات الموثوقة التي تؤكده فضلا عن التمييز بوضوح بين تشخيص كل من الحالتين.

تعطي الأدبيات البحثية المختلفة أساسا نظريا حول أسباب متلازمة المفصل العجزي الحرقفي (SIJS) ومتلازمة الكمثرية PS))، ولكن لا تناقش ابدا بشكل مكثف الممارسات السريرية اليومية. ركزت مراجعة الأدبيات على اعطاء خطوط عريضة في الأساسيات الخاصة بالعوامل التشريحية والمرضية لأن أحدهذه المتلازمات يمكن أن يؤدي ال الآخر والعكس.

الهدف من هذا الدراسة هو تحديث ما هو معروف عن الخصائص السريرية وطرق الامراض المحتملة لمتلازمة المفصل العجزي الحرقفي (SIJS) ومتلازمة الكمثرية (PS) , ولمزيد من الفهم للعلاقات المتبادلة بينهما.

INTRODUCTION

Chronic low back pain (LBP) and understanding its etiologies has been a matter of studies since antiquity and arriving at a definitive diagnosis has always been a clinical challenge. Different components of the body such as muscles, joints, fascia and ligaments have been incriminated as the probable cause associated with such clinical condition.[1] Many other synonyms such as lumbar pain, spinal pain have been referred to as low back pain with various terms, coined by different authors.

Low back pain can further be categorized to lumbar spinal pain and sacral pain where lumbar pain is the pain that is perceived in the area between an imaginary line at the spinous process of T12 and S1 with a lateral extension by erector spinae whereas sacral pain is the pain perceived in the sacral area falling within the boundaries demarcated by the posterior-superior iliac spine and posterior-inferior iliac spine.[2,3] Among the various known causes of low back pain such as spondylosis, herniated disc, spondylolisthesis, spinal fracture, spondylolysis, spinal tumor, sacroilitis, sacroiliac joint dysfunction, piriformis syndrome, and pregnancy; sacroiliac Joint syndrome and Piriformis Syndrome are the two important causes of sacral pain. Clinically arriving at a correct diagnosis of sacral pain is often difficult, because it has often been better observed that two or more overlapping symptoms may manifest simultaneously in the patient mimicking symptoms of each syndrome. In this context, in the present article attempt has been made to highlight both anatomical and pathophysiological findings of Sacroiliac Joint syndrome and Piriformis Syndrome, where a muscle and a joint are primarily involved in producing overlapping clinical symptoms lead to a diagnostic dilemma. Furthermore, it is often difficult to distinguish which precedes the other.[4-7]

Sacroiliac Joint and Sacroilliac syndrome:

The Sacroiliac Joint (SIJ), an axial joint is surrounded by a fibrous capsule. There is a dorsally extended sacro iliac ligamentous structure that helps to limit the movement in three different planes.[8,9] The ligamentous structure is relatively weaker in females compared to male.[10] Various muscles such as piriformis, biceps femoris and gluteus maximus are connected to this ligament and do have a role related to the mobility of the sacro-illiac joint.[11]

The SIJ pain is commonly prevalent as low back pain in approximately 15% of the population.[9] Pain in the sacro iliac joint is often idiopathic, however two reasons i.e. either due to dysfunction and/or due to some underlying pathological conditions have been attributed. Joint dysfunction can occur due to various isolated or combined functional anomalies of muscular imbalance, locking of the joint and possibly due to pelvic rotation.[12] With reference to pain associated with dysfunction of sacro-iliac joint, Vleeming et al described "self-locking mechanism" of SIJ,

and have attributed to four integrated components. These components are formed closure, force closure, motor control and emotion and awareness. The failure of muscles and ligamentous "self-bracing mechanism" at lumbosacral junction, can lead to low back pain.[13-15] Pathological basis of pain in this joint can also be attributed to prior trauma to associated ligaments and bones outside the joint besides osteoarthritis within the joint and spondyloarthropathies.[16] In fact, John Cowan (1923) based on his study concluded that the arthritis of sacro-illiac joint could be one of the causes of sciatica.[17]

