

ENTRAPMENT OF THE FIRST BRANCH OF THE LATERAL PLANTAR NERVE: Another Source of Chronic Heel Pain

Alan S. Banks, D.P.M.

The topic of nerve entrapment as a source of chronic heel pain has been discussed in the literature. Although this concept is not new, it appears that many clinicians are not familiar with this process. A number of papers have been published which propose that an entrapment of the first branch of the lateral plantar nerve may be another distinct entity which can reproduce chronic symptoms. Obviously in these patients, unless the surgeon addresses the nerve entrapment, the results of a procedure aimed at releasing the fascia alone may prove less than satisfactory. Over the past year, there have been several more individuals treated by the author who presented with chronic recalcitrant heel pain which is not related to plantar fasciitis.

The purpose of this presentation is to heighten awareness of another source of chronic heel pain, to attempt to provide a means of distinguishing which patients may suffer from this nerve entrapment, and to demonstrate a surgical approach which addresses this specific problem.

ANATOMY

The first branch of the lateral plantar nerve is a motor-sensory nerve which ultimately supplies the abductor digiti quinti and the skin of the plantar lateral aspect of the foot. This branch originates proximal to the abductor hallucis muscle, and then courses through the fascia under the superior margin of the abductor. It then directs distally between the abductor hallucis and the quadratus plantae, until it reaches the inferior margin of the abductor fascia. There, it turns laterally and lies adjacent to the calcaneus, approximately 0.5 to 1.0 cm distal to the medial tubercle. This nerve branch should not be confused with the medial calcaneal nerve, a purely sensory nerve which lies in the superficial fascia of the heel.

PATHOLOGY

Authors have proposed that the first branch of the lateral plantar nerve may become pinched or entrapped at two distinct locations within the heel. The first is where the nerve exits the deep fascia of the abductor muscle and turns laterally under the calcaneus. Pronation, muscle hypertrophy, or other sources of irritation have been cited as instigating events which may irritate the nerve as it passes through the fascial port of the abductor hallucis. Another potential site of entrapment is where the nerve lies between the plantar fascia and the calcaneus, just distal to the tubercle. Any bony spur or hypertrophy of tissue may impinge upon the nerve.

One should note the proximity of the nerve to the plantar calcaneal spur and fascia. Surgical failures following traditional heel spur surgery may be due to damage or subsequent entrapment of the nerve.

CLINICAL SIGNS AND SYMPTOMS

Patients with heel pain secondary to nerve entrapment generally describe pain similar to that associated with fasciitis. In most instances, it is difficult to make a distinction based on history alone. Clinically, one will typically note greater pain when compressing medially on the heel as opposed to plantarly. It is felt that this pinches the nerve at the exit site of the fascia between the abductor and flexor brevis. In some instances, the patient may complain of pain radiating to the lateral heel. Patients with plantar fasciitis will generally demonstrate a certain degree of firmness or induration at the site of pain. This is usually due to the associated inflammatory process, and typically resolves with the pain, as treatment measures begin to take effect.

On the contrary, in the author's experience, those patients who have nerve entrapment exhibit

little if any induration of the plantar medial heel, indicating that inflammation is not a primary factor in generating symptoms. Furthermore, those patients whose heel pain is derived from nerve entrapment demonstrate a limited response with NSAIDs, injections, ultrasound, and supportive measures, whereas those with fasciitis seem to respond to some degree, even if only temporarily.

A more definitive means to determine if fasciitis is a component of the heel pain is through a technetium scan. This modality may be considered when all conservative measures have failed, and when surgery has become a more viable consideration. Should the bone scan be negative, then with some degree of certainty one may presume that the heel pain is not inflammatory in nature. Therefore, simple release of the fascia may have a limited effect upon the symptoms. It is in these cases that a different surgical approach, one which deals with potential nerve entrapment, will be employed.

Initially bone scans may be a useful diagnostic aid, but over time one will develop a clinical sense for which patients possess a nerve problem without the need for routine use of this modality. Furthermore, MRI scans have been done on several of the initial patients, and each failed to demonstrate any findings consistent with inflammation.

SURGICAL APPROACH

An oblique incision is made over the medial aspect of the heel overlying the course of the first branch of the lateral plantar nerve. The distal extent of the incision ends just beyond the junction of the calcaneal tubercle and the plantar fascia. By orienting the incision in this manner, one remains parallel to the branches of the medial calcaneal nerve. This may reduce the potential for postoperative entrapment of these structures. The author has seen a number of patients who have sustained entrapment neuropathies with the standard DuVries medial incision.

Dissection is carried through the subcutaneous fascia until the muscle belly of the abductor hallucis can be visualized. A carefully-controlled vertical incision is then made into the deep fascia overlying the abductor hallucis. Using a Senn retractor, the abductor muscle is then reflected dorsally, and the fascia which separates the abductor and flexor digitorum brevis will be evident. A vertical incision is then made through this fascial

layer, and a segment of tissue is removed. This should eliminate any constriction upon the first branch of the lateral plantar nerve. A hemostat is then used to gently separate the tissues in this area. A small amount of dexamethasone may also be infiltrated directly into this area.

Next, a linear incision is made at the inferior margin of the abductor hallucis fascia. A small portion of the medial band of the plantar fascia is excised to eliminate any potential irritation at this level. If an inferior calcaneal spur is noted, it is gently removed with hand instruments. A Freer elevator is usually placed over the spur to prevent damage to the soft tissues and nerve at this level.

Following surgery, the patients are kept non-weight bearing for 3 weeks. A cast or posterior splint has worked well, as opposed to a soft bandage alone, albeit in a limited number of cases. Orthotic support is reinstated following surgery as well. In the author's limited series, patients generally have some residual pain for 4 months postoperatively.

CONCLUSION

The author is convinced that the vast majority of patients who present with a complaint of heel pain will have an associated plantar fasciitis. However, the reader is encouraged to remain aware of this nerve entrapment as a source of pain, particularly in recalcitrant cases. Furthermore, one is encouraged to palpate the medial heel as an initial part of the evaluation in patients with heel pain, to identify patients with this problem early in the treatment process.

BIBLIOGRAPHY

- Banks AS: Another source of chronic heel pain. In Camasta CA, Vickers NS, Ruch JA (eds): *Reconstructive Surgery of the Foot and Leg, Update '94* Tucker, GA, Podiatry Institute Publishing, 1994, pp 27-28.
- Baxter DE, Pfeffer GB: Treatment of chronic heel pain by surgical release of the first branch of the lateral plantar nerve. *Clin Orthop* 279:229-236, 1992.
- Baxter DE, Thigpen CM: Heel pain - operative results. *Foot Ankle* 5:16-25, 1984.
- Henricson AS, Westlin NE: Chronic calcaneal pain in athletes: entrapment of the calcaneal nerve? *Am J Sports Med* 12:152-154, 1984.
- Kenzora JE: The painful heel syndrome: an entrapment neuropathy. *Bull Hosp Joint Dis* 47:178-189, 1987.
- Przylucki H, Jones CL: Entrapment neuropathy of muscle branch of the lateral plantar nerve. A cause of heel pain. *J Am Podiatry Assoc* 71:119-124, 1981.
- Schon LC, Glennon TP, Baxter DE: Heel pain syndrome: electrodiagnostic support for nerve entrapment. *Foot Ankle* 14:129-135, 1993.