

increase the retention of heat? I wish Dr. Varney would tell us of any observation he may have made on that. Also whether a dry skin, which is so annoying, is due to a retention of heat or to interference with the nerve mechanism. I wonder whether he has any evidence to guide us in the use of the shampoo in these cases, as to whether the soap and water have anything to do with the production of oil or whether the active massage is the factor of most importance.

DR. C. A. SIMPSON, Washington, D. C.: I should like to ask Dr. Varney if senile atrophy of the skin does not play a large part in hypo-activity of the sebaceous glands. Most of my patients, excluding those with xerodermatous lesions, who suffer from dry skin are over 35 years of age. They have a thin, atrophic skin, prominently visible blood vessels, and other signs of cutaneous atrophy, such atrophy being more conspicuous on the extensor than on the flexor surfaces. I agree with all that Dr. Varney says, but I believe that senile atrophy of the skin (not necessarily in a senile person) is very often the primary lesion. The lessened activity of the sebaceous glands and their final atrophy simply share in the general and primary cutaneous atrophic process seen in some patients at a relatively early age.

DR. HENRY R. VARNEY, Detroit: In classifying oil deviations, I have arranged them in two general classes—the excess and the insufficient. The excess is manifested at the age of hyperactivity of all glandular functions. The excessively oily skin is caused by the constant attempt of the patient to remove the oil by frequent use of soap, thereby stimulating and liquefying the oil plug.

The less frequent use of soap will clearly demonstrate this fact through prompt reduction of the amount of oil. We must entertain the varying effect which water has on the skin owing to the great difference in its softness in different sections. The water supply of the lake sections of the United States is treated chemically for disinfecting purposes, and these chemicals have a decidedly drying and roughening effect on the skin because of their direct action on the normal oil of the skin. The people who are taught to bathe daily and use soap freely can carry on such a toilet without discomfort during the summer months, but during the winter months many adults have insufficient oil and through frequent bathing render the skin rough and dry and more susceptible to itching dermatoses. I do not think that I can answer Dr. Hare's questions, but it is a fact that oil does assist in retaining and equalizing body heat. The senile atrophies are a different condition from the congenital ichthyoses. We have to rely on oil, not only for protection and cleansing purposes, but for comfort, and patients with beginning senile atrophies, with the pigmented patches and the roughening, which appears later, of the epithelial layer with ulcers, etc., could be given much comfort and protection from all outward irritation and perhaps carcinoma later by a proper amount of protective oil.

AN OPERATION FOR "CLAW FOOT" *

RUSSELL A. HIBBS, M.D.

Professor of Orthopedic Surgery, Columbia University, College of Physicians and Surgeons; Surgeon in Chief, Orthopedic Hospital

NEW YORK

The term "claw foot" is generally accepted to mean a foot with exaggerated arch, prominent metatarsals and hammer toe, with corns on the toes, and callosities on the sole of the foot over the distal end of the metatarsals.

The cause of this deformity may be either a limit to dorsal flexion, or an impairment of the intrinsic muscles of the foot from paralysis, or both.

In cases in which there is only a limit of dorsal flexion—"muscle bound feet"—especially in children, a marked change in the position of the tarsals, metatarsals and toes may be prevented from developing by a restoration of freedom in dorsal flexion. In cases in which a gross change has taken place in the position of the tarsals and metatarsals, with shortening of the plantar structures, exaggerated arch and hammer toe, a much more complicated problem is encountered. The shortening of the plantar structures accentuates the effect of the common extensors in deforming the toes, and the hyperextension of the toes accentuates the shortening of the plantar structures.

A study of many roentgenograms of such feet shows that this deformity takes place chiefly at the articulation between the astragalus and the scaphoid. The relation between the cuneiform and cuboid and the metatarsals is very slightly changed, if at all.

In these cases there may

appear to be, on account of the exaggerated arch, a displacement downward of the os calcis, but such is not the case. The upper half of Figure 1 is a roentgenogram of an approximately normal foot; the lower half of Figure 1, one of a markedly developed claw foot—it shows at what point the deformity takes place.

