ON CERTAIN GRAVE EVILS
ATTENDING
TENOTOMY,
AND
ON A NEW METHOD OF CURING DEFORMITIES OF THE FOOT.

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BEFORE the year 1832, when Stromeyer realised the safety of subcutaneous division of tendons and muscles, the treatment of all deformities of the foot was simply mechanical; the individual exceptions being too few to influence this statement. But since the almost total absence of injurious inflammations in subcutaneous wounds has been clearly and practically established, tenotomy has been the one great resource in all such cases. The rapid effects of these operations must always give them a certain brilliancy and attraction, yet, in my opinion, they frequently produce lameness, less apparent, perhaps, but certainly more in-
rable, than the original disease.

In the purely mechanical treatment of distorted foot from excessive muscular contraction, which the use of the tenotome has superseded, it was found that the mere *lateral* twist could be overcome without any great difficulty, while the most obstinate distortion was the exaggerated extension of the part. The *pes equinus* could hardly ever be cured; *equino-varus* was, *cæteris paribus*, obstinate in a direct

proportion to the amount of the extension. That is to say, the difficulty of overcoming a contracted muscle is, other things being equal, in a direct ratio with its size and strength.

At the present time the treatment of pes equinus is, above all others, simple in its performance, and happy in its results. The restoration of all those other deformities in which extension mingles is also greatly assisted by annihilating that overaction of the gastrocnemius, to which much of the inward twist of the foot in equino-varus is attributable. But this last-named deformity is now treated by division of four tendons, at least—the tibialis posticus, the flexor longus digitorum, the tibialis anticus, and the tendo Achillis, and frequently also of the plantar fascia. A very similar treatment is inflicted on valgus. “The peronei tendons are to be divided, or together with them those of the extensor longus digitorum and the tendo Achillis, and also those of the tibialis anticus and extensor proprius pollicis.” Can we be surprised that after this “there is difficulty in continuing efficient support to the arch of the foot; and even after the arch has been restored support is required during many months?”

But, besides the cases which arise from excessive action in one set of muscles, there are others which have their origin in partial or total paralysis or in debility of certain other muscles. If, in such instances, it be endeavoured to restore the balance of the limb by dividing the tendons of the still active muscles, the consequences are very disastrous; but even orthopædists do not often now, I believe, tenotomize such cases, although no more efficient apparatus than the old jointed iron and Scarpa’s shoe appears to be employed in that special practice.

Now, the difficulty of overcoming a contracted muscle being, as I have already remarked, in exact proportion to its strength, it follows that it is most difficult, or, indeed, all but impossible, to overcome the sural muscles, those attached to the tendo Achillis. Hence division of that tendon is a most valuable, an all but indispensable, resource in all deformities of the equinal or extended varieties; and it happens

that the tendon is so situated and surrounded, that not only is its division, but also its reunion, extremely easy. So remarkably is this the case, that it requires a diligent application of ignorant management to produce a non-union of this tendon. But are the other tendons, whose section is so constantly performed, thus easily reunited? This question occurred to me rather more than four years ago, when I was struck by observing on a patient, who had long before been freely tenotomized *secundum artem*, that several movements of his foot were very feeble and uncertain. Since then it has fallen to my lot to see several feet in the same circumstances, both as to apparent cause and effect, but the full solution of the question only presented itself about a year ago.

There are four experiments on dogs performed by M. Bouvier, and reported by him in the 'Bulletin de l'Académie Royale' (t. viii, pp. 115-17), in the year 1842. He divided subcutaneously the flexor carpi ulnaris and radialis, the flexor digitorum sublimis and profundus; in one case all of them, generally two or three only. In no one instance did the subcutaneous wound reunite so as to restore the use of the parts. In one experiment the two divided tendons did not unite at all. In another, all the severed ones were massed together, thus destroying their normal action; and in two instances, besides this latter condition, the new tissues bound the tendons firmly to the bone, so as utterly to annihilate all muscular action. This last event was found also in an experiment by M. Bouley. Thus we have five experiments of division of some tendon other than the tendo Achillis, with the result in every case of destroying the action of the muscle.

