PODIATRY AND THE SPORTS PHYSICIAN — AN EVALUATION OF ORTHOSES

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ABSTRACT

Fifty athletes with resistant symptoms, were jointly assessed by physician and podiatrist. Commonest symptoms were foot pains (38%), anterior knee pain (34%), ankle pains including chronic sprains (30%) and Achilles pain (16%).

Simple clinical examinations were made for gait pattern, in which overpronation was specifically noted in 46%, posture, leg length and configuration, rearfoot and forefoot alignment. The commonest abnormalities were calcaneal inversion (varus) in 42%, forefoot malalignment (varus 24%, valgus 14%), tibial varus (12%) and leg length discrepancies (16%).

Individually casted orthotic corrections were made using rigid (60%) or soft (32%) orthoses, both (6%) or a simple shoe-raise (2%).

Results up to 3½ years' follow-up show symptom relief in 56% and improvement in 8%. No change was reported in 14%, while 6% could not tolerate appliances and 16% were lost to follow-up. 54% were still using orthoses, 26% had abandoned them and 20% were lost to follow-up.

Orthoses now cost up to £90 stg. in UK. If only about two thirds of patients benefit from them and half continue their long term use, critical selection of cases is required in both clinical and economic grounds.

Key words: Podiatry, Athletes, Orthoses, Running.

INTRODUCTION

The explosion of interest in running has presented clinicians with the new challenge of controlling chronic overuse injuries in patients reluctant to reduce the causative running overload. Underlying anatomical malalignments predispose to injuries due to cumulative stresses on the locomotor system. Recognition and correction of biomechanical deviations from normal symmetry are

important in the successful management of athletes and the demand for orthotic appliances is now outstripping the resources of the medical professions.

In order to evaluate critically some of the claims made for orthoses and more closely to define the indications for effective prescription, we studied 50 athletes over a period of up to 3½ years. Each patient was fully

evaluated clinically by the physician (PNS) and the podiatrist (LR).

METHODS

Out of 398 consecutive patients attending the Hillingdon Athletes Clinic, 50 suffered symptoms resistant to conventional management by rest, medication, physiotherapy or training modifications. The age, sex and sport distribution are summarised in Table I.

TABLE I
Analysis by sex, age and sport.

	Male 39	N = 50	
	Female 11		
Sport		Age	
Running	32	<15	5
Field games	6	15/19	7
Court games	5	20/29	14
Others	7	30/39	15
		40/49	7
	50	>50	2
			50

Seven of the 32 runners were international athletes.
Presenting symptoms

These are summarised in Figure 1.
The commonest symptom, in 34% of patients, was of anterior knee pain, or chondromalacia patellae ("runners' knee") which had not responded to first-line treatment of intensive straight-leg static quadriceps exercise aimed at strengthening vastus medialis. Causes of ankle pain (30%) included recurrent sprains and consequential instability or stiffness (24%) and tenosynovitis (6%).

DISTRIBUTION OF SYMPTOMS IN 50 ATHLETES

Fig. 1

Achilles tendon pain is common in runners and 3 of our 8 cases came to successful surgery, 5 responded to orthotic management and all returned to symptom free sport.

The wide range of conditions comprising the 38% of patients with foot pain included:—

calcaneal erosions	1 case
plantar fasciitis	4
MTP joint disorders:	8
hallux valgus	1
halux rigidus	2
callosity	1
metatarsalgia	2
sesamoiditis with metatarsus adductus primus	2
tarsalgia	4
general foot pain	2
	<u>19 = 38%</u>

Miscellaneous conditions included backache, (one with sciatica, one with leg length discrepancy); trochanteric pain associated with femoral torsion, calf and shin soreness and one international hurdler referred because of loss of form who was found to have leg length discrepancy, muscle weakness and wasting and gross foot asymmetry due to previous poliomyelitis.

Figure 2 shows the approximate weekly distance run by the 32 athletes, with an evidently increased representation of those exceeding 60 miles (96 km).

Fig. 2

Biomechanical assessment

A simple clinical examination was carried out on each patient as follows.

Gait

The undressed patient was asked to walk to and fro continuously across the clinic room. Shoulder level; spinal alignment, pelvic tilt, femoral movement and leg shape and movement were studied in turn, together with foot movements throughout the gait cycle. In 46% of cases pronation of the mid foot during the mid-stance phase of walking was specifically noted as being excessive. Overpronation is recognised as a mechanically important contributory factor in the causation of pain in the foot and elsewhere in the leg or trunk (Neale, 1981; Subotnick, 1975 and Hlavac, 1977).

Apart from indications of asymmetrical stride pattern, evidence of femoral torsion was sought, as illustrated diagrammatically in Figure 3. This condition is frequently associated with hip and trochanteric pains as well as "runners' knee".

Fig. 3

Anatomical variations such as tibial varus (Fig. 4) were noted together with genu valgum or varum.

Fig. 4

Leg length

This was compared, with the patient lying flat, from the most prominent bony reference point about the anterior superior iliac spine to the tip of the tibial malleolus on each side. Figure 5 indicates spinal and pelvic alignment where a leg length difference is compensated, as may happen with a shoe raise, or physiologically by plantar-flexing the shorter leg or bending the longer one.

