CASE STUDIES

A Standing Complaint: Inability to Sit: An Unusual Presentation of Medial Hamstring Myofascial Pain Syndrome

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ABSTRACT. Background: Hamstring muscle injuries are among the most common lower extremity injuries in athletes. Pain in the posterior thigh and leg weakness are usual presenting symptoms. Less dramatic onset in nonathletes, without pain in the posterior thigh, is more often thought of as an ischial bursitis or as pain from the sacroiliac joint or the gluteal or piriformis muscles. Pain localized over the ischial tuberosity resulting in disabling discomfort when sitting as the only symptom of medial hamstring muscle trigger points [TrPs] has not been reported before. Six cases of hamstring muscle myofascial pain syndrome are reported with this unusual presentation.

Findings: Two cases were only single muscle syndromes, and in four cases other regional muscles also had TrPs that were symptomatic at some time. Only the ischiocondylar head of the adductor magnus [a false

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hamstring muscle] contributed to the inability to sit and it was not a consistent factor whereas the medial hamstring TrP was always present. The diagnosis was supported by the finding of localized tenderness in the proximal medial hamstring muscles [and also in the adductor magnus in two cases], and confirmed by diagnostic TrP injection of local anesthetic into the muscle. In each case, TrPs were located in the proximal portion of the muscle. Treatment of the medial hamstring muscles [including the adductor magnus muscle in the one case] produced a complete resolution or significant improvement in all cases.

Conclusion: Medial hamstring muscle myofascial pain syndrome may present as a predominantly single muscle syndrome. Pain can be confined to the region of the ischial tuberosity, the only complaint being the inability to sit. Localization of TrPs in the proximal portion of muscle, above the tendinous band inscription of the muscle, may be a factor in proximal pain referral. Eccentric contraction, muscle fatigue, and inflexibility are factors that predispose to hamstring injury.

KEYWORDS. Myofascial pain syndrome, trigger points, referred pain, hamstring muscles, ischial tuberosity

INTRODUCTION

Six patients presented within a twenty-month time-span with the identical complaint of inability to sit for more than a few minutes without terrible pain. Five pointed to one ischial tuberosity as the site of their pain, and in one patient pain was located in both ischial tuberosities [bilateral involvement]. All six were found to have unilateral medial hamstring [semimembranosus and semitendinosus] muscle trigger points [TrPs]. Inactivation of the TrPs resulted in immediate relief of pain, and marked improvement in sitting. This unusual complaint, voiced vociferously, with a focal point of pain, and relieved by so specific a TrP release, had not been previously encountered in our clinic. Travell and Simons (1) noted that in persons with hamstring TrPs pain is felt posteriorly in the buttock, upper thigh, and back of the knee when sitting. Puranen and Orava (2) described gluteal sciatic pain as a presentation of hamstring muscle fibrotic tendinous bands, often in the biceps femoris muscle. Among the clinical features of the syndrome they described is

pain in the sitting position, often relentless, requiring the patient to change position or to stand up for relief. Their solution was to section the tendinous bands surgically. A review of the English language literature to 1983 failed to identify any report of cases similar to these. Relief of painful sitting by TrP injection is not mentioned in any report.

In this report two cases will be described in detail. Three cases will be discussed briefly, the only acute case, and a fourth case that is similar to case one. A fifth case with an unusually long duration of more than 23 years will also be described. A sixth, milder case is described. Treatment was similar in all cases. There were four men and two women in this series, all in their fourth to sixth decade of life. A discussion of the significance of the referred pain pattern and of the pathophysiology of the syndrome concludes this report.

