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## THE PAINFUL HEEL

### A CONTROLLED TRIAL OF THE VALUE OF HYDROCORTISONE

BY

N. J. BLOCKEY, M.Ch.Orth., F.R.C.S.

Late Senior Orthopaedic Registrar, Salford Royal Hospital

Pain in the weight-bearing area of the heel can be troublesome and incapacitating. Its explanation is often elusive. The symptom can be ascribed to injury, degenerative arthritis, or previous infection in only a few patients; in the greater proportion no satisfactory cause can be found. This paper records the results of study of 19 patients complaining of pain in one or both heels which could not directly be attributed to a known cause. Attention was paid to their history, their work, and the type of shoe they preferred. The blood pressure was measured and the pulses of the lower limbs were examined. The physical signs of the heels themselves were recorded and radiographs of both heels taken even though the symptoms were unilateral in 16 patients. The patients were divided into two groups, one group receiving an injection of 25 mg. of hydrocortisone acetate into the tender area and the other group receiving an injection of an inert substance. This latter group was used as a control in the assessment of results. All patients were given a sponge-rubber pad. The results of treatment were assessed at one, two, three, and four weeks, and again at a minimum of six months.

#### Selection of Patients and Controls

Patients excluded from this trial were those with generalized periarticular joint pains, those in whom a convincing local cause could be found, and those whose foot structure was so abnormal as to be, in itself, a likely cause of pain. Thus, those patients with subtaloid arthritis were excluded, but those whose only foot abnormality was hallux valgus, hammer-toe, or plantar callosity were included. Previous treatment for the painful heel did not exclude patients, provided that at the beginning of this trial their pain was not getting better and was severe enough to deserve treatment.

To control this trial as carefully as possible it was hoped to prepare two liquids, one being a suspension of hydrocortisone acetate and the other being inert, painless on injection, and indistinguishable from hydrocortisone in appearance and viscosity. At first a suspension of magnesium carbonate was tried, but, although this satisfied most of the criteria, it was by no means painless when injected intramuscularly. I was advised that no suspension existed which satisfied all the above criteria, and I therefore resorted to using one bottle labelled "hydrocortisone suspension A," containing hydrocortisone acetate, 25 mg. per ml., and the other labelled "hydrocortisone solution B," containing normal saline. The painful area was injected from either bottle A or bottle B by a registrar who did not know that only one bottle contained an active principle, and I, the assessor, did not know from which bottle the patient had been injected.

I saw these patients one, two, three, and four weeks after the injection, and again at six months. If there had been no significant change by the third week they were again injected from the same bottle they had had originally. When six months had elapsed from the time the last patient received his injection the trial was closed and the code exposed.

#### Clinical Material

There were 22 painful heels in 19 patients in this series. One patient was aged 40, the rest were between 46 and 80, the average being 55.7 years. There were 10 females and 9 males. Their occupations, with one exception, were heavy and arduous, involving a considerable proportion of the day on their feet. The exception was a company director who was on his feet only two hours a day. All the rest were on their feet from periods ranging from six to twelve hours a day.

The pain was well localized but deep-seated, usually worst on first standing after resting, then easing a little, and finally becoming severe again when weight had been borne on the heel for a few hours. The pain did not change in situation or character, and in only one heel was there any radiation along the sole of the foot.

*History.*—The patients had had pain in the heel for periods ranging from 6 weeks to 18 months. It was commonly episodic, with good and bad phases. In one patient there was a definite history of pain following a fall, and in another pain followed six weeks' enforced rest in bed for bronchitis. None of the group gave a history of gonorrhoea, rheumatic fever, or other significant incident. In 17 of the 19 patients the pain began without known cause.

*General Assessment.*—Only one patient in this series was of normal build; the rest were short and stocky, heavy, or frankly obese. None of the heavy patients was tall, and a strong impression was formed that this condition affected individuals who were overweight for their height. The blood pressure of this group did not show a significant divergence from normal, and the leg pulses and the capillary circulation of the feet were normal. I was unable to find any factor which distinguished this group from any other group similar in age and build.

#### Foot Data

*Foot Size, Shape, and Comfort.*—The pain was in the right heel in 11 patients, and in the left heel in five; in three it was bilateral. The size of the foot corresponded closely with that expected in a group of people short in height. The average size of the shoe required by the nine male patients was 7½. In the main, the patients wore normal shoes with rubber heels, but many preferred crêpe soles. All the females wore low-heeled shoes—not higher than 1 in. (2.5 cm.)—mostly preferring rubber or crêpe. None of the females had worn high heels—greater than 1½ in. (3.8 cm.)—regularly for the past five years, but the female patients concerned (average 56.0 years) were not of an age at which high heels are prevalent. In 11 patients there was a history of increasing weight preceding the onset of symptoms. In only two patients of this series was there a mild degree of flatness of the arch, and in the rest the architecture was normal.

*Structural Abnormalities: Spurs.*—There was no consistent abnormality in the forefoot. One patient had hallux rigidus and four a mild degree of hallux valgus. The lateral radiographs, taken of both heels even though in 16 of the 19 patients symptoms were unilateral, showed that of 22 heels giving pain 12 had calcaneal spurs. In only three of these painful heels was the spur present solely on the painful side. In a further four where pain was unilateral the spurs were exactly equal in size on the two sides. Two further patients had normal heel radiographs of the painful side but had spurs present on the other, or painless, side. The largest spur discovered in this series occurred in a heel which had given pain for three months only, and I was unable to discover any relationship between size of spur and length of history or severity of symptoms.

