Sacroiliac subluxation following ankle sprain mimicking sciatica

Lateral ankle sprain (LAS), also referred to as inversion sprain, is the most common injury in sport, with residual symptoms present in many patients (1,2). Disturbed neurological function is often seen following LAS, including impaired proprioception and sensation (2,3,4). Additionally, direct involvement of neural tissues, including injury to peroneal and tibial nerves, has been observed following LAS (5). Because an intact afferent nervous system is important in providing the feedback necessary for effective motor control, LAS may influence afferent feedback affecting stability and muscle function, both locally and regionally in the lower extremity (2,5). Altered muscle function has been shown to both activate and perpetuate myofascial trigger points (MTrPs) that can result in local and referred pain (6,7). Gluteus maximus MTrPs typically demonstrate pain referral patterns that include the sacroiliac joint, buttock region and proximal aspect of the posterior thigh, and sacroiliac joint dysfunction often occurs along with the soft tissue dysfunction (8). Sacroiliac syndrome is likely in some cases to produce pain, numbness or paresthesias above the knee or nonradicular referral below the knee (9).

Case Report

A 52-year-old right handed male presented with complaints of right-sided low back and hip pain with paresthesia in the right leg and foot. The patient denied knowledge of any precipitating event, stating that the pain came on gradually approximately six months prior. He described the pain as being a constant dull ache in the right sacroiliac, gluteal
and hip areas that radiated into the right posterior and lateral thigh and posterolateral calf. He rated the pain as being 8 out of 10 currently, with average 8 out of 10 and worst 10 out of 10. He stated that the pain was worse with standing, walking and sitting and was relieved by applying ice to the right buttock and supine hook-lying. The patient had been recreationally active as a hiker and highly accomplished martial artist, and he stated that he had been unable to engage in those activities for the prior two months because of the pain. He stated that this condition had been previously diagnosed by a medical doctor and a chiropractor as sciatica. Treatments had included anti-inflamatory medication, physical therapy, massage therapy and chiropractic care. The result was temporary relief, but not resolution of the symptoms. The patient stated that his goal in seeking care was a pain free return to functional activities.

Past medical history was significant for severe right LAS approximately fifteen years prior, which was treated with anti-inflammatoriy medication, ice and rest.

Physical examination included gait and posture assessment with the following findings: an antalgic gait favoring his right side, a right anterior innominate with a left pelvic upsip, externally rotated right lower extremity with calcaneal valgus, bilaterally protracted shoulders with right sided upward rotation and winging of the scapula and anterior head and neck carriage with right lateral flexion. Muscle atrophy was noted in the right gluteus maximus muscle. Upon palpation the patient reported point tenderness along the right posterior iliac crest, PSIS, right lateral sacral border, greater trochanter and sacrotuberous and sacrospinous ligaments. Palpation along the gluteal musculature resulted in a reproduction of the patient symptoms of pain in the right sacroiliac, gluteal and hip regions that referred along the posterior and lateral thigh to the calf. Active range
of motion (AROM) was within normal limits for the lumbar spine, hip and ankle except as noted in degrees: lumbar flexion 30 with pain, right hip internal rotation 20 with pain, right hip external rotation 30 with pain, right hip extension 10 with pain, right ankle dorsiflexion 10. Passive range of motion (PROM) assessment revealed reduced right hip flexion, external rotation and ankle dorsiflexion with early muscle spasm end-feel. Manual muscle testing for the right hip was graded as follows: flexion 5/5, extension 3/5, external rotation 4/5, internal rotation 4/5, adduction 5/5, abduction 3/5; manual muscle testing for the left hip and knee and ankle bilaterally were all within normal limits. Straight Leg Raise Test produced sacroiliac and gluteal pain at 45 degrees, Millgram’s Test was positive for sacroiliac and gluteal pain. FABER Patrick Test was positive for pain in right gluteal region. Resisted straight leg raise in supine and prone positions resulted in right sacroiliac pain that was relieved by trunk flexion with ipsilateral rotation and contralateral shoulder extension and internal rotation, respectively. Prone hip extension and side lying hip abduction movement patterns were altered including reduced firing of right gluteus maximus and minimus and synergistic dominance of lumbar spinal erectors and hamstrings and tensor fascia lata, respectively. Navicular Drop Test results were 8 millimeters on the left and 11 millimeters on the right. Results for timed single leg balance were as follows: left leg eyes open 30 seconds, eyes closed 15 seconds; right leg eyes open 13 seconds, eyes closed 6 seconds. Squat test revealed decreased motor control of pronation at the right foot-ankle complex, right knee adduction and left lateral weight shift. Slump Test with plantar flexion and inversion (PFI) was positive on the right for paresthesia in the lateral leg and foot. Dermatomes, myotomes and deep tendon reflexes were with normal limits bilaterally. Radiological studies were not performed.
Diagnostic impression

Our findings indicated the patient suffered from right sacroiliac subluxation, gluteal MTrPs and adverse neural tension of the superficial peroneal nerve secondary to LAS. Passive management included chiropractic adjustment to the right sacroiliac joint, neuromuscular therapy (NMT) and postisometric relaxation (PIR) to the right gluteal musculature and Grade II-III joint and neurodynamic mobilization to the right fibular head and superficial peroneal nerve, respectively, twice weekly for three weeks. The patient was fitted for functional orthotics for control of excessive foot pronation. Immediate active care included instruction in neutral spine posture and abdominal hollowing maneuver (AHM) in supine hook-lying and prone quadruped positions and biofoam roller self myofascial release for the leg, thigh and gluteal regions. Closed chain foot adduction exercises were initiated to activate the right tibialis posterior and functionally control foot and ankle pronation (11).

