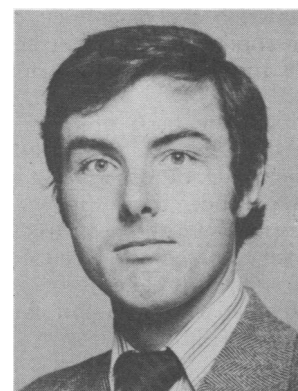




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MANAGEMENT OF PAIN BENEATH THE HEEL AND ACHILLES TENDONITIS WITH VISCO-ELASTIC HEEL INSERTS

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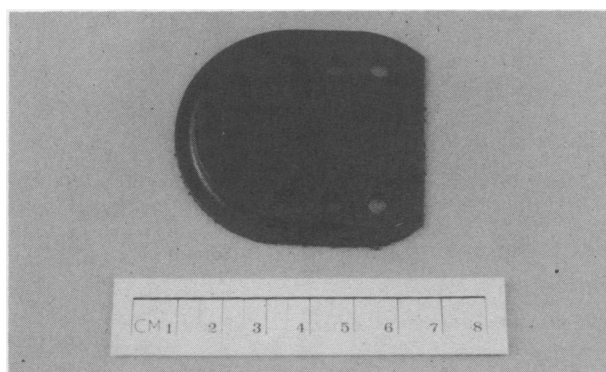
ABSTRACT

Soft tissue symptoms in the leg due to sporting activity are commonly associated with the force of heel strike. Conventional training shoes compromise between comfort and performance; few models are suitably designed for both considerations. Using a visco-elastic polymer insert the symptoms of heel pain and Achilles tendonitis have been largely or completely abolished in a preliminary study.

Key Words: Achilles tendonitis, Heel pain, Visco-elastic polymer, Shock waves, Sports injuries.

INTRODUCTION

The magnitude of the heel-strike acceleration in walking and running remained obscure until very recently (Light, L. H. and MacLellan, G. E., 1977; Light, L. H., MacLellan, G. E. and Klenerman, L., 1979). At this time direct bone readings were obtained in normal walking on a hard floor surface. In normal walking acceleration in the tibia at heel strike was found to be as high as 5 g barefoot and on running the scale of resolution of accelerometers was exceeded indicating accelerations of more than 10 g at heel-strike.



In the same experiment different types of heel construction were compared. One of these incorporated a visco-elastic polymer as a wedge in the heel construction. In these studies it was demonstrated that by using this insert it was possible to reduce the magnitude of the walking heel-strike transient to approximately 2.5 g with no recoil being observed. This contrasted with the finding on a soft crepe rubber construction in which

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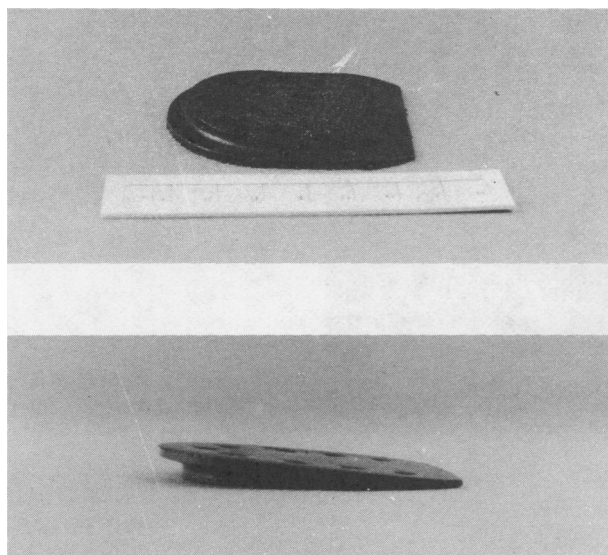
although the magnitude of the transient was reduced to approximately the same level there was cyclical reverberation while load was still on the heel.

On the basis of these studies conditions associated with heel-strike magnitude are being studied. Whilst many conditions lend themselves to investigation in this manner those thought likely to give the most rapid results were the heel-strike associated injuries of sportsmen. Consecutive groups of patients attending either hospital out-patients or a sports medicine clinic with Achilles tendonitis and pain beneath the heel have been studied.

MATERIAL AND METHODS

All patients presenting with Achilles tendonitis or pain beneath the heel at a hospital out-patient department or sports medicine clinic were treated prospectively with visco-elastic heel inserts in their sports shoes or their everyday walking shoes as indicated. At presentation parameters reviewed included their major sport, normal competitive surface, footwear used for training and competition, age and sex of the patient, previous treatment, and duration of symptoms.

All patients were reviewed at monthly intervals for a minimum of three months. In many cases the follow-up



is now in excess of six months. Symptoms and competitive ability were reviewed at each visit. There were nine patients with pain beneath the heel and fourteen with Achilles tendonitis. Their presenting data are given in Tables I and II.