By contrast, Figure 6 shows the effects of uncompensated leg length difference with consequential pelvic tilt and scoliosis, potentially leading to hip, trochanteric, pelvic, sacro-iliac and spinal symptoms as well as leg pain due to asymmetry of gait. This is naturally exaggerated by the higher speed and greater surface impact of running compared with walking and accounts for the relatively greater clinical importance of asymmetry in runners presenting with symptoms usually beyond the reach of walking speed.

Fig. 5

Foot alignments

With the patient lying prone with the feet extending free over the end of the plinth the neutral subtalar position is determined by the standard methods (Neale, 1981). This allows measurement of the calcaneal and forefoot positions in relation to the neutral.

Figure 7 illustrates the back of the right foot with normal calcaneal alignment portrayed anatomically and by convenient line diagram. Inversion of the heel, or calcaneal varus, and eversion (valgus) are frequent causes of instability and associated with overpronation.

Forefoot alignment is similarly illustrated in Figure 8. The normal position meets the line of the metatarsophalangeal (MTP) joints perpendicularly to the vertical alignment of the rearfoot. Both the varus and valgus configurations predispose to overpronation and mechanical instability of the foot.

Biomechanical results

Figure 9 summarises the commonest findings. These included the conditions shown in Table II.

Fig. 6

Excessive pronation was noted in 46%. 32 different patients (64%) totalled 56 abnormal biomechanical findings.

ORTHOSES

Prescription

When biomechanical functional abnormalities were found in relation to symptoms, orthoses were made. The aim of the orthosis is to hold and support the foot in a biomechanically optimal position so as to minimise the wayward movements occasioned by anatomical instability.

Rigid orthoses were constructed in resilient thermo-plastic material (Rohadur). Softer appliances were made of a cork and latex mixture. The orthosis is posted posteriorly and anteriorly with suitable material to secure individually correct alignment of both rear and

CLINICAL FINDINGS IN 50 ATHLETES

forefoot. Orthoses prescribed were rigid (60%), soft (32%) or one pair of each (6%). One patient (2%) required a simple stabilised heel raise inside the shoe.

It is difficult to predict patient tolerance. Experience has modified our practice and many runners prefer different, often softer, appliances for running than for day-shoe wear. Many, however, prefer rigid orthoses at all times; some need help only during sport.

RESULTS – Symptoms

Table III shows a significant change in the pattern of results with longer term follow-up.

The proportion of patients “cured” or satisfied (64%) has remained constant but there was a considerable shift towards greater relief of pain with time.

RESULTS – Use of orthoses

Table IV indicates a similar tendency for the majority of satisfied patients to remain loyal to their appliances.

TABLE III

Orthoses: Outcome in 50 athletes.

	up to 1½ years	up to 3½ years
Cured	17	28 (56%)
Improved	15	4 (8%)
No change	5 (4 operated)	7 (14%)
Worse/not tolerated	10	8 (16%)
Lost to follow-up	10	8 (16%)
	50	50

Rearfoot alignments

Fig. 7

Forefoot alignments

Fig. 8

DISCUSSION

It seems apparent that orthoses are highly effective and well tolerated in the majority of patients with painful overuse injuries related to biomechanical disorders. Indeed, many patients' lives have been transformed by their painfree return to sport being clearly dependent on their continued use of orthoses for some or all activities. Nevertheless, an apparent relief rate of 64% and a persisting use of orthoses in only 54% of patients up to 3½ years' follow-up calls for critical examination.

TABLE IV

Orthoses in 50 athletes

Appliance use at 3½ years

Used	27	54%
Not used	13	46%
Lost to f.u.	10	

50

Clinical judgment and competence are the physician's first targets for critical self-analysis. These patients taught us many basics and there is no doubt that our expertise has developed over these years, as have the materials available for appliance construction. Perhaps the most important development for runners is the evolution of far superior shoes to those of yesteryear. Nevertheless, there are still many faults to be found in running shoes and some of these have been reviewed critically by Sperryn (1980) in relation to their causation of injury. A major part of our advice concerns training regimes and footwear correction and we are lucky to have a superbly competent shoe-maker available to our clinic.

Patient selection is important but enigmatic. It is easy, with hindsight, to blame therapeutic failure on patient non-compliance. Our patients gave the following reasons for discarding their orthoses:—

"couldn't be bothered with them"	1
"uncomfortable, so didn't try them"	1
"threw them away"	1
no plausible reason at all	1
made no difference to symptoms	3
spontaneous cure, often by coincidentally abandoning or changing sport	3
operations changed symptoms	2
wrong diagnosis — we missed a navicular stress fracture	1
	<hr/> 13 (26%)

FINANCIAL IMPLICATIONS

The prescription of orthoses now costs a British athlete up to £90 sterling if prescribed privately (though our NHS clinic has different, cheaper costings). Appliances are widely advertised in lay sports magazines and the medical professions do not yet have widespread competence, or even basic undergraduate or postgraduate training in this field. Commercial companies are exploiting this field but these indications that perhaps only two thirds of patients will benefit from, and half persistently wear, orthoses may suggest that basic education of the health professions — and why not the coaches too? — in the elements of gait correction backed by cheap, temporary orthoses and better shoes could go a long way to keeping pace with the ever increasing harvest of overuse injuries reaped by converts to the Running Movement.

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