Operative treatment, without the usual preliminary period of conservatism, is probably safer in suspected cases. The clinical histories of six cases of the condition are reported.

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AETIOLOGY AND TREATMENT OF SPASMODIC FLAT-FOOT*

BY

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Let me say at the outset that I have not solved the problem of acute spasmodic valgus. That condition is now well defined and well recognized, but its cause is as obscure as ever, and the most I can hope to do is to give a concise summary of the present state of our ignorance. Its clinical characteristics are striking and fairly uniform. They differ only in intensity; consequently the condition is easily recognizable clinically, and it is so sharply defined and so different from all other forms of flat-foot that it may properly be regarded as a *clinical* entity. I do not think, however, that it is entitled to be regarded as a pathological entity. On the contrary, I believe that consideration of all the known facts will lead us to the conclusion that acute spasmodic valgus arises, in certain circumstances, out of various orthopaedic diseases of known pathology, and that it has not a distinct pathology of its own.

Incidence of Spasmodic Flat-foot

In London, among 1,000 patients seen at an ordinary general hospital orthopaedic out-patient clinic, there were 141 cases of flat-foot of all kinds, and eight of these were indexed as cases of acute spasmodic valgus—that is to say, they formed 5.7 per cent. of all cases of flat-foot. The sexes were affected in approximately equal numbers, and the average age of the male patients was 18 years and that of the female patients 15½ years. It was noticeable that in a number of the cases the patients had left school recently or early, and had undertaken somewhat arduous forms of work, in which they would be on their feet for many hours. Boys, for example, were found to have become errand boys to an ironmonger, or to be working in a foundry or a quarry; the girls, while still at the age of puberty or hardly past it, had become waitresses, laundry workers, etc.

* Read in opening a discussion in the Section of Orthopaedics and Fractures at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

In about a quarter of the cases there was a history of some recent sprain or twist of the affected foot. In those which gave a history of injury the condition was nearly always unilateral; and when it was due to what might be called general or constitutional causes it was sometimes bilateral, but even then one foot was affected more severely than the other. Taking all the cases together, it was found that the left foot was affected more often than the right.

Definition of the Condition

A precise scientific definition is, I think, impossible; but it is easy to give a word-picture of what is meant by the term "acute spasmodic valgus." We mean a case in which the foot is strongly everted by the action of the

peronei and of the extensor communis digitorum muscles. The foot is held rigidly in that position, and the slightest attempt to adduct or invert it passively causes intense pain, and to do so is, in fact, quite impossible; but in sleep, or when muscular relaxation is induced by full anaesthesia, the rigidity disappears entirely, and the foot can be moved easily into any desired position without the slightest obstacle being encountered, even momentarily. In particular, in a recent case one never notices the slightest suggestion of the giving way of any adhesions, or any other physical obstacle to the restoration of the normal position of the foot. This is important. The condition seems to be one of acute spasm, and of nothing more than spasm. Even after many weeks full anaesthesia often reveals that the deformity is still entirely caused by spasm, though in a few cases (presumably those in which some inflammatory but not necessarily infective cause was the exciting condition) adhesions may ultimately appear. The foot is exceedingly painful; the patient can walk for a very short distance only, and his gait lacks all spring, whilst running, games, and dancing are quite out of the question.

Those cases which originate in a sprain of the ankle or of the foot are invariably found to have had little or no early treatment: acute spasmodic valgus does not appear as a complication of fractures or of dislocations at the ankle, or even of a sprain which is severe enough to send the patient of necessity to bed and keep him there. The history invariably is that the injury was regarded as being "just a mere sprain." The patient walked about much as usual; pain and disability appeared later and gradually became more and more severe, until at the time of examination the foot presented the characteristic fixed everted appearance, with the peroneal and common extensor tendons standing out beneath the skin as tense as they could possibly be.

Not much is to be gained by a perusal of recent surgical literature on this subject. Indeed, our knowledge has advanced very little beyond that which we possessed in March, 1930, when a discussion on spasmodic flat-foot took place in the Section of Orthopaedics at the Royal Society of Medicine. Mr. Malkin, who opened that discussion, said that the first description of cases he had been able to find in England was published by Sir Robert Jones in 1897, in the *Liverpool Medico-Chirurgical Journal*. Textbooks are disappointing also. For the most part they do not give a separate clear description of this particular kind of flat-foot, in spite of its clinical characteristics being so sharply defined; they merely present a vague unhelpful description of what they call "rigid flat-foot," and under that term they include two distinct clinical states—acute spasmodic valgus and the chronically or permanently stiff flat-foot—that result from simple flat-foot that has been long neglected, from gross injury, and so on. This confusion of two perfectly distinct clinical states is unfortunate and most misleading; moreover, each needs quite different treatment.