It may easily be averred that experiments on animals cannot be relied on as proof of what happens in man. Post-mortem examinations after tenotomy, moreover, are not common; but Mr. William Adams has been able to gather together, in his book on the 'Reparative Process in Human Tendon,' the results of thirteen autopsies. In this number there are six in which the tendo Achillis only was divided, a tendon which should never do badly. There are, therefore, seven cases, in which other tendons were also divided; and

in every one of them one or more of the severed tendons is either not united at all or is adherent to the bone or surrounding parts, so as to abolish the action of the muscle. In no one instance, in which the tibialis posticus and flexor longus digitorum, one or both, were divided, did they so unite as to be of the slightest use, while the tibialis anticus is more exposed to extinction by non-union than by false union. Now, these are the only accounts of examination in the human body of the actual effects of tenotomy upon tendons other than the tendo Achillis. The results are confirmed by experiment. What conclusion is to be drawn from them but that such muscles as the tibialis posticus, flexor longus digitorum, and probably also the peronei (which are similarly placed behind the leg-bones), might as well be struck with sudden and irremediable paralysis as be subjected to the knife of the tenotomist; and that, moreover, other tendons—those in front of the foot—are only a little better off in this particular? Under such circumstances the phrase made use of at the commencement of this paper—that tenotomy frequently produces lameness, less apparent, perhaps, but certainly more incurable, than the original disease—is, I hold, fully justified.

Analysis of Mr. Adams' seven cases of Autopsy in which, during life, tendons other than the tendo Achillis had been divided. (The cases are numbered in accordance with the original.)

No. of Case.	Tendons divided.	Results observed.
I.	{ Tendo Achillis Tibialis anticus	Non-union of tibialis anticus.
II.	Left { Tendo Achillis Tibialis posticus Tibialis anticus Flexor longus digitorum	Non-union of tibialis posticus. Non-union of flexor longus digitorum.
	Right { Tendo Achillis Tibialis anticus	
III.	{ Tibialis anticus Tibialis posticus	Union of posterior tibial to the bone.

No. of Case.	Tendons divided.	Results observed.
IV.	{ Tibialis posticus Flexor longus digitorum	Union to adjacent parts. No union ; held together by shreds of sheath to which also other tendon adhered.
V.	{ Tendo Achillis Tibialis anticus Tibialis posticus Flexor longus digitorum	Tibialis posticus and flexor longus digitorum adhered together and to the bone.
VI.	{ Tendo Achillis Tibialis anticus Tibialis posticus Flexor longus digitorum	Tibialis and posticus and flexor longus digitorum adhered together and to the bone. Ends of tibialis anticus hung together by shreds of sheath.

In the five next cases the tendo Achillis only was divided.

XII.	{ Tendo Achillis Tibialis posticus Flexor longus digitorum	Non-union of tibialis posticus. No retraction of flexor longus digitorum.
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After this scrutiny into the effects of tenotomy we come to another inquiry. Cannot most cases, in fact, nearly every case, of talipes, be reduced without division of the tendons in question? Dr. Little, in some papers on "Unnecessary Orthopædic Operations" ('Lancet,' 1857), after saying that "in London indiscriminate operation is the rule," gives certain signs whereby the necessity or non-necessity of operation may be ascertained ; but he speaks of tenotomy generally, including the tendo Achillis. If, however, we grant the propriety of dividing this tendon, the signs which might justify further operation must be, after what we have just seen, excessively severe. Let me, for instance, again refer to Mr. Adams's book, to Case 3 on his list. In the right foot of that unfortunate patient an attempt had been made to divide the posterior tibial tendon, and my friend Mr. Adams says—"Now, as this tendon was supposed to have been divided, and the case had proceeded as favorably as if it had been divided, it would," &c. "But the view I am disposed to take is, that the tendon never was divided."

Now, Mr. Adams filled for many years, with credit to himself and advantage to the school, the post of demonstrator of morbid anatomy at St. Thomas's Hospital, and probably knows as well as any man the appearance of a divided tendon. But what an extraordinary fact does that sentence disclose! We have only six cases of post-mortem examination after section or supposed section of the posterior tibial tendon, and in one of these instances the tendon was *not* divided; yet the deformity was reduced with such ease that the orthopædist supposed it had been cut. Now surely we may question how many of the cases in which the tendon was really divided would have done as well without such severance. Would a sixth have done as well—or a half—or would five sixths have "proceeded as favorably," with the additional advantage of retaining some use in the muscle?