CASE REPORTS

Case One

History

A 40-year-old professional male noticed pain first in one buttock, then in the other, three years before, while driving for several hours. He had to shift from side to side to take the pressure off the buttocks. He had no previous episode of such pain. Since that trip he has been unable to travel. He experienced a sense of deep pressure over the left ischial tuberosity after sitting for 5-10 minutes, then discomfort in the area. He had to get up or move because of the pain. Within another 5-10 minutes pain would be felt over the left ischial tuberosity. He rigged a system of cushions that allowed him to sit forward, avoiding pressure on the upper thigh and ischial tuberosity. He required pain medication regularly [tramadol and rofecoxib]. He saw many doctors in different specialties and had many tests and diagnostic imaging procedures which failed to disclose the cause of his problem. He saw a myotherapist, had a dorsal column spinal stimulator, gastric plexus blocks, chiropractic manipulation, and epidural steroids. No treatment provided sustained relief. Each lumbar epidural steroid block gave him 2-3 days of decreased symptoms. A lumbar laminectomy for foraminal stenosis was done one year prior to our evaluation, without improvement. He described his pain “as if an alligator clip was being placed on my muscle.” The pain has a

stinging and burning quality. He has no days without pain. He had no injury, and he is otherwise in good health.

Examination

His posture was normal, with a level pelvis. There was a well-healed lumbar laminectomy scar. The standing forward flexion test for symmetry of pelvic rotation when bending forward at the waist was normal. There was a left anterior iliac rotation when sitting from a supine position on the examining table, causing the left leg to apparently lengthen in relation to the right leg. The straight-leg-raising test was normal in that each leg could be flexed 90° or more at the hip, but the left leg was nevertheless sightly restricted compared to the right. There was no neurologic impairment. Tender regions were identified in the upper third of the medial hamstrings in the left posterior thigh, on taut bands that were easily palpable in the muscle. Firm palpation of these tender, taut bands reproduced part of his pain. These were characteristic of TrPs. Trigger points were also found in the left adductor magnus muscle. The remainder of the musculoskeletal examination was normal. He was also found to have a structural abnormality of the fifth lumbar vertebrae and of the lumbo-sacral junction that was considered to be responsible for an anterior-posterior obliquity that altered the mechanics of walking and stressed the hamstring muscles.

Diagnostic Test

Trigger point injections were made into the two medial hamstring muscles and the adductor magnus muscle in TrPs that were identified by manual palpation. 0.2-0.3 cc of procaine 0.5 percent were injected whenever a local twitch response was elicited with the needle. There was no evidence of a sciatic block from the injection. The muscles were then stretched. He was able to sit unencumbered by pain for at least two hours after the TrP injections.

Treatment

He continued physical therapy sessions concentrating on treating the medial hamstring muscles with manual therapy and with "dry-needling" the muscle using a solid, centrally pointed acupuncture needle to inactivate TrPs and to restore normal length to the left medial hamstring muscles. Additional TrP injections with procaine 0.5 percent were given

into the medial hamstrings and adductor magnus. He was able to sit for as long as four hours on a number of occasions after beginning treatment, but he continued to have pain afterwards. The number of pain pills he used was reduced. He progressively improved with continued treatment that included physical therapy and TrP injections, and then a program of postural awareness and strengthening. He has been able to sit for many hours at a time for several days after each treatment with TrP point injections. The length of time he could sit at one time progressively improved with treatment.

Case Two

History

This 62-year-old woman complained of five months of inability to sit. She stated that she could sit for no longer than 10 minutes at any one time, and that she could sit for no more than a total of 46 minutes daily. She pointed to the right ischial tuberosity as the site of her pain, implicating that pain as the cause of her inability to sit. She also had a sciatic-nerve like pain that radiated down the right leg to the foot. She had a pain problem for many years as a result of complications following removal of a Morten's neuroma from the left foot 25 years prior to the onset of her sitting problem. She had chronic pain in the low back and legs, with severe impairment of walking and standing, but not of sitting. Eight years ago she had the neuroma removed by a second operation. After that surgery she was able to stand and walk without restriction, and sitting was not a problem, but she had low back and hip pain. Nonetheless, she was able to work and produced a number of significant works over the following years. She was unable to complete another project because she could not sit long enough to work. She was treated with physical therapy when she developed cervical radiculopathy seven months prior to her initial visit in our clinic. The cervical radiculopathy resolved entirely, and the low back improved. Two months after starting physical therapy she began to have pain on sitting, without any injury or unusual activity. The therapist worked on the pelvic region, eliminated an abnormal pelvic torsion, after which she was able to resume walking. There was no improvement in her sitting tolerance since then.