In these cases, therefore, there are two problems to be solved: first, the correction of the exaggerated arch, and second, the removal of the deforming power, on the toes, of the common extensors, at the same time making more direct and effective their function as

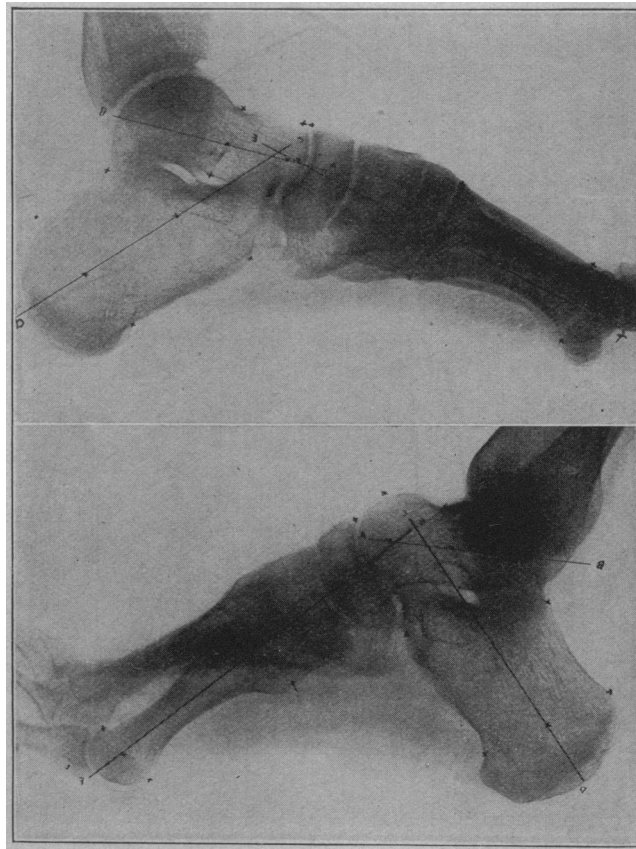


Fig. 1.—Comparison of normal foot (above) with claw foot (below), showing exaggerated arch of the claw foot and elevated toes: A-B, axis of astragalus; C-D, axis of os calcis; E-F, axis of navicular, internal cuneiform and first metatarsal. Compare angle made by D-C and E-F in upper figure with the angle made by A-B and C-D in the lower. The comparison shows that the deformity is caused by the dropping down of the front foot at the mediotalar joint.

* From the service of the New York Orthopedic Hospital.

* Read before the Section on Orthopedic Surgery at the Seventieth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1919.

dorsal flexors of the foot, which has been lost because of the deformity of the toes. Elongating the plantar structures, by separating them from their attachments to the os calcis, makes possible the correction of the exaggerated arch by elevating the foot anterior to the astragalus.

The second problem cannot be successfully met without destroying completely the power of the common

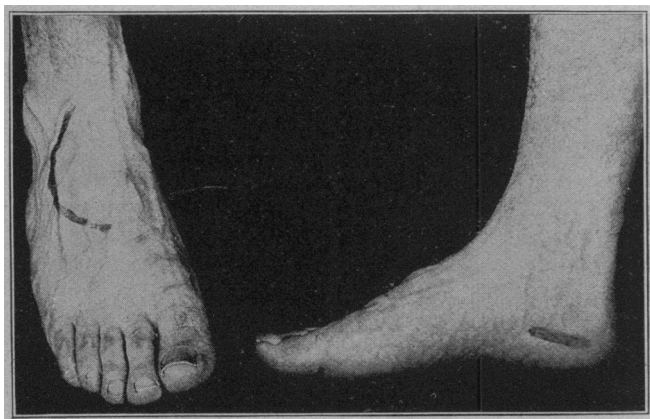


Fig. 2.—Lines of incision.

extensors to extend the toes and transferring their attachment to a point in the foot which will insure the most powerful and direct exercise of their force in elevating the front foot at the mediotarsal articulation and in dorsal flexion at the ankle joint. This may be done by the division of the common extensors and the insertion of their proximal ends into the external cuneiform bone. This point of attachment is selected because it will insure the exertion of their force in elevating the front foot, and in serving as direct and positive dorsal flexors of the foot at the ankle joint. In most of these cases, there is some degree of inversion of the foot, and the attachment of the common extensors at this point such as that described insures correction of the inversion. In those cases in which there is also any serious degree of limitation of dorsal flexion at the ankle joint, subsequent lengthening of the Achilles tendon may be necessary.

After the usual preparation of the foot, an incision $1\frac{1}{2}$ inches long is made internally through the skin and subcutaneous tissue over the os calcis, and with a periosteal elevator the plantar structures are separated from their attachment to the bone. The suggestion for this feature of the technic is from an article by Steindler.¹ With the exercise of force the front foot is elevated, the exaggerated arch corrected, and the position of the metatarsals improved. Second, through a curved incision, 3 or 4 inches long, on the dorsum of the foot to the outer side of the median line, the common extensor tendons and the internal cuneiform bone are exposed (Fig. 2). The tendons are divided low down, and their proximal ends pulled through a tunnel in the external cuneiform bone, and held there by a suture of forty-day chromic catgut. Subcutaneous tissue is closed by plain catgut, and the skin with ten-day chromic gut.