We may not have quite sufficient data at present to determine the exact proportion, but at all events we have sufficient to show that, under the circumstances which I have endeavoured to portray, the tendons in question should never be divided, except in the very rare cases in which *no other* means will succeed in reducing the deformity. Therefore we must return to mechanical treatment for the elongation of those muscles whose size renders this possible, and which have tendons so placed as to cause their section to be destructive of muscular action.

All the best forms of instrument hitherto invented act on the principle of confining the foot in a shoe or *sabot*, which, by springs of various shapes and materials, bend or twist the limb in a direction contrary to that of the deformity. There are several grave objections to the application of force through the medium of a shoe—the impediment thrown in the way of walking, the pressure on the limb, &c. But the greatest inherent and insurmountable defect is that the antagonistic force is not applied in the delicate and discriminative manner employed by nature; the foot is treated as a clumsy whole, to be twisted inward or outward upon a stiff turnboard, to which it is bound

for the purpose. Let me explain this a little more fully. The foot consists of twelve bones (leaving out the toes), to every one of which muscles are connected. Even when not attached, these muscles or their tendons glide through grooves or over surfaces of the bones, and strongly influence their position and movement. The balance of the different parts of the foot is kept up by the equalised antagonism of the muscles. Deformity is produced by the predominance of one set, whether it arise from excess of power in the prevalent muscles or deficiency in their opposers. Let us take as an example the fibular group, and consider how the long peroneus crossing the foot almost transversely at the base of the metatarsal bones not only keeps the outer side properly raised, but also draws the front half of the foot outwards; in this latter action it is greatly assisted by the peroneus brevis, the two together antagonising by peculiarity of position the more powerful anterior and posterior tibial muscles, whose action is to drag the inside of the foot upward, and to bend its anterior half inwards upon the posterior. Now, when these fibular muscles are deficient, the loss of their beautifully adapted action allows the production of varus; when they overmaster the others, valgus and flat foot are established. The shoe is clumsily designed to replace the subtle interaction of these muscles by fixing the limb in a rigid case, and twisting it inward or outward, dealing with it as a single whole, and not as a construction of many well-fitting parts.

In fact, however, when any of these constituents change their position, and thus the whole foot its form, the only rational indication is to use some means of supplying the overbalanced muscular power *in its proper place and direction*, until the organs themselves regain their due force; and this latter can only take place when *the foot is allowed its liberty*. I believe myself to have fulfilled these indications by the following method, which, though simple in itself, is difficult to describe. The only necessary apparatus is strapping-plaister;¹ a piece of tinned iron about an inch

¹ Emplastrum resinæ, spread on stout twilled calico.

broad, as long as the patient's leg, and provided at its upper end with a wire loop; a few india-rubber springs of $\frac{1}{4}$ -inch cord of various lengths, and furnished at each end with a steel hook; and some eyelets, with the pincers for fixing them.

First, a piece of the plaister is cut into a trapezoid form, in such wise that its broadest part, adherent to the sole and side of the foot, shall follow with considerable accuracy the course and insertion of the weakened tendon. The narrower part shall lie on the side of the foot, a little before or behind one or other of the malleoli, as the case may be: it is not to adhere, but to be folded on itself with the sticky sides together, and through the double thickness an eyelet must be inserted. The foot must now be held by an assistant as nearly as possible in the normal position, and be evenly strapped from the toes backward, leaving out the ends into which the eyelets are driven. By these first-named pieces of strapping the insertion of the muscle or muscles is represented. (See Plate I, fig. I.)

We now turn to the *leg*. A piece of strapping rather broader than the tin, and three times as long, is made to adhere over the defective muscle, from its origin to just above the ankle-joint, the superabundant length hanging loose below. Over the plaister which covers the muscle is placed the piece of tin, roughly moulded to fit the surface, and padded at its lower end with a little cotton-wool. The additional length of strapping is next turned upward over the tin. The leg is then to be smoothly strapped, in continuation with the circular strapping on the foot, from the ankle to just beyond the upper end of the tin, care being taken to leave the wire-loop uncovered. There is still an additional length of longitudinal plaister, which, for security, may be brought down and made to adhere outside the circular pieces. Now it will have been perceived that the arrangement of the longitudinal piece of strapping is as follows: it first adheres to the skin of the leg, then forms a loop sustaining the lower end of the tin; thence it runs up with its sticky side outwards

and adherent to the inside of the surrounding strips ; lastly, for more security, it turns down over the last circular piece, its inner side adhering to the outer surface of those strips. Thus we have at the upper part of the leg a fixed point, the wire eye supported through the medium of the tin by a loop of plaister, which takes its bearing in such a manner that no constriction of the limb can be produced, whatever downward force be exerted upon the wire. Now it is only necessary to choose an india-rubber spring of such length as to produce the right amount of tension, and to fix one of its hooks in the wire loop, and the other in the eyelet which was let into the plaister on the foot. (Plate I, fig. II and III.)

