

Tight hamstrings: primary culprit for acute pelvic girdle pain: A case report

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Abstract

Sacroiliac joint (SIJ) pain is the most common type of pelvic girdle pain in youngsters with sedentary lifestyle, the incidence of which being 60% of all lower back pain. The pelvic girdle is stabilized by ligaments (sacrospinous and sacrotuberous ligaments) as well as by local muscles. Hamstrings along with sacrotuberous ligament provide posterior stability during functional activities. A 30 year old IT professional presented with acute onset of low back pain and difficulty in transition from sit to stand, walking & sitting for a long duration. Physical examination revealed disturbed Standing hip flexion test (SHFT), disturbed lumbo-pelvic rhythm, severely tight hamstrings & poor stability of pelvis. Based on the clinical findings, he was diagnosed as acute sacroiliac joint pain with anterior rotation of innominate. Manual therapy was aimed to achieve joint movement & correction of asymmetry, which led to significant short term functional recovery. Addition of hamstrings flexibility & core stability training resulted in functional betterment through correction of the asymmetry was not accomplished. Therefore, we can derive that the nociception that occurred was due to stress on the SIJ restricting the functional activity. Improvement in the functional ability and physiological movement of SIJ can be attained by correcting the muscle functions through manual therapy, exercise training, and pain rehabilitation.

Keywords: Hamstrings tightness, Sacroiliac joint, Pelvic girdle pain, Sedentary lifestyle, Innominate.

Case Study

A 30 year old IT professional with sedentary lifestyle developed an acute onset of pain in the right side of the lower back, buttock and posterior aspect of the right thigh after he had walked a long distance two days ago. Due to pain, it was difficult for him to walk, stand & sit for a long duration. After the onset of pain, he walked with a limp. The patient had no previous history of any symptoms in the lower back and extremities & no significant past medical history.

He felt a deep dull ache at the right side posterior sacroiliac ligaments area and around the right piriformis. The pain shot up intermittently while turning on the bed, long sitting, driving and during forward bending. The pain subsided in the prone lying position. The severity of pain on the numeric pain rating scale was six at rest and during forward bending the score was nine on ten with mild irritability.

On observation, weight bearing on the right leg during standing and the stance phase duration of the right leg during walking was reduced. On palpation, the right innominate had a relative anterior rotation on sacrum with an apparent limb lengthening compared to the left side.

Trunk flexion, right side lateral flexion, and left rotation were also guarded due to pain. Lumbar spine and hip joint had full pain free range of motion. Standing hip flexion test (SHFT) demonstrated the aberrant pattern of movement of right innominate as compared to the left. There was an excessive upward translation of innominate during hip flexion instead of typical posterior rotation of innominate. The transverse plane movement was equal bilaterally.¹

On examination, multifidus, gluteal and hamstrings muscles were weak compared to their antagonists. Hamstrings were severely tight. On 90-90 test, first physiological resistance was noticed at 80 degrees of knee

flexion. {Fig. 1} During the assessment of hamstring tightness, pain aggravated and referred to the posterior aspect of the right thigh. Piriformis and gastrosoleus were also moderately tight.



Fig. 1: 90-90 test for right hamstring tightness on a subject with right sacro-iliac joint pain

On palpation, tenderness was present over right posterior sacroiliac ligaments (short & long), piriformis, and biceps femoris muscle belly. SLR test provoked dull pain at the site of right sacroiliac ligaments at 50 degrees of hip flexion. There was no change observed with dorsiflexion & plantar flexion movements at the ankle. Three sacroiliac provocative tests (Distraction, Gensalen & compression) were positive.

The radiological investigations did not suggest any obvious pathology in the lumbar spine, pelvic girdle or at the hip joint.

From the above physical examination, the case was diagnosed as acute sacroiliac joint dysfunction with anterior rotation of innominate, based on which the following

physical therapy interventions were applied:

Physical Therapy Intervention

1st session: Three repetitions of leg pull manipulation in long axis were given followed by isometric contraction for hip muscles bilaterally to achieve innominate movement in the sagittal and transverse plane, after which stability exercises were initiated, which included isometric contraction of transverse abdominis, Multifidus, hip adductor, and abductor's.^{2,3} {Fig. 2} {Fig. 3}

Immediately after the first session, the patient perceived up to 50% of reduction in pain during walking and forward bending. The patient was advised to continue the same exercises twice a day for 10 repetitions as a home program and an alternate day follow up



Fig. 2: Right lower limb pull manipulation in a patient with right sacro-iliac joint dysfunction was advised



Fig. 3: Isometric contraction to achieve sagittal plan innominate movement

1st Follow up session: Patient revealed similar findings as on Day 1, therefore the same physiotherapy interventions were performed along with the addition of active rhythmic dynamic hamstrings stretching in 90-degree hip flexion in supine lying.⁴ {Fig. 4}



Fig. 4: Active rhythmic dynamic hamstrings stretching of right lower limb in patient with right sacro-iliac joint dysfunction

2nd Follow up session: There was a significant pain reduction during functional activities especially during walking and forward bending (the score was 2 on the numeric pain rating scale). Physical examination revealed a relative reduction in the tightness of hamstrings and superior translation of innominate on SHFT, although the asymmetry of right innominate remained moderately unchanged. SLR test provoked mild pain at the site of right sacroiliac ligaments at 70 degrees of hip flexion. The same interventions were performed without leg pull manipulation. Progressive hamstring flexibility exercises, piriformis stretching and active hip muscles strengthening were initiated.⁵

3rd Follow up session: There was no pain at the lower back and buttocks during walking and forward bending but minimal pain (2 on the numeric pain rating scale) after 30 minutes of walking and sitting. Reassessment suggested significant improvement in hamstrings flexibility, full and pain-free lumbosacral movements. SHFT test revealed reduced superior translation but typical posterior innominate rotation was still missing. SLR test provoked a small discomfort at the site of right sacroiliac ligaments after 80 degrees of hip flexion.