1. Steindler, Arthur: *Operative Treatment of Pes Cavus*, Surg., Gynec. & Obst. 24: 612 (May) 1917.

The foot is then put in plaster, with the metatarsals in corrected position and the toes straight, with a thick felt pad under the sole. The plaster is worn for five weeks, when it is removed daily for exercises and massage. After seven weeks, the patient is permitted to walk without plaster, though massage and exercises are continued for six weeks longer.

The importance of not lengthening the Achilles tendon at this time is obvious; its resistance is a great aid in correcting the cavus. As has been indicated above, the Achilles tendon may be lengthened, if it seems necessary, after six months.

Our first operation for clawfoot was performed, April 24, 1917, and since then nineteen others have been performed: in fifteen cases, on one foot, and in five cases, on both feet. Operations, therefore, were performed on twenty-five feet, all at the New York Orthopaedic Hospital.

A sufficient length of time has elapsed in all of the cases referred to here, and especially in the earlier ones, to permit a fair estimate of the result. In every instance there has been shown a definite amount of improvement, and the effect of the common extensors' acting from their new point of attachment has been conspicuously shown to enhance their power in elevating the front foot, and their power as dorsal flexors at the ankle joint.

Figures 3 and 4 are photographs taken before and after operation in the case of a boy, aged 12, with a single claw foot, and are fairly representative.

It seems unnecessary to publish in detail a report of each case, as there have been no complications, and no failure of the tendons to hold in any case; nor has there been any reappearance of the deformity of the toes, nor any impairment of their control, as their control is sufficiently maintained by the short extensors.

ABSTRACT OF DISCUSSION

DR. BENJAMIN P. FARRELL, New York: I agree with Dr. Hibbs. The results from this operation are very satisfactory, and it was a surprise to me to find where the deformity took place. It was my opinion that the deformity was between



Fig. 3.—Claw foot of a boy, aged 12, before operation.

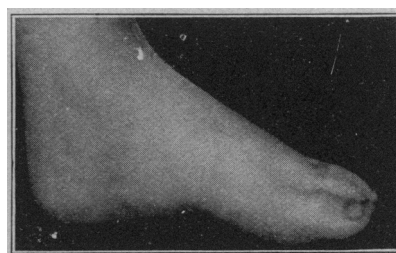


Fig. 4.—Same foot as in Figure 3, after operation.

the tarsal and metatarsal joints. The procedure gives very satisfactory results.

DR. FRED S. WILLIAMS, Bridgeport, Conn.: I wish to report two cases in which I followed the technic of Dr. Hibbs. One patient was a man, 23 years of age; and the other was a girl, 16 years of age. The results in both cases were as satisfactory as those described by Dr. Hibbs. If the Achilles tendon is lengthened, this condition should be corrected. In many cases, the tendon is not short, but merely has that appearance. This should not be overlooked.

DR. JOHN PRENTISS LORD, Omaha: I have been undertaking to cure these feet by separating the tendons from the toes, and preserving just as much of the length as possible,

boring holes through the heads of the metatarsals and putting the tendons through the holes, making a half hitch of the tendon, and usually suturing it. The results of the operation have been very gratifying; although it must be considered that in some persons, particularly in adults, the deformity is so extreme that a perfect foot cannot be hoped for. I have been undertaking, however, in some cases, to improve this badly shaped foot by doing a cuneiform osteotomy through the navicular region and removing as much bone as may be necessary in order to reshape the foot. That procedure has proved most effective in relieving the deformity and meeting, as far as may be, the other mechanical and functional conditions. It may be said in criticism of doing so radical a procedure as cuneiform osteotomy in adults, that the subjects are subsequently disabled for a considerable length of time, from three to four months or more.

DR. JOHN RIDLON, Chicago: I have done the operation advised by Dr. Lord, which, I understand, is the procedure devised by Dr. Sherman of San Francisco, in many cases, and have never found it of much use. I have been accustomed for many years to lengthen the dorsal tendons of the toes by tenotomy at the first operation, holding that lengthening by putting the foot in plaster of Paris for long periods, and then doing a second operation, the cuneiform operation advised by Dr. Hibbs. I think that is the only operation that will give a permanent result in these bad feet. In feet that are not very bad, many things can be done that will be satisfactory; but in bad cases in adults, the only thing is to destroy the deformity in the way mentioned by Dr. Hibbs.