By the tension of this india-rubber we can assist any one muscle or muscles in their action on the foot, making them adapt themselves to a normal posture in an active condition. If we wish to supply two muscles, *e.g.*, the tibialis posticus and anticus, two tins and two wire loops are as easily fixed as one. But a little difference must be observed in supplying the peroneus longus and brevis. These run so equally and closely on the leg that one wire loop suffices for both ; but below the fibula they make a bend of a little more than a right angle, and we cannot, as is the case with other and less crooked tendons, produce the necessary change in the direction of the force by the trapezoid shape, and the adhesiveness of the strapping. That which represents these tendons must be laid on the outside of the foot, nearly as far forward as the root of the toes, and to its eyelet must be fixed a piece of catgut, which in passing to the spring runs through a little metal block, thus constructed. An eyelet is nipped by the proper pliers as though for fixing it, but without fastening it to anything ; this is to act as a pulley. It is tied, not too tightly, by a piece of wire to a hole at the lowest part of the front edge of the tin. Of course, the catgut running through this barren eyelet bends at an angle, which can be made precisely to imitate that of the tendon. In these cases, the

tin should be passed into a slit in a piece of the strapping going round the leg, so as to resist the slight tendency forward. (Plate I, fig. IV and V.)

It appears to me that this paper has already reached the limit which it is desirable not to overstep, but it must be permitted me to say a few words on the application of this principle. A case of varus is to be treated by supplying force to the two peronei muscles; it is better to use a spring for each muscle, and the amount of traction should be distributed between them, until the due balance is obtained. On the other hand, valgus is treated by giving greater effect to the anterior and posterior tibials; in severe cases to both, in milder cases to the former only. Two tins and two wire loops should be used, except in the case of infants, when one tin, broader above than below, and one broad loop will suffice. The common and very inconvenient deformity called flat-foot may be conquered in a week or two by supplying power to the tibialis anticus, and the treatment relieves the patient of pain so completely that one who limps to the surgeon will walk away upright and freely. Nothing has struck me with greater astonishment than to observe that tenotomists counsel the division of this tendon; for this muscle, above all others, is that which by lifting the inner cuneiform and metatarsal bones from the ground, keeps up the arch of the foot, and aids in preventing the outward twist of valgus, which is always more or less present in flat-foot. One reads in books that this painful affection is produced by relaxation of the ligaments, although it is well known that the ligaments are merely secondary assistants to the muscles, and that their yielding is only an effect, and not a cause. Even the elongation of the plantar fascia is in these cases simply a sequence of muscular debility.

In equino-varus or equino-valgus, it may be necessary to divide the tendo Achillis, but only when the extension is severe and well marked; otherwise the treatment should be undertaken for the other tendons, as though no equinal deformity were present.

In treating an infant, very little force is required, certainly less than when a *sabot* is used, since it is applied in the normal direction. During the first few hours, it is well to apply less force than is intended to be used in the subsequent treatment. I have never found the amount of pressure influence the growth of the bones. If the child be old enough to walk, he should be encouraged to do so as soon as the treatment begins to have any effect on the posture of the limb; since the weight of the body will then aid in the cure. This is further advisable for the following reasons. When deformities are treated by irons and shoes, which confine the bones of the foot, the muscles remain inactive, and merely contract to their new position in a passive manner; such distortions, when the limb is again used, are very apt to return. To combine exercise with the treatment above indicated increases the muscles; they accustom themselves to activity in their new relations; when the apparatus is discontinued, the deformity has no tendency to return. Lastly, the faulty posture must be somewhat reversed, and the patient encouraged to walk with the foot in its new position before the treatment is finally abandoned.

I subjoin a short account of my cases.

Case I.—Jane Evans, æt. 10 months, was brought to me at the Charing Cross Hospital with a non-congenital varus of a somewhat severe description, January 18th, 1861.