### Tenderness and Spontaneous Pain

Examination of these 22 heels showed three points where there was tenderness to pressure. The accompanying diagram shows these sites and the frequency with which tenderness was elicited in each site. Point 1 is situated near the anterior edge of the weight-bearing part of the heel, as far anterior as a vertical line dropped from the tip of the medial malleolus; point 2 lies at the junction of the medial wall and plantar aspect of the calcaneum; and point 3 in the centre of the weight-bearing area of the heel. In all cases the tenderness was deep, and was elicited only on firm pressure. In none was there any cutaneous tenderness, hyperaesthesia, swelling, or redness. The thickness of the skin over the area was regarded as normal. The only correlation between site of tenderness and presence or absence of spur is that in the 12 cases of spur the tenderness was at point 1 in seven cases and point 3 in five cases. Tenderness at point 2 was seen only in those without a spur.

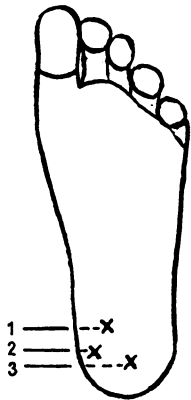


Diagram showing the points of tenderness in 22 painful heels (represented as if all were the left heel). Point 1 was the site of tenderness in 13 heels, point 2 in 3 heels, and point 3 in 6 heels.

Spontaneous pain—that is, pain felt at times other than when bearing weight—was felt in 10 of these 22 heels, but the distribution of this symptom throughout the series bore no relationship to the presence of a spur or to the length of history. It was described as “burning,” “a feeling of inflammation inside,” or “as if a drawing-pin was sticking in the heel.” The patients experiencing pain at rest were those in whom the tenderness was most pronounced. In two patients pain radiated from the heel up the back of the calf, but in the rest it was confined to the heel.

### Results of Clinical Trial

The length of follow-up was: 6–9 months in 6 heels, 9–12 months in 7, 12–18 months in 7, and over 18 months in 2.

The selection of patients for treatment or for control was a random selection made by the registrar. At

conclusion of the trial it was found that 13 heels had been injected with hydrocortisone and nine with the inert control substance (saline).

The individuals in these two groups were thought to be identical in all respects other than the nature of the substance injected. All were given a sponge-rubber pad to wear under the painful heel, and we are therefore comparing the results of injections of hydrocortisone and injections of normal saline in the treatment of this condition.

### Results

	Hydrocortisone	Control	Total
Marked relief at one week proceeding to complete cure ..	4	1	5
Relieved at two months and cure maintained .. .. .	6	4	10
Not relieved .. .. .	3	4	7
Total .. .. .	13	9	22

The Table reveals that of the 13 heels receiving hydrocortisone four showed a definite improvement at one week and continued to complete cure, six showed gradual improvement over two months and proceeded to complete cure, and three were not affected by the injection. Of the nine heels injected with the control substance, one showed a definite improvement at one week and continued to complete cure, four showed gradual improvement over two months and proceeded to complete cure, and four were not affected.

The final assessment was made at an interval of between 6 and 18 months after the injection; of the 13 heels receiving

hydrocortisone 10 were cured and three not relieved, and of the nine heels treated by the control injection five were cured and four not relieved.

A second injection was given to nine heels three weeks after the first, but this did not alter the trend that was apparent before it was given—that is, if the pain in the heel was totally unaffected by the first injection, a second injection failed to change this state.

No patients were affected adversely either by the injection of hydrocortisone or by that of normal saline.

The Table shows that in this series of 22 painful heels treated by the injection of a liquid five were improved within the first week and continued to complete cure without recurrence of pain. I have had no immediate maintained successes in the treatment of this condition with any other technique. Statistical analysis of the figures of the differences between the two groups, using the fourfold table technique with Yates's correction, gives a  $\chi^2$  value of 0.375 and  $P$  equal to 0.6. The differences have therefore no statistical significance and could easily have arisen by chance.

### Discussion

The build of the patients in whom this syndrome occurs, and their age, create the impression that strain is an aetiological factor. The site of pain is either over the large medial tubercle situated posteriorly on the plantar surface of the calcaneum where the strong central portion of the plantar aponeurosis is attached, or it is at a point on the anterior edge of the area of the heel that bears weight. This latter point is considerably anterior to the point of attachment of the plantar aponeurosis and overlies an area where no structure of mechanical significance is gaining its sole attachment to bone. If this syndrome was due to strain of a ligament one might have expected a radiation of pain along that ligament, particularly when the ligament is stretched by an action such as dorsiflexion of the toes and metatarsus, a point of tenderness at the attachment of that ligament, and some sign such as flatness of the longitudinal arch to indicate insufficiency of the ligament. One might also expect the symptoms to be commonly bilateral and the complete absence of rapid permanent success by the injection of any substance. Most of these features were not seen in a study of the patients here reported.

### Summary and Conclusions

The results of a study of 22 painful heels occurring in 19 patients are reported. Attention is drawn to the frequency with which patients so afflicted are of the stocky or short and heavy type. An analysis of this group fails to show any relationship between the symptoms of pain and the presence of a spur. Ten out of 13 heels injected with 25 mg. of hydrocortisone acetate and five out of nine heels injected with normal saline were cured at two months after the injection and remained cured—a difference which could well be due to chance.

The pain is commonly one-sided, and no cause can be found in the majority of sufferers.

Calcaneal spurs seem to be quite an incidental finding and to bear no relation to the onset or severity of the symptoms.

Injection of a painful heel, with the provision of a sponge-rubber pad, has given more immediate and late successes than have been achieved by any other method of treatment used in this survey.

Hydrocortisone acetate may be the best substance to inject, but its advantage over saline has not been proved in this series.

My thanks are due to Mr. W. Sayle-Creer for permission to study this problem in his department and for help with this paper, and to Mr. C. H. Cullen and Mr. R. R. Thomas for their help.