Past Medical History

She was diagnosed with diabetes mellitus at age 37, but that resolved with diet and had not recurred. She suffered an injury to the inferior al-

veolar nerve when she had prolonged jaw surgery to place implants into the mandible seven years previously. One year prior to evaluation, she was diagnosed as having an acute right peroneus brevis tendonitis, achilles tendonitis, and a lateral ankle sprain, which were treated conservatively with recovery. She had rheumatological and orthopedic evaluations, with diagnoses of left sacroiliitis, piriformis syndrome, pronated feet [corrected by orthotics], and chronic lumbar strain. Cervical spine x-rays were normal; lumbar spine x-rays showed mild scoliosis and no degenerative changes. Antinuclear antibody was positive at 1:80 [speckled pattern]. Creatine phosphokinase, sedimentation rate, and rheumatoid factor were normal. Thyroglobulin stimulation hormone was 4.2 μIU/ml.

Examination

She had scoliosis, with the right shoulder low and the right hip high. The standing forward-flexion test was abnormal, the right posterior superior iliac spine moving upward relative to the left [an anterior rotation of the right iliac bone and sacro-iliac joint]. The Trendelenberg test was normal. Straight leg raising was restricted on the right side relative to the left, but approached 90°. There was no neurologic impairment. She was tender over taut bands in the right medial hamstring muscles, and firm palpation of the these tender, taut bands reproduced her ischial tuberosity pain. She was also tender over taut bands in the right piriformis muscle, but firm palpation of these taut bands did not reproduce her ischial tuberosity pain.

Diagnostic Test

Trigger point injections were made into the right medial hamstring muscles and into the right piriformis muscle, injecting procaine 0.5 percent whenever local twitch responses were elicited. A total of 6 cc were injected. She was able to sit for four hours straight after the injection treatment. The sciatic-like pain disappeared and has not returned.

Treatment

She was treated by her physical therapist with instructions to inactivate the medial hamstring muscle TrPs, and to release regional TrPs in the piriformis muscle and other regional muscles. She also had a second TrP injection with procaine 0.5 percent that caused an electric shock-like

sensation to travel down her leg to her foot, but left no neurologic impairment nor abnormal sensation or parasthesia. The right piriformis muscle had no further TrPs, but the left piriformis did, and was also treated by TrP injections. She was able to sit without restriction for a day or two, and then experienced a gradual return of her symptoms, but could still sit for periods of more than 30 minutes. She continued to improve with therapy.

Case Three

History

A 60-year-old woman presented with a three week history of inability to sit. She spent most of her time either standing or lying down. She could not put weight on the left upper thigh or on the left ischial tuberosity. She was otherwise well, with no illnesses or injuries, when she went on a holiday trip to the seashore. The beach was rocky, so that she lifted her buttocks off the rocks, traveling back and forth to and from the water on her hands and feet in a crab-like fashion. In this way, she constantly extended and flexed her legs at the knees as she moved across the stones several times each day. At the end of the week-long vacation, she began to experience such severe pain in the left ischial tuberosity region that she could not sit. The trip home was very difficult for her because she could not sit without pain. She had no other medical problems.

Examination

The only findings related to the left thigh and pelvis. She put one finger on the left ischial tuberosity as the site of her pain. She could walk without difficulty. She stood when presenting her story. The neurologic examination was normal. Range of motion at the waist was normal. Straight-leg-raising was slightly limited on the left side. Tender, taut bands were identified in the left medial hamstrings in the upper third of the muscle and the ischial tuberosity itself was tender. Palpation of the bands reproduced her pain. The rest of the examination was normal.

Treatment

A diagnostic TrP injection with procaine 0.5 percent was made into the TrPs in the proximal medial hamstring muscles. She was immediately able to sit without pain. She had four physical therapy treatments

over two weeks and had complete resolution of her symptoms, without further TrP injections.