It appeared that a little less than a month previously the child had had some fits, and that the foot then seemed turned a little; that nine days ago she had a more severe fit, and then the foot became worse. Some *arnica*, ordered by a homœopathic practitioner, had not produced any marked effect.

There was a strong bend in the middle of the inside of the foot, and the line of the toes was rather perpendicular than horizontal. There was also a great projection of the cuboid.

I dressed the limb in the manner described for supplying the long and short peronei. The application of the spring to the strap which represents the long one, had a marvellous effect in turning the sole down and unfolding the medio-tarsal bend ; the influence of the other was less marked, but still effective.

January 23rd.—The foot is more changed in shape than I had expected it ; the mother was obliged to take off the spring during the first night or two, but not afterwards. The leg has been washed and rubbed for some time ; there is a little abrasion under the end of the tin. I dressed the limb again with a little pad of lint over the abraded part, and applied a little more power.

30th.—Foot a good deal better in form ; the first night the spring being tighter was taken off, to give the part rest, but after that time it was not found necessary to remove it.

March 19th.—The history of this case consists simply in a constant gradual improvement ; the child is now very nearly a year old ; when she is placed standing, but supported, on the table, the sole of the foot is still found to turn a little to the inner side. The inversion is, however, but very trifling, and slight force obliterates it ; the inner margin of the foot is also a little hollow. The same apparatus was reapplied so as to turn the foot almost into a valgus position, and the mother was told to let the child begin to feel its feet.

April 3rd.—The child's foot was perfectly restored. Discharged.

Case II.—Anne Payne, æt. 2 years and three months, affected with valgus, sufficient to allow the inner ankle to come almost to the ground, was brought to me at the Charing Cross Hospital, April 19th, 1861. I dressed the limb so as to supply the tibialis anticus. The child suffered no pain, but held the leg with an awkwardness that began to wear off before she left the room.

April 26th.—The position of the foot was better, and

the arch more formed, still it was not quite right. I added another spring for the *tibialis posticus*.

May 8th.—I have seen this child twice since the last report; she places her foot very much better, indeed the mother thinks that she is cured.

June 7th.—The child walks quite straight. Discharged.

Case III.—Alice Weston, æt. 16, came to me at the Charing Cross Hospital, May 17th, 1861. She had a considerable degree of *valgus* of the right foot, and walked very lame, which prevented her getting a situation. The inner malleolus was very protuberant, the arch of the foot was quite gone, and she had severe pain under the scaphoid and internal cuneiform whenever she bore any weight on the limb.

May 22nd.—The strapping had somewhat excoriated the skin, and the edge of the tin pressed a little over the tibia, where it begins to enlarge towards the malleolus. There was a little excoriation or blister (separation of the cuticle) in that situation. The pain under the sole was hardly to be complained of. In dressing the part again, I applied lint with a very little simple ointment over the excoriated part, and bent the lower end of the tin a little outward, placing one of the circular pieces of strapping between it and the dressing.

June 10th.—Has been seen twice since the last report. On the 3rd inst., when she was last here, I observed that the action of the succedaneum for the anterior tibial was too great in proportion to that of the posterior. I made the necessary change in this respect. The pain under the scaphoid was quite gone. She walked from Peckham to the hospital, while, two months ago, she had been quite unable to walk at all more than a few yards.

July 29th.—The patient has been here of late only every fortnight. She has a situation, and cannot come so often as before. The foot is very nearly straight, the arch is still rather low, but very little lower than in the other foot.

August 21st.—Discharged cured.

POSTSCRIPT.

June 11th, 1862.

Since this paper was read, several additional cases have been treated in the same manner by the author. From among them, he would select the following instance of congenital varus.

Margaret Lynch, æt. 3½ years, came into the Charing Cross Hospital, with varus of the left foot, and was placed under my care February 18th, 1862. The child was of a very irritable temper, and cried through the greater part of the day and nearly all night, although she was undergoing no treatment, and was kindly managed.

The varus was congenital. The sole looked inward and backward; the cuboid and the external malleolus projected much; the internal malleolus was hardly to be seen. The foot was so twisted that when the child was held erect on the right foot and persuaded to put the other to the floor, the malleolus very nearly touched the ground; the cuboid was made the point of support, and the great toe nearly touched the inner edge of the tibia.