The plan of physical therapy interventions was modified to aim at flexibility and stability training of the Lumbo-Pelvic-Hip region. Active progressive flexibility for hamstrings, piriformis, and calf was continued and motor control level 1 training was initiated. Motor control training was continued for 2 weeks and gradually the patient had complete recovery in terms of symptoms and functions.⁶

After 6 months of close follow up there was no recurrence of lower back pain. The patient was educated on the biomechanical origin of pain, therapy progression & need for regular therapeutic exercises throughout the course of treatment.

Discussion

The pelvic girdle is one of the most common and disabling sources of acute onset lower back pain. The involved structures being the SIJ and the Pubic Symphysis.¹ To rehabilitate lower back pain, one needs accuracy in the

understanding of pelvic girdle biomechanics, appropriate examination and effective implementation of manual therapy & rehabilitation.^{1,7}

Multimodal intervention in this case study and subsequent improvement signify the mechanical origin of pain and dysfunction. Tenderness over posterior sacroiliac ligaments, disturbed movement pattern, three [positive provocation tests, and poor hamstrings flexibility confirmed the source of pain as SIJ.¹ Significant pain relief immediately after the first visit while walking and forward bending was possibly due to inferior glide to innominate on sacrum and mobilization of innominate in the sagittal & transverse plane. This movement at SI joint significantly reduced the nociception and minimized secondary spasm to piriformis, quadratus lumborum, and other musculatures.³ Manual long axis leg traction or manipulation along with sagittal & transverse plane innominate movements allowed immediate significant pain relief.³

Sagittal & transverse plane innominate movement was achieved by isometric contraction of the hip muscles. Biomechanics explains that the innominate & sacral movement is very minimal but essential to carry out functional activities efficiently.²

A recent RCT (Visser et al, 2013) concluded that manual therapy approach allows immediate joint mobility in order to reduce pain and functional activity, and is the choice of treatment for patients with SIJ-related leg pain.¹⁰ Another experimental study by Kamali F and Shokri (2012) has confirmed that SIJ and lumbar manipulation is an effective technique for improving functional disability in patients with SIJ pain.¹¹

The sacrotuberous ligament, sacrospinous ligament, and gluteals, allow stable movement pattern of the pelvic joint for the functional activities. Stable movement pattern or optimal stability has been defined as “the effective accommodation of the joints to each specific load demand through an adequately tailored joint compression, as a function of gravity, coordinated muscle and ligament forces, to produce effective joint reaction forces under changing conditions” by Vleeming et al.⁷

Poor function of the global and local stabilizers & movers affect the stable mobility leading to joint movement restriction either unilaterally or bilaterally.⁵ Restriction of joint movements allows abnormal stress on the surrounding soft tissues during a task thereby eliciting nociception. Actively or passively assisted movement at innominate or sacrum or both allows short term mobility facilitating pain-free physiological movement. This explains the short term benefits to the patient on the first visit.³

A comprehensive review by Benjamin et al. found moderate to strong-evidence in favour of manual mobilization/manipulation for pain, function, and overall health in the short-term in patients with different stages of LBP. Additionally, they have concluded that manual therapy along with exercises and other interventions is the recommendation for lower back pain rehabilitation.¹²

Hamstrings flexibility training along with manual therapy was significantly effective in long-lasting pain

relief. Global/local muscles initiated the movements and hamstrings flexibility allowed smooth lumbopelvic rhythm.⁴ Reduced hamstrings stiffness released the tension in sacrotuberous ligament and that reduced tenderness. In addition, hamstrings tightness was related to the weakness of the gluteus maximus (primary stabilizer). Gluteus maximus is the key muscle to stabilize innominate on sacrum posteriorly for all the functional movements of the trunk.⁸ Piriformis flexibility & multifidus strengthening facilitated the good movement of the sacrum thereby adding to the lumbopelvic rhythm. Surprisingly there were no changes in the symmetry of the innominate which may indicate that postural asymmetry is not the cause of pain or dysfunction directly.²

Previous literature also showed the existence of static sagittal plane asymmetry in asymptomatic individuals, therefore correcting the asymmetry need not be the primary aim of rehabilitation.⁹

Conclusion

A present case report suggests that hamstrings tightness can be the primary culprit for acute onset of Sacroiliac joint or pelvic girdle pain. Essentially, pelvic girdle pain rehabilitation required the corrections of the physiological & functional movement pattern. Therefore, in order to achieve the best outcome, therapists need to have a comprehensive knowledge of biomechanics & pathomechanics of pelvic joints and appropriate skills to achieve normal joint functioning.

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