TABLE I

Pain beneath the heel prior to treatment with visco-elastic heel inserts

| Initials | Age | Sex | Shoes Used | Major Sports | Competitive Level | Duration of Symptoms | Previous Treatment |
|----------|-----|-----|-------------------|--|--------------------------|----------------------|------------------------------|
| E. L. | 67 | F | Golf | Golf | Club | 3 months | Hydrocortisone Injections x2 |
| D. E. | 71 | M | ? | None | — | 8 months | Physiotherapy |
| M. W. | 14 | F | Nike Adidas | Athletics 800, 1500 m Cross Country | Junior National | 9 months | Physiotherapy |
| A. M. | 10 | F | Winfield | Squash Netball | School Team and Club | 3 months | Physiotherapy |
| A. P. | 11 | M | Adidas | Football | Schoolboy County | 8 months | Physiotherapy |
| N. I. | 14 | M | Puma Patrick | Football | School, Junior County | 18 months | None |
| J. I. | 38 | M | Dunlop Stubert | Football Cricket | League Linesman Club | 2 years | Physiotherapy |
| W. K. | 12 | M | M & S Nike | Football | County Schoolboys | 2 weeks | None |
| D. E. | 14 | M | ? | Football | School | 1 month | None |

RESULTS

1. Pain beneath the heel — see Figs. 1 and 2

The pattern of response was remarkably uniform. All patients stated there was immediate improvement in comfort. At one month there were no patients demanding any treatment other than the heel inserts and only one patient still had symptoms preventing training. All the remaining patients had returned to full training or competition though some still complained of slight symptoms.

At two months four patients still had rare symptoms and the remainder were symptom free. At three months only one patient had any symptoms whatever and all patients had returned to full competitive level in their sports.

Since this study a number of patients have returned to sports without their heel inserts and suffered a return of symptoms. These have been swiftly relieved by once again using the heel inserts.

2. Achilles Tendonitis — see Figs. 3 and 4

The response was charted as for pain beneath the heel. Only one patient failed to achieve a satisfactory response both in symptoms and function, a former Olympic marathon runner in his late 40's who had had to give up competition because of Achilles tendon problems more than ten years previously and was attempting a comeback. All former attempts at treatment had also failed. Among the remaining patients, providing the heel inserts were used a full competitive level was maintained with no other treatment being required. This result was the