Case Management Outcomes

After four weeks of care examination revealed increased AROM and PROM at the lumbar spine and hip joints without pain. The patient was provided with balance sandals, the use of which has been shown to significantly impact the degree and timing of muscle activation in the gluteal and leg musculature (10,11), and directed to walk forward, backward and side-to-side three times per day for five minutes each. One week later the patient reported that the average pain was 1 out of 10 with the worst being 3 out of 10 and notably less frequent. The patient stated that he no longer had pain or paresthesia below the knee. Examination revealed normal, pain free AROM and PROM in the lumbar spine, right hip and right ankle joints. All special tests were within normal limits.
The patient was given a program of neuromuscular autostretching for the gastrocnemius/soleus, hamstrings, hip adductors, hip flexors and rotators and erector spinae, as well as spinal stabilization exercises including prone, supine and side lying floor bridges and alternation arm and leg reaches in the quadruped position. The patient returned to martial arts training five weeks after the initial visit and reported only slight discomfort in the right gluteal and posterior thigh regions. The patient was discharged from care after progressing satisfactorily in his exercise program after week eight.

**Figure 1.** Visual Analog Scale (VAS) for Pain

The patient reported a significant decrease in pain levels after 5 weeks of care
Discussion

This case study demonstrates the importance of a thorough examination of the kinetic chain to determine precipitating and perpetuating factors in idiopathic neuromusculoskeletal pain. In this case, LAS incurred fifteen years prior resulting in two separate pathologies not uncommon in such injuries. Altered leg vibration sense, balance deficits and inhibition of gluteus maximus has been demonstrated subsequent to LAS, possibly due to altered joint proprioception and sensation (2-4). Inhibition and altered muscle activation are frequently seen in conjunction with MTrPs (6,7). Activation of MTrPs in gluteal musculature is often seen in activities requiring forceful and repetitive hip extension and abduction, common motions in martial arts kicks. Sacroiliac subluxation, as well as MTrPs can demonstrate pain referral patterns that include the sacroiliac joint, buttock region and proximal aspect of the posterior thigh, not unlike that distribution of pain in cases of sciatic neuritis. Sacroiliac joint dysfunction often occurs along with the soft tissue dysfunction (8). Gluteus minimus and medius MTrPs are often associated with MTrps in gluteus maximus and pain referral patterns include gluteal, posterior thigh and calf and lateral leg regions (11). The gluteus maximus has been shown to be an important component of the force-closure mechanism component of the SI locking mechanism (12). It is postulated that in this case that the inhibition of gluteus maximus secondary to the LAS resulted in MRrP activation associated with the patient’s sport and recreation activities (SRA) of martial arts and hiking, with secondary activation
of MTrPs in gluteus minimus and medius. Concurrently, right sacroiliac dysfunction was precipitated secondary to abnormal biomechanical stress applied to the joint due to the muscular dysfunction and altered arthokinetic reflex (13). These dysfunctions were perpetuated by the kinetic chain effects of excessive foot and ankle pronation (14-16).

This patient also demonstrated adverse neural tension in the superficial peroneal nerve secondary to the LAS. While the cause of such dysfunction has not been conclusively established, it has been postulated that scarring secondary to nerve traction injury would result in adhesions that could restrict the ability of the connective tissue coverings to elongate during functional movements that apply a stretch to the neural structure. While nerve trunks are highly resistant to stretching because of their connective tissue coverings, scarring could result in a tethering of the connective tissue and result in tensile stress being applied to the axon, resulting in motor and sensory impairments (5,17). The superficial peroneal nerve is susceptible to stretching with the position of knee extension, plantar flexion and inversion, and if the ability of the nerve to elongate with such movements is compromised pain and paresthesia could result. Certain martial arts stances, as well as hiking on uneven terrain, place the lower extremity in positions that can stretch the superficial peroneal nerve. Under normal conditions where the connective tissue coverings are free to glide and elongate, pathological stretching of the nerve does not result. In this case, however, it is proposed that scarring of the connective tissue covering secondary to LAS resulted in adverse neural tension being applied to the superficial peroneal nerve resulting in the patient’s neurological symptoms in the lateral leg and foot.
Conclusion

This case presentation details the favorable outcome of a patient with local and regional sensorimotor dysfunction and associated symptoms secondary to LAS. The use of an integrated, management model involving chiropractic adjustments, joint and soft tissue mobilization combined with therapeutic exercise resulted in the return of this patient to high-level functional activities within eight weeks. Clinicians must be aware of the kinetic chain implications of neuromusculoskeletal injury and direct treatment plans to address local, regional and global dysfunction.
References