Aetiology

A sense of proportion is a most useful attribute in a surgeon. It is an obvious but a very important fact that only a small percentage of those who are engaged in arduous occupations and are of an age at which they are liable to contract acute spasmodic valgus actually develop that condition. Why do the minority succumb? It has been repeatedly stated that focal sepsis is the determining factor. Indeed, some have gone further and have contended that infection, and in particular tonsillar infection, is actually the primary cause of the disease. It has even been suggested that these feet might be nicknamed "tonsil feet"! I do not think that this view is really tenable. In the first place, thousands of children are seen every year by many different doctors and are found to be suffering from tonsillar infection, but cases of acute spasmodic valgus are very rarely observed among them. The relief of an acute spasmodic valgus by tonsillectomy is not proof that it was due to tonsillar infection, because the operation usually means that the child is taken away from work for several weeks, is rested and well fed—is treated, in short, in a manner that would probably cure the condition without tonsillectomy.

I believe the truth is that certain feet succumb to the effects of habitual overstrain because they are structurally and developmentally weak. The studies of Dudley J. Morton are of great interest and significance in this connexion. He has shown that the human foot is as yet by no means fully adapted to man's upright attitude, in spite of the fact that the mammalian foot has been evolving for a period of something like a hundred million years. Some feet are strong; others are ill developed and prone to break down under conditions which would be harmless to another person. That, I believe, is an important conception, for it has a very practical bearing on treatment. If a person has a potentially weak foot, and it breaks down under strain, it is not enough merely to remedy the immediate cause of complaint; the patient must be removed from the condition which was the fundamental cause of the breakdown. In other words, in such cases it is vital to change the patient's occupation.

Treatment

It is obvious—so obvious as to be a truism—that in treating any disease we must always try to abolish its cause, not merely alleviate symptoms. In acute spasmodic

valgus, therefore, we must not treat the spasm only: that is not the disease, but the result of the disease. For that reason I regard tenotomy and excision of the peroneal tendons as being based on an entire misconception. And everyone knows that, as a matter of fact, these operations are often unsuccessful, and prone to be followed by re-appearance of the pain and deformity. Seeing that the primary cause of the condition has been left unaffected, this is not surprising. Paralysing the peroneal nerve or its musculo-cutaneous division with novocain or alcohol, or crushing it or freezing it, abolishes the spasm for a time but does not remove its cause.

The mainstay of treatment is, I submit, complete physiological rest: the patient must, before all else, be taken off his feet. The importance of this is shown by the fact that many of the milder cases get well by this means alone. I can recall more than one instance in which an adolescent was admitted to hospital for tonsillectomy; that operation was postponed for some reason, and while the patient waited in bed he recovered from his acute spasmodic valgus. It is a good thing to put the affected foot or feet into plaster-of-Paris, for this measure gives the maximum rest. Especially is it valuable in cases in which the foot has broken down in consequence of prolonged misuse and strain. It has been suggested that the eversion of the foot is simply an example of protective muscular rigidity (Sherrington's "myotatic reflex"), the foot being held in the position of rest or relaxation, in which the joint surfaces on the inner border of the foot are held apart and the joints themselves are in their position of greatest capacity. If, in fact, there were an effusion into these joints this would be their most comfortable position. It is a mistake, therefore, to bring the foot, by force or by abolishing the natural method of protection with an anaesthetic, into a position of adduction and inversion. It is a more rational and actually more successful procedure if one simply fixes the foot in the position it has adopted. Furthermore, to stretch the evertor muscles severely is probably to increase and prolong their state of spasm. Perhaps there is an analogy in the condition of cramp. We all know that if our leg muscles go into a state of cramp the very worst thing we can do is to stretch the leg out. This at once makes the pain unbearable, and increases the spasm and rigidity of the muscles; it is far better to flex the joints and relax the affected muscles.

At any rate, it is well known that treatment by acute inversion and adduction of the foot is apt to be disappointing, in that the deformity occurs as soon as the controlling plaster is removed. I suggest that immobilization in the everted position is more physiological, and, having tried it, I find that it really is more successful. In mild unilateral cases it may be permissible to let the patient continue to go about; but he must use crutches, so that no weight at all is borne on the affected foot. In all bilateral cases and in all severe cases confinement to bed is essential. I believe that a month's rest in bed is the best start for the treatment of any case of acute spasmodic valgus, and it is sufficient treatment, without anything else, for many of the milder cases.

I cannot see that manipulation has any logical basis in the treatment of this particular form of flat-foot, though it is of great value in other forms, notably in cases with pain due to adhesions. (I have already commented on the unfortunate confusion, in textbooks and in much of the current literature, of the two distinct forms of "rigid flat-foot.") In the few cases of true acute spasmodic valgus in which I have seen manipulation tried it has failed completely.

