



Musculoskeletal Case No. 5, May 2000

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Presenting Symptom(s): Heel Pain

Case prepared by: Michael Fredericson, MD

Appropriate Audience: Residents and practicing physicians

Learning Objectives: 1) To be able to evaluate heel pain in athletes; 2) To be able to treat heel pain in athletes

History

An 18-year-old highly competitive gymnast developed the insidious onset of heel pain over a several month period. She had been practicing long hours in preparation for the junior national championships, but there was otherwise no change in her training regimen.

- *Prior to continuing, please develop a differential diagnosis and list each possible diagnosis in order of likelihood.*
- *Is there any additional information regarding the clinical history that might be helpful in clarifying your differential list or changing its order of priority?*

Commentary I

Given the history presented the differential seems straightforward. The primary cause of heel pain in athletes is plantar fasciitis. The other strong possibility would be a calcaneal stress fracture from the repetitive pounding with the increased training load. Retrocalcaneal bursitis, Achilles tendinitis, plantar nerve entrapment, subtalar arthritis, and radiculopathy should also be considered.

History, continued

She continued to have nagging discomfort in the heel for several months, and ultimately was placed in a cast for 3 months and then a protective boot for another month to treat a presumed calcaneal stress fracture found on MRI. A physical therapy program and gradual return to activity was attempted, however, the pain returned with more aggressive bounding activities. Her parents then decided to seek a second opinion. On evaluation past medical and injury history were unremarkable except for an apparent minor injury 1 month preceding the onset of pain. She had struck her heel on the high bar with subsequent tenderness and swelling, however, this resolved completely after 3 days. She was able to return to full practice and did not feel this was related to the onset of her heel pain that developed 1 month later.

- *If necessary, revise your differential diagnosis based on the additional clinical history.*
- *On which details of the physical examination should you focus at this point?*

Commentary II

Calcaneal stress fractures present as heel pain with localized tenderness over the bone, usually in the body of the calcaneus posterior to the talus. Pain elicited by squeezing the calcaneus from both sides simultaneously (i.e., the squeeze test) can usually differentiate



this condition from other diagnostic possibilities. This is a non-critical stress fracture with rapid healing and return to activity is usually possible by 4 to 6 weeks.

Physical Examination

There was excessive pronation at the subtalar joint bilaterally. Inspection revealed no evidence of gross deformity, atrophy, erythema, or swelling. There was no Achilles thickening or retrocalcaneal bursal inflammation. Moderate palpation resulted in pain along the medial calcaneus. No pain was elicited with resisted flexion of the great toe or with plantar flexion and inversion of the foot. There was no allodynia nor paresthesias. Strength, sensation, and reflexes were intact throughout the lower extremity. She had full painless ROM of her ankle and foot. Pulses were normal and there was no indication of ligamentous instability.

- *At this point, review your differential diagnosis and revise as appropriate.*
- *Are there additional observations on physical examination that might be helpful in narrowing your differential list?*

Commentary III

The physical examination should include an evaluation for any potential nerve entrapments. The entire course of the tibial nerve and its branches must be thoroughly palpated.

Physical Examination, continued

Tinel's test was negative over the tarsal tunnel but there was exquisite tenderness over the first branch of the lateral plantar nerve deep to the abductor hallucis muscle with reproduction of pain proximally and distally.

- *If necessary, revise your differential diagnosis based on the additional physical findings.*

Clinical Impression

Possible entrapment of the first branch of the lateral plantar nerve.

- *What diagnostic tests would you order at this time?*

Commentary IV

Entrapment of the first branch of the lateral plantar nerve occurs between the deep fascia of the abductor hallucis longus and the medial caudal margin of the quadratus plantae muscle.

Test Results

A diagnostic injection of lidocaine and bupivacaine into the region of the nerve gave complete, but temporary relief of all pain.

- *If necessary, augment or change the clinical impression based on the test results.*

Commentary V

Complete pain relief with a diagnostic injection is highly suggestive that nerve entrapment was the cause of her pain.

