

## **The Use of Night Splints for Treatment of Recalcitrant Plantar**

*This study reports the results of the use of molded ankle-foot orthosis night splints for the treatment of recalcitrant plantar fasciitis on 14 patients with a total of 18 symptomatic feet. All patients had symptoms for greater than 1 year and had previously undergone treatment with non-steroidal anti-inflammatory medicines, cortisone injections, shoe modifications, and physical therapy without resolution. All patients were provided with custom-molded polypropylene ankle-foot orthoses in 5° of dorsiflexion to be used as a night splint. With continued use of non-steroidal anti-inflammatory medication, Tuli heel cups, Spenco liners, and general stretching exercises, successful resolution occurred in 11 patients in less than 4 months. There were three failures. It is felt that the use of night splints provides a useful, cost-effective adjunct to current therapeutic regimens of plantar fasciitis.*

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### **Introduction**

Heel pain at the region of the medial tuberosity of the calcaneus is a common problem. A myriad of treatments have been proposed, including non-steroidal anti-inflammatory medication, orthotic devices, activity modification, weight loss, steroid injections, physical therapy, and surgical release.<sup>1,2,4-8</sup> In this report, we describe an adjunct to the treatment of this condition.

### **Material and Methods**

In July 1987 through October 1988, 14 patients with 18 painful heels were diagnosed as having recalcitrant plantar fasciitis and were included in this study based on the following criteria: all patients reported a history of subcalcaneal pain at the insertion of the plantar fascia after more than 1 year. The pain was severe on arising in the morning and diminished with walking a short distance or stretching of the foot in dorsiflexion. The pain would recur on standing after sitting for long periods of time or with prolonged standing or walking.

The patients had localized tenderness at or 1-cm distal to the insertion of the plantar fascia on the medial tubercle calcaneus, increased radionucleotide activity on the inferior surface of the calcaneus on delayed images, and hyperemia along the region of the plantar fascia in the earlier phases on technetium scan.<sup>3</sup> Plain radiographs were reviewed to rule out evidence of other pathologic processes.

The group consisted of nine males and five females with an average age of 37 years. All patients had symptoms for greater than 1 year prior to our first evaluation. The average duration of the patients' symptoms was 17 months. The average patient was 20 lbs over ideal weight. All patients had treatment prescribed before we evaluated them that consisted of activity modifications, non-steroidal anti-inflammatory medication, orthotic devices, multiple steroid injections, and physical therapy. None of the patients had obtained relief of their symptoms from earlier treatment.

Each patient was prescribed a custom-molded ankle-foot orthosis made of polypropylene. The orthosis is applied with Velcro® straps and holds the ankle in 5° of dorsiflexion. The footplate of the splint must extend beyond the toes or patients will experience forefoot discomfort against the distal portion of the splint. The approximate cost of the splint is \$200.00.

Each patient was asked to wear the splint only while sleeping and to remove the splint immediately upon awaking in the morning. Patients were maintained on their previous non-steroidal anti-inflammatory medications, physical therapy programs, Tuli heel cups, and Spenco liners. All patients were continued in their night splints for a 3-month period. After that time, they were weaned off of their splint in 2-week increments, using the device every other night, then every third night, then every fourth night. and then on an as needed basis.

## **Results**

All patients were followed for a minimum of 9 months after commencing the use of their splints. Eleven patients with 15 painful heels had complete resolution of symptoms in less than 4 months. Recurrence has not been noted in those patients with successful resolution. In each case, it was noted that there was prompt relief of morning pain and that symptom intensity was markedly decreased throughout the day. After an initial break-in period of 1 week, no patient found the splint to be uncomfortable or to interfere significantly with sleep. If the splint was used intermittently during the first month of treatment, patients noted a return of their symptoms on the mornings the orthotic was not used.

There were three treatment failures. One was due to noncompliance. One patient finally responded to surgical release of the medial calcaneal nerve in both feet. This patient had noted some initial relief of symptoms with the use of night splints; however, her symptom complex became more consistent with medial calcaneal nerve entrapment. The last patient was 60lbs over ideal weight and it was felt that this contributed to her continued symptoms as a result of the increased mechanical load to her heel.

## **Discussion**

While sleeping, the patient's foot will assume a plantar flex position regardless of a prone or supine posture in bed. In this position, the Achilles tendon and plantar fascia are relaxed and allowed to contract through the night. Upon awaking, the patient's first steps are predictably painful, since this tissue is then stretched. However, after application of moist heat and gentle stretching, the symptoms will often subside. The dorsiflexion molded ankle-foot orthotic splint we prescribe maintains the ankle in 5° of dorsiflexion. This resists contraction of the Achilles tendon and plantar fascia, allowing this tissue to remain stretched out. We feel the ability of the splint to resist contracture of the plantar fascia is the main reason for its success. The use of a night splint offers a low risk alternative that has proven successful.

Although this report represents a preliminary study, in light of our success with the patients in this group, we have incorporated the use of night splints into our general treatment of patients with heel pain. Several questions remain unanswered about their use. Is full-time splinting as effective as part-time splinting? What is the optimum duration of continued splinting? Is splinting alone as effective as other modalities of treatment? We are currently in the process of investigating these issues.

## **Conclusions**

We have found the use of a custom-molded ankle-foot orthosis used as a night splint to hold the foot in 5° of dorsiflexion to be a useful adjunct in the treatment of chronic recalcitrant plantar fasciitis. We have now incorporated it into our treatment protocol for plantar fasciitis.

## **References**

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