As a general rule not less than six weeks' fixation in plaster-of-Paris is needed to bring about lasting relief of the eversion spasm, and in severe cases, especially among the older boys, eight weeks' fixation is better. When the plaster has been taken off, weight-bearing must be very cautiously resumed. Usually it is wise to make the patient use crutches at first; then gradually more weight can be borne on the foot, with the aid of two sticks, and then of one. Passive movements of the foot are contraindicated, though the use of heat as a sedative may be recommended; the whirlpool bath may be used, or, in the home, simple soaking in a pailful of hot water, before exercise. Inside wedging of the sole and heel of the shoe is a wise precaution, and in severe cases showing a tendency to relapse it is well to make the patient use an outside steel and inside wedge and T-strap for a year or so.

Conclusion

I would here like to suggest that much useful information upon this difficult subject might be obtained if it henceforward became a routine practice to determine the blood sedimentation rate in these cases. Latterly I have been doing this, but my results are too few to be significant. I may say, however, that they seem to show that in at least half the patients there is no element of infection at all. These are probably the cases in which the eversion spasm is simply the result of mechanical strain, acute or prolonged, including all the cases of developmentally weak feet exposed to arduous conditions.

Finally, let me give one word of warning. In every case of acute spasmodic valgus it is worth while to have a special oblique radiograph of the foot made, to eliminate the possibility of calcaneo-navicular fusion. This developmental peculiarity usually gives rise to persistent rigid flat-foot, without spasm, but it may cause typical spasmodic valgus with tense peroneal tendons. It is evident that no improvement can result from antispasmodic treatment in such a case. Unless the true cause of the symptoms and signs is realized, as the result of a routine x-ray examination, time will be wasted on futile treatment, for the condition demands a skeletal operation.

Summary

The phrase "spasmodic flat-foot" connotes a familiar condition which is well defined clinically, but the pathology of which is still obscure.

A description is given of a characteristic case.

The incidence of the condition is assessed, and the aetiology and pathology are subjects of review.

Treatment consists in eliminating the cause of the spasm, not in treating the spasm itself. When the patient's occupation exposes the feet to a strain which they are unable to withstand, it is imperative that the occupation be changed.

Insulin Hypersensitivity.—Two patients with strong local reactions after insulin injections were proved to be allergic to insulin by the passive transmission of the hypersensitivity in the Prausnitz-Küster test. One of the patients was desensitized by protamine insulin. The other one proved to be sensitive to insulin from the calf, pig, and ox, but not to beef protein from other organs or to ox serum, which suggested hypersensitivity to the insulin protein. Skin tests with insulin should be performed in diabetics before starting insulin treatment.—K. Herzog (1939): *Zeitschrift für Klinische Medizin*, **136**, 297.

TREATMENT OF LEG FRACTURE CASUALTIES IN A CENTRAL CHINA WAR ZONE

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Most established hospitals and surgical units working in war areas in China have been called upon, during these many months of hostilities, to deal with the greatest variety of military and civilian casualties. Among the former, who are forwarded from the various fronts, and the latter, who are bomb victims from the local community, few wounds present a greater problem than those which involve the long bones of the lower extremity. As a result of the difficulties of transportation, hospitals handling military casualties have been receiving many compound fractures of the femur or the tibia and fibula which are not only grossly infected, with great destruction of tissue, but show extensive overlapping of fragments with associated muscle shortening. Such cases have often been transported over most difficult country, where there is no system of roads and where the nearest unit adequately equipped to deal with them is one, two, or even three days behind the lines. Among civilian hospitalized bomb casualties this group of fractures has been proportionately large, possibly because of the very heavy immediate fatality of wounds of the head, chest, and abdomen. These cases, again, very commonly show great destruction of tissue and extensive comminution.

Method of Splinting

It has been just these types of leg wounds which this hospital undertook to handle in as large numbers as ward space would permit. There has therefore been ample opportunity to try to develop a method of splinting which will provide the necessary extension and fixation, and at the same time leave the large wounds easily accessible for frequent irrigations and dressings. We have found that these cases needed a splint which would not only be comfortable for many weeks of application but was such that the patient could be easily moved for safety during air raids. Furthermore, and in some ways most important, we needed a splint that was inexpensive and one that could be made by the local metal workers, as there are no instrument makers or supply houses to turn to in Central China.

As a basis for the method which we have developed the simple Thomas extension leg splint was chosen, with or without the Pearson knee-flexion piece. No other splint has in our opinion been of more general use, and it can be easily made, stored, and distributed. We had thoroughly tried most of the commoner methods of extension which utilize applications such as adhesive strapping or plaster boots, and those which use callipers, extension stirrups, or wires, but had encountered certain difficulties. We were not always obtaining the extension force required; there was so often insufficient skin to apply surface traction; the wounds were not easily accessible; the patients suffered considerable discomfort, especially when it was necessary to shift them quickly for air raids; and, finally, the wards were a virtual forest of frames, ropes, pulleys, and sand-bags. The last-mentioned difficulty, quite apart from the vigorous objections of the nursing staff, was made very apparent when the weeks of intense heat set in and adequate ventilation in the crowded wards was most difficult to maintain.