Case Four

A 42-year-old man presented with a two year history of unilateral pain over the ischial tuberosity, preventing him from sitting more than a few minutes. He was forced to shift sides or to stand. He worked standing, doing his reading and writing on a lectern. He ate standing. Multiple evaluations, including electro diagnostic tests and imaging procedures, and treatments by other practitioners failed to reveal the source of his problem or to resolve it. His only abnormal findings were related to the proximal thigh and the tender ischial tuberosity. Straight-leg-raising was slightly restricted on the affected side. He had local tenderness over taut bands in the proximal medial hamstrings. Firm palpation in this area reproduced his symptoms. He had immediate relief with a diagnostic TrP injection into the medial hamstring muscle TrPs. Complete resolution followed a short course of physical therapy directed towards inactivation of the hamstring TrPs, lengthening of the hamstring muscles, and attention to the functional muscle group that included the hamstring muscles. Further TrP injections were not given.

Case Five

This is a 45-year-old man who complained of pain on sitting for the past 23 years. He had a Guillain-Barre syndrome 23 years ago manifest by bilateral leg weakness and numbness. He recovered in one week and returned to full military duty, but he started to experience pain beginning in the ischial tuberosity region and extending down the posterior thigh when sitting. He described the sensation to be as if he were sitting on a cement bench, beginning 15 minutes after sitting. This sensation on sitting has been present ever since he recovered from the Guillain-Barre syndrome. Pain begins in 15-20 minutes on a typical chair. He can last about one hour using a special cushion. His pain subsided when he walked. His examination showed TrPs in the proximal medial hamstring muscles, in the piriformis muscle, and in the adductor magnus. The remainder of his medical history and physical examination were normal. His initial response to TrP needling of the medial hamstring muscle TrPs was an increase in sitting tolerance to four hours. He continues to improve with physical therapy and needling of the medial hamstring TrPs.

Case Six

A 59-year-old man underwent arthroscopic knee surgery to treat a medial meniscus cartilage tear. He began to walk three miles daily two months after the procedure, and began to jog three months after the procedure. Two weeks after he started jogging he began to experience pain in the region of the ischial tuberosity beginning after one hour of sitting, relieved by standing. His condition was milder than those in the previous cases 1-5. Trigger Points were found in the upper medial hamstrings. Initial treatment utilized stretching and manual means to effect a release of TrPs. When that did not result in an improvement, TrP needling was begun with a reduction in pain on sitting.

DISCUSSION

Each of these patients had in common the inability to sit and pain felt at the ischial tuberosity. Each had TrPs in the proximal medial hamstring muscles. The adductor magnus muscle was also involved in cases one and five. It acts as a medial hamstring at the hip. Piriformis muscle TrPs in case two were responsible for the sciatic nerve pain which resolved while there was still ischial tuberosity pain from TrPs points in the medial hamstring muscle. In these cases, the proximal medial hamstring muscles were consistently involved, even though the adductor magnus and the piriformis muscles were involved at times in some of the cases. It is rare to have a single muscle myofascial pain syndrome without any other muscle in the functional muscle unit involved at some time. The consistent involvement of the proximal medial hamstring muscles and the immediate relief of symptoms in each case following a diagnostic TrP injection in the hamstrings confirmed the hamstring TrPs as the cause of the ischial tuberosity pain on sitting, even though relief was temporary. All cases improved substantially or completely resolved with additional TrP injections and physical therapy or with physical therapy alone.

Functional anatomy. The hamstring muscles attach proximally to the posterolateral aspect of the ischial tuberosity. The biceps femoris and the semitendinosis muscle attach in a common tendon, whereas the semimembranosis muscle usually attaches separately to the ischial tuberosity deep to the other two muscles, the muscle itself being deep to the semitendinosis muscle. The attachment of the semitendinosis muscle to the tibia is the most distal of the three heads of the hamstring, giv-

ing it greater leverage in flexion of the partially bent knee. In addition to extension of the femur at the hip which counteracts the tendency of the body to flex when standing, the hamstring muscles flex the tibia at the knee, and decelerate the forward swing of the tibia when walking or running. The adductor magnus is termed a false hamstring because the ischiocondylar head of the muscle attaches proximally to the ischial tuberosity, and distally to the medial femoral condyle, not crossing the knee joint and not participating in the flexion action of the true hamstrings on the tibia, but assisting in extension of the thigh.