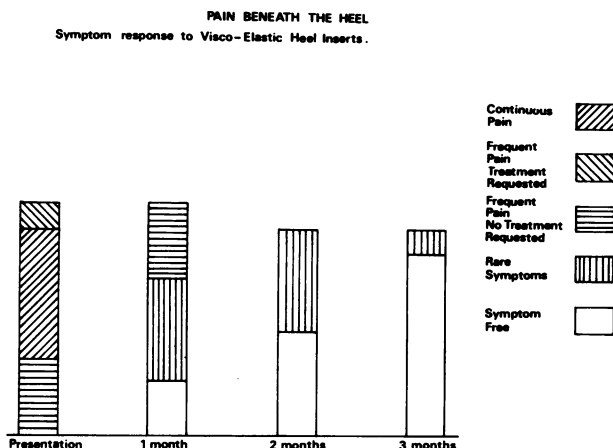


Figure 1

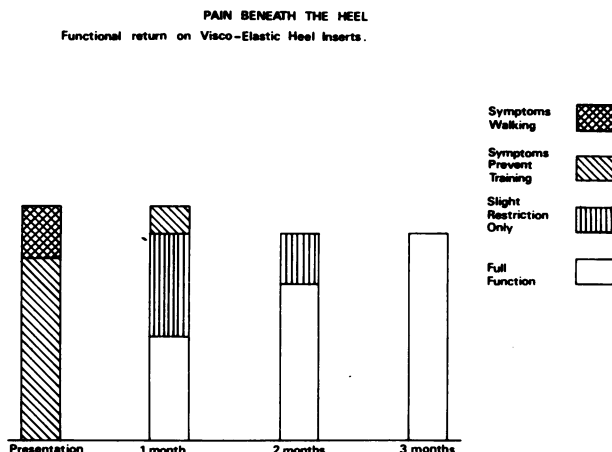


Figure 2

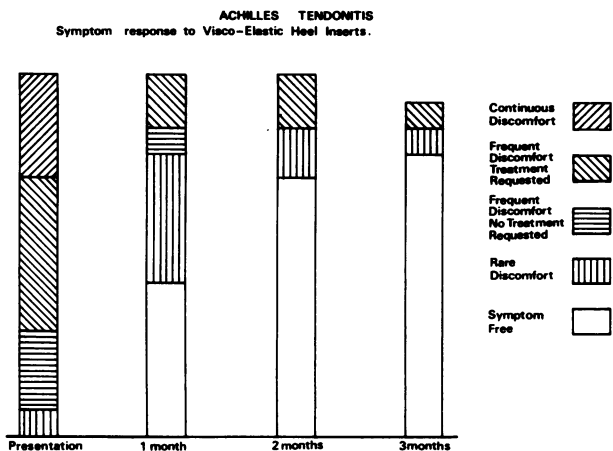


Figure 3

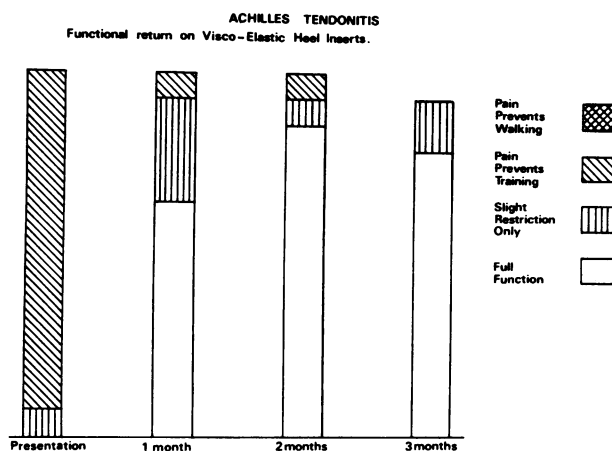


Figure 4

TABLE II
Achilles tendonitis prior to treatment with visco-elastic heel inserts

| Initials | Age | Sex | Shoes Used | Major Sports | Competitive Level | Duration of Symptoms | Previous Treatment |
|----------|-----|-----|---------------------------------------|----------------------------|--------------------------|----------------------|---|
| D. J. | 17 | M | Mitre Ripple | Cross Country Marathon | School Representative | 2 months | None |
| J. S. | 40 | M | Nike Inter squash | Squash | Club | 6 weeks | None |
| P. E. | 46 | F | Adidas R.O.M. | Tennis | Club | 8 months | None |
| J. W. | 30 | F | Simlam Stubert | Hockey | Club | 4 weeks | Ultrasound, Ice, Frictions, stretching |
| T. L. | 37 | M | Inter squash | Squash | County | 5 years | None |
| S. S. | 30 | M | Dunlop Green Flash. Oggi Squash | Squash Running Road | Club | 3 months | Ultrasound Heal raise. Ice |
| J. G. | 29 | F | Adidas Handmade | Cricket | National | 2 years | None |
| G. D. | 35 | F | Adidas R.O.M. Omitsuku Tiger | Netball Badminton | Club | 10 years | Surgery. Plaster Cast Infections. Physiotherapy |
| A. H. | 39 | M | Inter | Cricket Football (Ref.) | Club | 2 years | Physiotherapy |
| D. M. | 13 | M | Gola Intersport | Rugby | School Team | 2 years | Physiotherapy |
| S. H. | 35 | F | Adidas Stubert | Hockey | County | 1½ years | Physiotherapy Heel Raise |
| J. N. | 45 | M | Gola Squash | Squash Running | Club | 7 months | Osteopathy |
| C. S. | 17 | M | Patrick | Squash Running | School Team | 1 week | None |
| A. M. | 16 | M | Nike elite Nike interval | Running | County | 2 years | None |

same for a patient who had had symptoms for seven years and for patients who had had symptoms for only two months.

DISCUSSION

The appreciation of heel-strike as being a significant vector in joint loading has been given a new dimension by actual in-bone recordings at tibia level. By modelling the distortions produced in transmitting a shock force from bone to soft tissue it is clear that substantial traction, shear and overswing phenomena all take place and that by reducing the magnitude of the shock wave these distortions can also be reduced (Light and MacLellan,

1977). If this were to be a significant factor in hard or soft tissue pathology we would expect a response from those who heel-strike hardest, i.e. sportspeople.

It is a usual part of the management of both of the conditions studied here to incorporate some form of heel cushioning, generally plastazote, T-foam or sponge rubber. However, large volumes are required to produce an effect. There are sound physical reasons why this should be so. The use of a solid visco-elastic polymer gives all the energy absorbing qualities of the time honoured treatments but none of the drawbacks (Light et al, 1979).

The results achieved, and particularly the time base over which they occurred, imply a degree of biological effect. Although symptoms improved rapidly it was not an all-or-nothing phenomena but one of gradual progression over a number of weeks suggesting a healing process. The duration of symptoms prior to management with visco-elastic inserts does not appear to have any relation to either the rate or the quality of resolution of symptoms.

If the resolution of symptoms in these conditions is due to healing, as is suggested by the pattern of the response observed, it would seem inappropriate to intervene surgically in any way that could interfere significantly with the blood supply to the healing part (Kvist, H. and Kvist, M., 1980). Although one of the patients in this study has had an excellent response to the heel inserts after Achilles tendon adhesion stripping

had been done, we are receiving mixed results on other sportsmen who have had stripping operations performed sometimes without either benefit either from surgery or from visco-elastic heel inserts. Thus while the aetiology of the Achilles tendon symptoms may be similar, surgery may alter the pathology and therefore the predictability of the outcome of the management with visco-elastic heel inserts.

CONCLUSION

Small prospective series of patients with Achilles tendonitis and pain beneath the heel are reported. Both conditions have responded rapidly to the use of a visco-elastic polymer heel insert. This not only commends a new mode of management of these conditions but also suggests a new aspect of the aetiology and pathology both of the conditions and their resolution.

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