- *What additional diagnostic testing would you order?*

Test Results, continued

Repeat MRI was ordered to ensure that there was no underlying bony pathology contributing to the athlete's pain. The MRI showed a tiny area of increased signal on T2-weighted images within the talus, just anterior to the mid-subtalar joint, and in the adjacent navicular tuberosity.

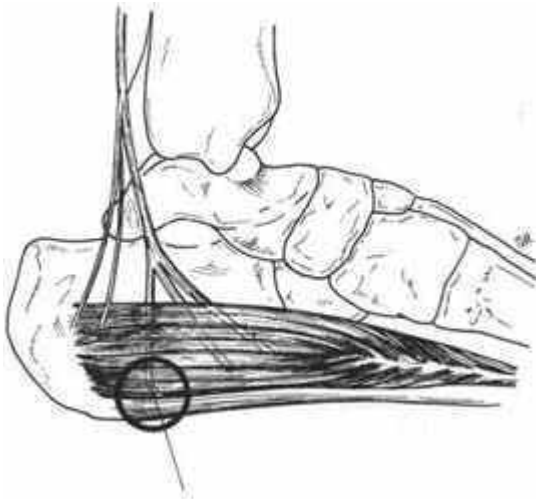
Commentary VI

The MRI changes were felt to be the result of stress related bony changes. These are not uncommonly seen in athletes feet and were not felt to be the cause of her symptoms, particularly since the location did not precisely correlate with the athlete's pain.

- *What is the impact of the additional test results on the final diagnosis?*
- *Considering all the data from the history, physical examination and laboratory studies, what is/are your final diagnostic impression(s)?*

Final Diagnostic Impression

1. Entrapment of the first branch of the lateral plantar nerve.



Entrapment of nerve to the abductor digiti quinti m. between deep fascia of the abductor hallucis m. and the medial caudal margin of the quadratus plantae m.

- *What treatment would you now recommend?*

Commentary VII

Before resorting to surgery one more attempt at conservative treatment was attempted. Padding the heel and various taping techniques to support the arch and help prevent hyperpronation and stretching of the nerve, did not relieve the pain. A repeat injection with corticosteroids around the area of the nerve entrapment was also without long-term relief.

- *What treatment would you now initiate for this patient?*



Commentary VIII

The patient underwent surgical decompression of a scarred nerve.

Final Discussion

Baxter feels that entrapment of the first branch of the lateral plantar nerve accounts for 20% of chronic heel pain in athletes. The pain is increased with running or local trauma at the heel. Pain radiates to the medial inferior aspect of the heel and proximally into the medial ankle region. The pain may even radiate across the plantar aspect of the heel to the lateral aspect of the foot. Unless there is more proximal entrapment of the nerve (i.e., tarsal tunnel syndrome), patients usually do not complain of numbness in the heel or the foot. There is some controversy as to whether nerve conduction studies (NCS) and electromyography (EMG) can detect entrapment of this nerve. A recent article by Park and Del Toro found that while the specific sensory nerve study is unreliable, the mixed nerve study and EMG study into the affected intrinsic foot muscles yield more consistent results. NCS and EMG can also help rule out tarsal tunnel syndrome, which is a more proximal injury to the tibial trunk of this nerve and is also capable of reproducing chronic heel pain. Percussion of the nerve along the tarsal tunnel can produce the patient's symptoms, including pain, burning, or tingling on the bottom of the plantar aspect of the foot. Electrodiagnostic studies can also rule out a lumbar radiculopathy or peripheral neuropathy, which can also present with diffuse heel pain.

Follow Up

Following surgery, the athlete was maintained on crutches for 1 week and then allowed to bear weight in a postoperative shoe as tolerated. A compressive dressing was in place for 2 weeks until all swelling had subsided. At 4 weeks post-surgery, ambulation was resumed with a soft athletic shoe and a padded heel insert. The athlete was an entering freshman at a PAC-10 school on a scholarship, and eager to return to gymnastics. In the early fall, at 2 months post surgery, she was cleared to start training with avoidance of any bounding, and was pain free with full activity at 4 months.

Bibliography

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