Pain referral patterns and differential diagnosis. The semitendinosus muscle is divided by a tendinous inscription across the middle of the muscle, there being two distinct end-plate zones, one above the inscription and one below (1, p. 317). The referred pain zones of the medial hamstring muscles are most frequently proximal to the ischial tuberosity but also distal down the posterior thigh and medial calf (1, p. 317). Pain felt in the ischial tuberosity is referred from the TrPs by means of central sensitization in the spinal cord (3). It is possible that TrPs in the upper portion of the muscle are more likely to refer pain proximally to the ischial tuberosity, but that distinction has not been documented. There may also be pain in the ischial tuberosity from the constant pull or tension from the taut, contracted bands of muscle in the true and false hamstring muscles. Ischial tuberosity pain with pain referred to the back of the thigh can be caused by compression of the sciatic nerve by a tense, tendinous band as it passes laterally to the biceps femoris muscle where it is entrapped (2) and has been named "the hamstring syndrome." Trauma was not implicated in those cases. Pain was induced by sitting and by forceful physical activity, such as sprinting. Refractory cases were treated surgically. One of the patients reported herein had pain referred in the sciatic distribution down the posterior thigh which cleared with piriformis muscle TrP. All of our patients experienced some or total relief from inactivation of muscle TrPs in the medial hamstring muscles [including the adductor magnus in one case]. The lateral hamstring muscle biceps femoris was not injected in any of the patients.

Other causes of pain in this area include apophysitis, more common in younger individuals with unfused apophyses, and piriformis syndrome where pain is more often referred laterally to the region of the greater trochanter or medially to the sacroiliac joint, but which often has a posterior thigh pain referral and a sciatic component from compression of the sciatic nerve. Ischiogluteal bursitis and avulsion fractures of the ischial tuberosity can also cause local pain. Pain from hamstring injuries is most commonly considered to be posterior thigh pain, a region

to which pain can be referred from the lumbar spine, the sacroiliac joint, and gluteal TrPs in addition to the conditions mentioned above (1,4). Hamstring injuries range from lacerations, contusions, or bleeding within the muscle, to strains with partial or complete tears of the muscle, to cramps (5), and the development of TrPs.

Muscle fatigue: the energy crisis theory. The mechanism of injury in muscle strain generally involves overuse with fatigue and weakness which reduces the amount of energy that the muscle can absorb, and therefore makes it more vulnerable to injury, especially during strong eccentric contractions (6). The current model of TrP formation involving motor end-plate dysfunction implicates an energy crisis in the muscle (3, pp. 232-259). Hamstring muscle fatigue alters muscle activation patterns because of reduced force generating capacity (7), decreases the amount of energy the muscle can absorb that is required to control and regulate limb movement, and reduces the force required to cause muscle failure, including rupture or tear (8). The decrement of force generated by exercised muscle during dynamic contractions was twice that seen in isometric contractions (9). One factor that may affect the output of fatigued muscle in shortening contractions as opposed to isometric contractions is the slowing of contractile properties in fatigued muscle. In particular, slow relaxation is a feature of fatigued muscle, and is reflected in a prolongation of myo-electric activity in fatigued muscle. This has been attributed to a slower turnover of actomyosin cross bridges. When fatigued muscle continues to work, the demand placed on the muscle may exceed the capacity of the muscle to respond, since the muscle cannot generate the energy required, resulting in muscle failure. These considerations fit neatly into the concept of an energy crisis at the cellular level that Simons (4, pp. 232-259) has proposed to be critical for the formation of muscle contraction knots and the development of myofascial trigger zones that form the basis of the clinical myofascial pain syndrome. Secondary release of nociceptive substances lead to the perception of pain and to the sensitization of the peripheral and central nervous system and results in hypersensitivity and allodynia.