February 22nd.—I began to treat this child, supplying the peroneus longus and brevis with india-rubber springs; even a slight force made a good deal of change.

24th.—I supplied shorter india-rubber for the purpose of making more extension. The foot was already improved. I had her dressed, and encouraged to walk about.

28th.—The foot was much improved, and the medio-tarsal bend unfolding. The child had become wonderfully good since the 24th. I readjusted the apparatus. The child has taken to crying in the night, and as I had a severe operation in the ward, I sent her out of the hospital.

March 20th.—Strapping was readjusted on the foot only on the 6th; she was then able to walk very fairly, while the sole came well to the ground, but she had a tendency to turn the foot in. I somewhat inverted the mal-

position, and told her parents to encourage her to walk. She had grown very much better tempered, and the calf had much increased in size.

April 22nd.—There was only a gradual improvement to report in the position of the foot ; the child walked now very fairly. She was, however, out of health, had been growing very fast, and had bowel irritation and debility ; the hot weather seemed to be one cause of this. After a little aperient medicine, cod-liver oil and steel were ordered, and the india-rubber left for a day or two rather less tight.

May.—In the middle of this month the child's foot was quite restored. The patient had been kept in bed during only the first two days of the treatment.

DESCRIPTION OF PLATE I.

N.B.—The feet are drawn in a healthy condition, to allow the positions of the appliances to be more readily seen.

Fig. I.—The first steps in the treatment of valgus.

A. A trapezoid piece of plaster, with an eyelet in its upper end, adherent to the foot in the position of the tibialis posticus tendon.

B. A similar piece, adherent to the foot over the former, to supply the place of the tibialis anticus tendon.

C. A broad and long piece of strapping adhering over the tibialis posticus muscle. The rest, nearly twice the length of the limb, hangs freely down.

D. A similar piece of strapping, applied in a like manner over the tibialis anticus muscle.

E, E. Pieces of tinned iron laid upon the strapping at C and D, and roughly moulded to fit the surface.

F, F. Wire loops fixed in the upper part of each piece of tin.

Fig. II.—An advanced stage in the treatment of valgus. Circular strapping has been applied to the foot, and in part upon the leg also; in the ordinary course the whole leg would have been covered, but here only four circular strips have been represented, the rest are left out in order to show the disposition of the longitudinal strapping.

G. Strapping surrounding the foot, and covering the plaster visible in Fig. I, A and B, except the ends with the eyelet holes, which are free at A and B.

H, H. The arrangement of the longitudinal strips, the ends which, in Fig. I (C, D), hung loose, are here turned up and lie over the tin, with the sticky side outwards. Thus they each form a loop under the lower end of the tin to support any downward pressure.

I. The wire loop protruding through a hole cut in the strapping; it is equally or even more convenient to let it project between two contiguous strips of plaster.

K, L. India-rubber springs, fitted to their place as though the other arrangements were finished. K is to replace the tibialis posticus. L is to reinforce the tibialis anticus.

DESCRIPTION OF PLATE I—(continued).

Fig. III.—The same limb, in the same stage of treatment, seen from the front. The lettering is identical.

Fig. IV.—The treatment of varus, complete.

m. The upper end, with an eyelet-hole, of a trapezoid piece of plaster; the continuation of which under the circular pieces is marked by dotted lines, and which adheres over a rather broader surface of the sole than the insertion of the peroneus longus.

n. The end, with the eyelet, of a piece of plaster, representing the insertion of the peroneus brevis; its continuation is marked with dotted lines at n', as being split so as to embrace the head of the metatarsal bone.

o. Circular strapping, covering but one piece of tin placed just behind the fibular, with its layer of plaster on either side.

x. The remainder of the longitudinal strip of plaster brought down and adherent to the outside of the circular ones.

r. An india-rubber spring assisting the peroneus longus.

v. An india-rubber spring assisting the peroneus brevis. At the lower part of v, is an arrangement for changing the direction of the force; this is better seen in Fig. V.

Fig. V.—Arrangement for changing the direction of the forces in replacing the tendon of the peroneus brevis.

v. The tin which is laid on the longitudinal strapping.

x. An eyelet fastened by wire to the lower and posterior angle of the tin.

r. Catgut passing from the lower end of the india-rubber spring to the strapping representing the attachment of the tendon. It is bent in the direction of the tendon of the peroneus brevis.