Association of Sciatica in sacro-illiac syndrome

Sciatica refers to musculoskeletal pain in the back and hip. This pain often radiates to the area that is supplied by the sciatic nerve.[18] Till late 1920s sacro-illiac joint was considered to be the important cause of sciatica. Barre & Duprez et al (1920) were the first to coin the term Sacro-Iliac Sciatica. They were of the opinion that lumbosacral plexus is lying immediately in front of SIJ just separated by Piriformis Muscle (PM), so SIJ could be included in one of the causes of sciatic nerve compression.[17] Schwarzer AC et al in their study found out that sometimes tears of ventral capsule of sacro-iliac joint have been seen in arthrograms of patients with SIJ-related pain.[19] Fortin et al stated that SIJ dysfunction could produce pain resembling sciatica and was very similar to PIVD (Prolapsed Intervertebral Disc). It was suggested that this pain could be a result of L5-S1 neural insult caused by SI capsular irritation and released cytokines. [20,21] Fortin et al stated that SIJ dysfunction could produce pain resembling sciatica and was very similar to PIVD (Prolapsed Intervertebral Disc). [21] Slipman et al found out 18 different pain referral patterns after studying 50 patients with SIJ and concluded that pain was referred mainly into two regions, one around the lumbar region and other in the lower extremity. In the lumbar region, most common pain referral areas were buttocks, lower lumbar and groin, and the least common was upper lumbar and abdomen. In contrast, the lower extremity pain referral patterns were observed only in 50% of the patients and the pain patterns were limited to the lateral or posterior thigh. SIJ compressing sciatic nerve can produce sciatica like symptoms but without any neurological signs. [22]

Diagnosis of SIJS

According to Cusi et al assessment of sacro-illiac syndrome may be done by careful history taking, clinical examination besides relevant imaging studies. While taking history, most of the patients complain of unilateral low back pain and also indicating pain directly to SI joint (Fortin's Finger Test).[13]

Various maneuvers have been tried for clinical diagnosis of sacro-illiac syndrome such as thigh thrust test, Gillet test, Active straight leg raise test, Patrick's Fabere, Gaenslen's tests, palpation of long dorsal SI ligament test, standing flexion test, sitting posterior-superior iliac spine palpation, su-

pine long-sitting test, prone knee flexion test, distraction test, compression test and sacral thrust. Amongst the cluster of all these tests, some researchers are of the opinion that a combination of positivity of three provocative tests without any centralization or decentralization of symptoms being evaluated by McKenzie evaluation, are suggestive of SIJ dysfunction pain.[3,13,22,23,24]

Imaging investigations like X-Ray, Computed Tomography (CT) & Magnetic Resonance Imaging (MRI) are must be done to rule out the other diseases simulating SIJ symptomatologies. Use and validity of intra-articular SI joint blocks to diagnose SIJ pain still remains debatable.[13,21,25,26,27]

PIRIFORMIS SYNDROME

The sciatic nerve passes below the flat pyramidal shape muscle known as Piriformis muscle.[28,29] Due to close juxtaposition of nerve and the muscle, there is some amount of constant developmental and functional interrelationship between the two structures. [30] The function of PM is dependent mostly on the different movements of the hip joint. During extension, the muscle helps to rotate the hip joint externally where as in flexion it abducts the hip joint.[31] The piriformis muscle has a close proximity with SIJ because this is the only muscle that bridges the joint.[28] Yeoman et al were the first to describe the role of anatomic relations of sciatic nerve and piriformis muscle in causing the hip pain. [4] Further, Freiberg and Vinke proposed that pain could be due to priformis muscle causing compression of the sciatic nerve that passes below it.[5] Later on, the hypothesis of Freiberg and Vinke was reinforced by Robinson and a clinical entity of piriformis syndrome (PS) was known to medical literature.[6] The term PS has been debatable due to inclusion of different entities viz i) damage to the sciatic nerve by adjoining tumors, fibrosis, hematomas, endometriosis etc. ii) possible compressive damage to the sciatic nerve due to piriformis muscle. iii) damage to sciatic nerve by piriformis muscle or adjoining tissues due to trauma. iv) Chronic buttock pain with no evidence of sciatic nerve damage. However, in all these entities, the primary symptom will be of buttock pain often with sciatica, without any neurological deficits. Depending on the availability of definitive diagnostic tests, the incidence rates of piriformis syndrome may vary from 33 to 36%. [32]

Sciatica & Piriformis Syndrome (PS)

The causal etiologies of PS can be categorized into two types i.e. primary and secondary. The primary PS may include intrinsic anatomical variations, myofascial pain, hypertrophy, myositis ossificans or direct trauma to the pelvis or buttock whereas secondary PS may occur due to sacroiliac joint dysfunction, facet syndrome, trochanteric bursitis, PIVD.[33]

