

Introduction

Metatarsalgia is the name given to a range of frequently occurring and sometimes very painful foot pathologies of various origins that can result from injury, a vascular problem, osteoarthritic or bone pathologies, neuralgia, bunions (particularly in elderly subjects) and also ill-fitting footwear. In the last four years, these pathologies have accounted for 15% of the reasons for patient consultations in the referring sports orthopaedics centre (638 cases out of 3,659). These patients suffer constant pain from this condition. It was in this context that we decided to evaluate the efficacy of plantar orthotics based on different criteria. Thermoforming is a technique widely recognised in podiatry (Boissinot, 2007) that has a number of advantages: adapting to the shape of the foot, realigning it; distributing pressure over the entire surface of the foot; and improving centre-of-gravity stability.



Materials and methods

638 patients (433 women and 205 men) with a mean age of 51 years and mean anthropometric characteristics of 1.65 m and 67.5 kg were included in this analysis. The subjects were of the high-arched-foot morphotype (330) and flat-foot morphotype (308). Study location: Centre d'orthopédie du sport - PA Champfeuillet Est - 18, rue Léon Béridot - BP 353 - 38509 Voiron Cedex, France.

The patients presented painful metatarsalgia-type pathologies (after-effects of stress fractures, bunions, Morton's neuroma, second ray syndrome, inflammation of the metatarsophalangeal joint and Freiberg's disease).

The thermoformed orthotics were tailored to the patient's pathology and made after a podiatric examination comprising several stages: questioning, palpation, static podoscopic examination, dynamic examination, and analysis of the wear and deformation of the patient's sports shoes. Based on a summary of these findings, the practitioner was able to make tailor-made plantar orthotics suitable for each patient. The plantar orthotics chosen were of two types: men's and women's metatarsalgia orthotics (Photograph 1).



Photograph 1

The orthotics comprised a base of Pyroflex® resin (1.7 mm) with an EMF® top layer (0.8 mm) for the women and a Conforteva® top layer (2.5 mm) for the men. The middle layer used in the women's orthotics was Podiane+® (2 mm) at the rear foot, Posteva® Black (2 mm) in the mid-section and Lighten dynamique® (3 mm) at the forefoot. The middle layer used in the men's orthotics was Primtech® (3 mm) at the rear foot, Podialène® 180 (2 mm) in the mid-section and Poron® medical (2 mm) at the forefoot.



Photograph 2

The method chosen to make the orthotics was thermopressure in the corrected position by thermoshaping. To make the orthotics, in the first instance we had to make an accurate mould of the foot using a vacuum bag (Photograph 2).

The orthotics were made malleable by heating them and then positioned underneath the subject's feet in order to assume the foot shape.

Using the windlass technique when moulding the thermoformed orthotics ensured that the hind- and midfoot were naturally realigned (Aquino and Payne, 2003).

Each patient was asked to fill out a questionnaire after one month to record his/her opinion regarding comfort, perspiration, weight of the orthotics and perception of foot stability. Pain was evaluated by the question "Has wearing your orthotics had a positive influence?", with the choice of responses being yes or no.

Results

In 79% of cases the patients judged that the orthotics had a positive influence on pain. The vast majority of patients were satisfied or very satisfied in terms of comfort (87%), perspiration (93%), weight of the orthotics (99%) and foot stability (92%) (Figure 1). 23% of the orthotics were renewed 12 months later. This depended essentially on the intensity of the sporting practice.

Discussion

Wearing the orthotics appears to bring real comfort to the patients. This survey confirms the results of previous studies: foot orthotics are shown to be effective in reducing pain (Mejjad et al., 2005; Trotter and Pierrynowski, 2008).

There is a very close connection between footwear and plantar orthotics in everyday life. The footwear has to adapt as well as possible and in a neutral way, but the thermoformed plantar orthotic fulfils a compensating role in connection with pathologies. The addition of a plantar orthotic does not appear to result in unacceptable excess weight or excessive perspiration. Patient satisfaction in terms of perception of foot stability may be partly explained by better plantar weight distribution (Berger and Calleja, 2005).

Bibliography:

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Patient satisfaction:

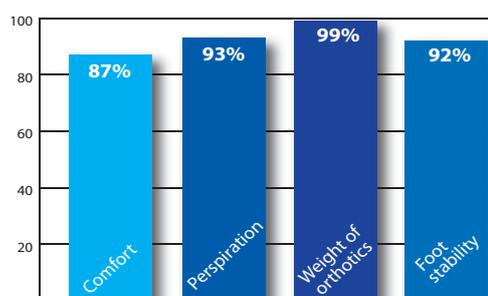


Figure 1