DR. EDWIN W. RYERSON, Chicago: This work is, of course, a modification of the work originally done by Sherman of San Francisco, and published a number of years ago, in which the extensor tendons were fastened to the distal ends of the metatarsal bones. It is efficacious, if done well. The only way to do it successfully is to loosen the plantar structures at first. It is also well to destroy the astragalonavicular joint. Make an arthrodesis there. These cases are very numerous. It has been a constant surprise to me to find how many women and men have a hollow clawfoot. There is also apt to be an inward deviation, as Dr. Hibbs states. The one mistake is to think that there is a shortening of the Achilles tendon. As the pictures show, the posterior part of the os calcis is more apt to be dropped than raised. It was a pleasure to me to see the demonstration of the deformity that I had always considered to be a dropping of the metatarsal bones, but Dr. Hibbs has shown that it is at the astragalonavicular junction that the deformity occurs. The detail of whether we use silk or something else is unimportant. We must force the toes down into complete plantar flexion. If we do not, we shall be chagrined to see how dorsiflexed they will become after a while, and how rigidly they will persist in that position.

DR. JAMES W. SEVER, Boston: I think that it would be interesting if Dr. Hibbs, in closing the discussion, would give us some idea of the etiology of the cases. I believe that they represent what we have known as the nondeforming Shaffer clubfoot. At the Children's Hospital, in Boston, we have been operating on a number of these patients, but by no means doing as well as Dr. Hibbs has done. We have been using the extensor longus hallucis, transplanting it into the head of the first metatarsal. In view of what Dr. Ryerson has said, if you do an arthrodesis at the astragalonavicular junction, provided you get a loosening of the plantar fascia, I do not see the use in transplanting the tendons.

DR. SAMUEL W. BOORSTEIN, New York: We must remember that many cases of clawfoot are really due to spastic paralysis. It seems to me, therefore, that Dr. Ryerson's suggestion of destroying the joint at the astragalonavicular articulation is practical. If this is not done, the spasm of some muscles may cause a recurrence of the deformity. It is well to relieve the spasm of the muscles by the transplanting advocated by Dr. Hibbs and also destroy the joint, combining the two procedures.

DR. RUSSELL A. HIBBS, New York: In reply to Dr. Sever's question, as to the cause of this condition, there are two classes of cases: one, in which there is simply a limitation

of dorsal flexion in early life. The other class consists of cases with paralysis, perhaps poliomyelitis, probably undetected, as many cases have been; or perhaps the spastic form of paralysis. The whole point of my paper, if it had one, was that in the first class of cases the removal of the limit to dorsal flexion may prevent the development of the deformity and that in the second the performance of this operation earlier will prevent the necessity of an arthrodesis. I have operated on ten or twelve adult feet, and in all there has been a distinct improvement. I am not prepared to say whether I should have done an arthrodesis also or not; but if we can avoid doing that, at that articulation, it is most important to do so; for this articulation is important in maintaining the flexibility of the foot.

DR. JOHN L. PORTER, Chicago: I have been waiting to hear Dr. Hibbs tell us the advantage that his operation has over Sherman's operation which we have been doing, and he has failed to do that in his response.

DR. HIBBS: In my paper I said that that bone was selected for two reasons. One was that by attaching these tendons to the external cuneiform bone, you get a direct pull from these tendons at a concentrated point, as elevator of the front-foot. In the second place the inversion is corrected.

DR. ELLIS W. JONES, Los Angeles: We have studied a number of these cases and find that about 30 per cent. have an occult spina bifida. The remaining 70 per cent. of the cases of claw foot are due to infantile paralysis or spastic paralysis; but I think this etiology of spina bifida has a very definite place in claw foot.

A CONSIDERATION OF SOME OF THE PROBLEMS PRESENTED BY AMPUTATIONS*

CLARENCE L. STARR, M.D. (TORONTO)
Lieutenant-Colonel, C. A. M. C.

OTTAWA, ONT.

Apart altogether from the psychologic factors pertaining to amputation cases, the desire of some to stay indefinitely in comfortable quarters, the effort of some to get all that is "coming to them," the anxiety of others to secure a "square deal," the personality of the individual, and other similar difficulties that will not be considered in this paper, the chief problems relate themselves to (1) the stump and (2) the artificial appliance to be used as a substitute for the member lost.

Up to the present time we have had slightly more than 3,000 amputations to deal with in the Canadian army medical corps.

The policy of the government has been to treat all amputation cases in a central depot, and to supply them with artificial limbs from a government controlled and operated factory in the same center, with subsidiary plants, to take care of alterations and repairs, in strategic points in various military districts of the dominion. The central treatment depot is at the Dominion Orthopedic Hospital, Toronto, and the limb factory is adjacent.

I am related to these two institutions as consultant and adviser, and therefore have had an opportunity seldom given to one person to study these cases, and to become acquainted with the problems presenting themselves.

AN IDEAL STUMP

An ideal stump might be defined as one the length of which will best permit the instrument maker to fit

* Read before the Section on Orthopedic Surgery at the Seventieth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1919.