Sciatic pain can be caused by the piriformis muscle was suggested in a rationale hypothesis given by Yeoman et al[4] and by Freiberg and Vinke.[5] In addition, inflammatory degeneration of muscle and its fascia,

spasm and hypertrophy of piriformis muscle and prior trauma may also be responsible for pain.[34,35] Pecina et al, in one of their study reported that possibly there are two different passages of sciatic nerve or its branches through PM. The first one through the belly of the muscle and the other through tendinous portions of the muscle. If the nerve passes through the muscle, the contraction of muscle fibers during external rotation of thigh may not be able to exert enough pressure on the nerve fibers and the resulting damage is not of great magnitude, and this condition can be managed conservatively. However, if the nerve or its branch passes through the tendinous portion of the piriformis muscle, it can produce significant morbidity (ishchalgia) due to compression of a nerve or its branches during inward rotation of thigh causing passive stretching of the piriformis muscle. It is also known that sciatica would not be caused because of muscular contraction during outward rotation of thigh. In such a case, ischalgia can be managed by cutting through one of the tendons of PM.[30] Pace & Nagle suggested that compression of the sciatic nerve by Piriformis muscle can produce sciatica like symptoms without any neurological deficits.[29]

Diagnosis of PS

In clinical settings, diagnosis of PS can be made by considering characteristic clinical symptomatology and by excluding other causes of sciatica or low back pain.

History of old trauma in the sacroiliac and gluteal region must be considered while diagnosing periformis syndrome. Moderate traction relieves the symptoms of pain in sacroiliac joint, greater sciatic notch and piriformis muscles. Pain which extends down the limb and causes difficulty with walking; acute exacerbation of pain caused by stooping or lifting also relives by traction. Other clinical signs like- a palpable sausage-shaped mass, tender to palpation, over piriformis muscle on the affected side; a positive Lasègue sign; and gluteal atrophy, depending on the duration of the condition should be seen while diagnosing periformis syndrome.[6,36]

Out of various tests proposed by different experts in the field , two tests are often preferred that is Freiberg and Pace. In our clinical experience, Freiberg was found to be more useful because in this test symptoms are produced due to compression of nerve by PM while Pace shows only weakness or loss of function of PM which may not mandatorily be caused by nerve compression.[18,29.34,37,38] It was proved by Martin et al in their study to get most accurate findings for identification of sciatic nerve entrapment in deep gluteal region combined results of the active piriformis and seated piriformis stretch tests can be used with sensitivity of 0.91, specificity of 0.80, positive likelihood ratio of 4.57, negative likelihood ratio of 0.11, and diagnostic odds ratio of 42.00.[39] For confirmed diagnosis, albeit it is expensive and not feasible at outpatient settings - muscle scans and electrodiagnostic studies, may be used.[31]

RELATIONSHIP BETWEEN SI JOINT PAIN AND PS

From the above appraisal on PS and sacroilliac syndrome, the commonality is sciatica like symptoms having no neurological deficit besides the referral patterns of the pain. Kirkaldy-Willis et al in their study concluded that the symptom complex of PS is similar to that of the sacroiliac syndrome.[40] This commonality of symptomatology often creates difficulty in arriving at a confirmatory diagnosis and the diagnostic dilemma prevails. Alfred in his study opined that muscular pain from piriformis, gluteus maximus, quadratus lumborum may co-exist with both the conditions and / or may have independent presentation.[12] However, by introspecting and revisiting the anatomical structure, we are aware that piriformis muscle lies in the close vicinity of sacro-illiac joint. And it is also intriguing to note that sacro-illiac syndrome can give rise to PS or vice-versa. In other words, we can say that out of these two clinical entities, it is often difficult to establish what overlaps the other.

However, there are some logical conclusions have been made regarding this. According to Bhojani et al, PS is not necessarily caused because of structural abnormality, as at times an unstable sacroiliac joint may result in a ligamentous strain that may be responsible for the spasm of piriformis muscle that can further lead to contracture, fibrosis, finally entrapping the nerve with other adjoining muscles in the sciatic notch.[7]

Although, Yeoman et al first reported that one of the causes of sciatica is due to sacroiliac periarthritis that involves the anterior sacroiliac ligament, the piriformis muscle and some of the adjacent branches of the sciatic nerve.[4] Subsequently, Freiberg and Vinke considered that inflammation of the sacro-illiac joint may primarily affect piriformis muscle and its fascia leading to irritation of the overlying lumbosacral plexus.[5] Many other available literature provided the fact that PS can be caused by stimulating the nerve by causal agents, at two points. The first at the origin i.e. at sacroiliac joint by excitatory reflex spasm of the muscle due to stimulation, The second at the insertion by inflammation of trochanteric bursa as a result of general involvement of trochanter.[4-6,30,41,42]

CONCLUSION

With these above analysis, we are of the opinion that in most of the population, both SIJS & PS can co-exist or one can give rise to other. There are chances also that these can be found separately in patients. Clinically it has been observed, although not yet proven by research that most of the patients present signs and symptoms of both the conditions at the same time adding to diagnostic confusion and need treatment for both the conditions. So this article provides a platform to researchers for future clinical researches supporting or opposing the fact of coexistence of PS and SIJS.

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