Flexibility. Hamstring overuse injuries are also affected by hamstring flexibility, or the ability of the muscle to lengthen or stretch. Increasing flexibility or stretching the hamstring muscle decreased the incidence of lower extremity overuse injuries in male army trainees (10). Most hamstring injuries occur during eccentric contraction of the muscle. A lengthening contraction combined with a limited lengthening of the leg while it is progressively flexed at the hip predisposes to mechanical injury of the muscle, including tear at the musculotendinous

junction. The most serious injury due to inflexibility of the hamstring muscle is rupture at the ischial origin of the muscle when the leg is forcibly flexed at the hip while extended at the knee (11).

Although hamstring muscle injuries are the most common muscle strain injury in athletes (6) the incidence of myofascial pain syndromes involving the hamstring muscle is unknown. A muscle strain is defined as a partial or complete tear of the muscle. Failure of the muscle resulting in partial or complete tear usually occurs at the muscle-tendon junction. During dynamic contractions, symptomatic TrPs develop in conditions of muscle overuse that do not necessarily involve muscle tears. Certainly, they may coexist with partial tear injuries, but this incidence is also unknown. None of the individuals reported in this series was performing high stress athletic activity, although the patient in case three had short periods of more intense muscle overload, and was the only case in which forceful activity took place at the time of injury. Although the referred pain zone was over the ischial tuberosity, and could be traced to the medial hamstring muscles [including the ishiocondylar head of the adductor magnus in case one] by the elimination of the referred pain by TrP injections, secondary TrPs were also identified in functionally related muscles in cases one and two. Myofascial pain syndromes are seldom only single muscle syndromes, but here the major findings were related to the hamstring muscles.

CONCLUSION

These cases are presented to highlight an unusual, but striking, presentation of hamstring muscle injury. The diagnosis was overlooked by multiple practitioners in four of the six cases. In each case, the diagnosis was strongly suggested by the history, supported by the physical examination, and confirmed by the immediate effects of TrP. The use of TrP injection as a diagnostic tool is of particular interest, as the rapid relief of symptoms following injection quickly led to the correct diagnosis and treatment. Nevertheless, one should be alert to the possibility that TrPs in the medial hamstring muscles can develop as a complication of another condition, such as a tear or hemorrhage. A thorough evaluation should always be performed to detect coexisting or underlying injury or biomechanical dysfunction. The medial hamstring muscles act both at the hip and at the knee. Finally, the ischiocondylar head of the adductor magnus muscle cannot be injured as a result of forces generated by a

combination of hip flexion and knee extension, a situation in which strong contraction of the hamstring muscles is more likely to produce injury. It is more likely to be injured as a result of contraction against a flexed hip.

REFERENCES

1. Travell JG, Simons DG: Myofascial Pain and Dysfunction: The Trigger Point Manual. vol 2. Williams & Wilkins, Baltimore, 1992, p 324.

2. Puranen J, Orava S: The hamstring syndrome: a new diagnosis of gluteal sciatic pain. Am J Sports Med 16:517-521, 1988.

3. Mense S, Simons DG: Muscle Pain. Lippincott Williams & Wilkins, Philadelphia, 2001, pp 84-98.

4. Brukner P: Hamstring injuries. Aust Fam Physician 25:1109-1112, 1996.

5. Kujala UM, Orava S, Jarvinen M: Hamstring Injuries. Sports Med 23:397-404, 1997.

6. Garrett WE Jr: Muscle strain injuries. Am J Sports Med 24(Suppl): 2-8, 1996.

7. Pinninger GJ, Steele JR, Groeller H: Does fatigue induced by repeated dynamic efforts affect hamstring muscle function? Med. Sci. Sports Exerc 32:647-653, 2000.

8. Mair SD, Seaber AV, Glkisson RR, Garrett WE: The role of fatigue in susceptibility to acute muscle strain injury. Am J Sports Med 24:137-143, 1996.

9. James C, Sacco P, Jones DA: Loss of power during fatigue of human leg muscles. J Physiology 484.1:237-246, 1995.

10. Hartig DE, Henderson JM: Increasing hamstring flexibility decreases lower extremity overuse injuries in military basic trainees. Am J Sports Med 27:173-176, 1999.

11. Orava S, Kukjala UM: Rupture of the ischial origin of the hamstring muscles. Am J Sports Med 23:702-705, 1995.