

—without the shoe—and another with it on. Both of these pictures were taken within a few minutes of each other, and beautifully illustrate the advantages of this plan of treatment; as you now see, this boy walks perfectly well, with his foot in natural

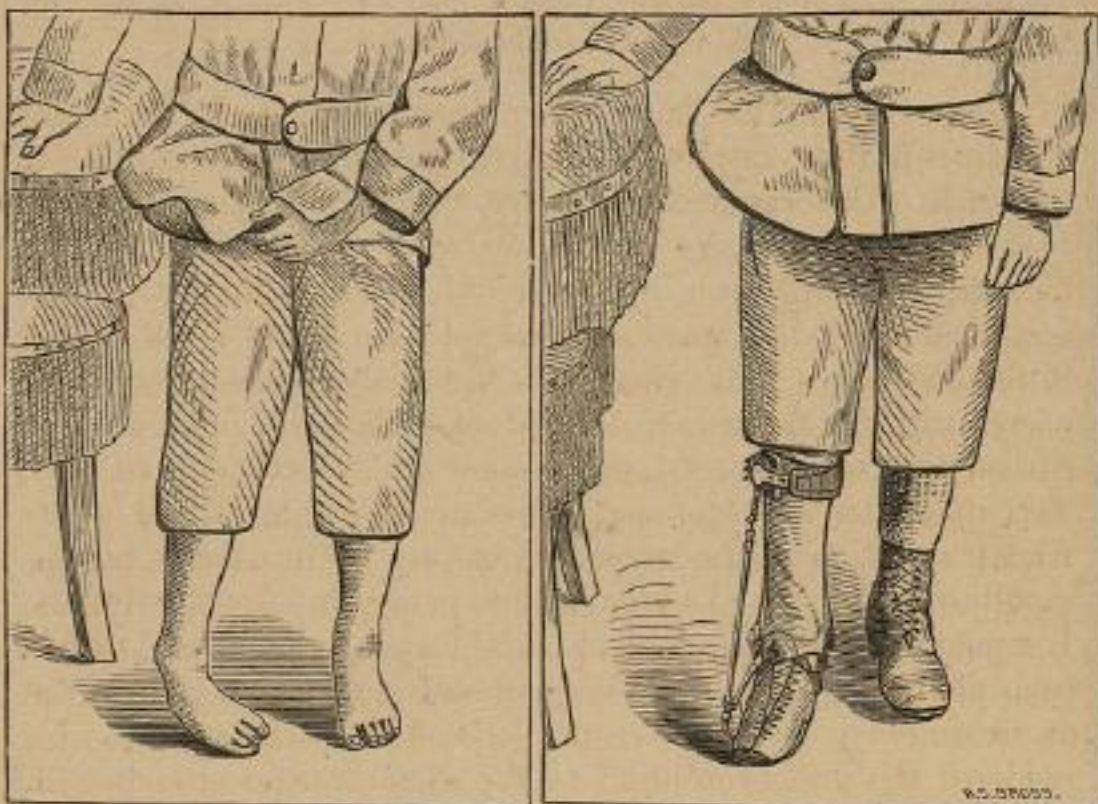


FIG. 41.

FIG. 42.

position when the rubber elastics are properly adjusted. (See Figs. 41 and 42.)

So much, gentlemen, for the management of that class of cases of club-foot that can be rationally and successfully treated without resorting to any operation.

LECTURE XI.

TALIPES.

Treatment (continued).—Tenotomy.—Indications for same.—Dressing applied after the Operation.—After-Treatment.

GENTLEMEN: Thus far we have been studying the treatment of talipes in those cases which may be cured without resorting to the knife. Unfortunately, however, the great majority of cases that fall under our care require *tenotomy*; and almost without exception require such operative interference, simply because a rational method of treatment has not been put in practice early in their history. This brings us to the study of tenotomy as connected with the treatment of club-foot. From the publication of Stromeyer's work, in 1831, dates a new era in orthopedic surgery. The operation of tenotomy, advocated by him, found many friends; and, from the surprising nature of its results, became rapidly popular. It was brought into general use by Dr. William Detmold, of this city, who had himself been a pupil of Dieffenbach and Stromeyer. The immense advantages which this plan of treatment possessed over the let-alone method for some time rendered the profession blind to the disadvantages attending it. After a time, however, surgeons noticed that all cases of club-foot were not cured by tenotomy, and many that had appeared to be cured afterward relapsed.

This failure was due in some cases to the neglect of proper after-treatment, but generally to the fact that the operation of tenotomy was based in many cases upon a false pathological theory, namely, that the deformity was due to a spastic contraction or abnormal shortening of the muscle, the tendon of which was to be cut.

If what I have told you regarding the paralytic origin of most cases of club-foot is true, then the severing of the tendons of muscles still remaining sound is entirely irrational. The very best result that could be expected from the operation would be, that the muscular support of the foot being removed on all sides, gravity would throw it into a normal position. The disease which underlies the distortion, namely, the paralysis, has been untouched. And, if the tendon becomes firmly reunited, there

is likely to be a complete relapse of the deformity; if the union is incomplete, the foot hangs as helpless at the end of the leg as the flail of the thresher.

But, while I believe that in cases of congenital or acquired paralytic talipes, if taken in hand early, tenotomy is very rarely, if ever, needed, cases frequently present themselves where, from neglect, it is absolutely essential, as a preliminary measure to all other treatment. These cases are those in which the fasciæ or muscles have become contracted. By *contractured*, I mean a tissue that has undergone *structural* change, and cannot be stretched or lengthened without severing its fibres either by the knife or force.

Now, how is this contracture to be diagnosticated? By anæsthetizing the patient, and then attempting to reduce the deformity. If the contraction yields without the rupture of any of the tissues, the condition is one of simple contraction, and can be relieved without section. If, however, the deformity persists, contracture has taken place, and tenotomy or rupture of the shortened tissues is demanded.

I have been obliged to cut the plantar fascia in a child of only fourteen months of age, that had walked less than two months, and whose history showed that the contracture had taken place during the last-named period.

The law by which you are to be governed in determining whether a muscle, tendon, or fascia, must be cut, has already been fully laid down in a previous lecture, but its importance is such that I shall offer no apology for repeating it. It is this: Put the parts to be examined upon the stretch to their fullest extent, and, while thus stretched, press with the finger or thumb upon the tendon or fascia thus made tense; and if this additional point-pressure produces *reflex* contractions, that muscle, fascia, or tendon, must be divided, and the point of pain is the point for the operation. If, on the contrary, the additional point-pressure thus applied does *not* produce reflex contractions, the contraction can be overcome without cutting, and by the application of constant elastic tractile force.

A full description of the manner in which the operation should be performed, and the instruments to be used, has also been given; hence it will not now be necessary to go over these subjects again. (See Figs. 10 and 11.)

We will therefore pass at once to the consideration of the dressings to be applied after the operation has been performed.

After division of any of the tendons or fascia for the relief of the different distortions of the foot, and hermetically closing the wound in the manner already described, bring the foot *immediately* into its natural position, or as nearly so as can be done, and retain it there by the following dressing:

Cut a thin board (the top of a cigar-box answers very well) into the shape of the sole of the foot which is to be dressed, only a little longer, and square at the toe.

Then take a piece of strong "moleskin" adhesive plaster, as wide as the board, and long enough to cover both sides of the same, and to reach some inches above the knee.

Apply the adhesive side of the plaster to the board, commencing at the anterior extremity of the upper surface, passing backward over the posterior extremity of the board, and under the same to its anterior extremity; the remainder of the strip is subsequently to be applied to the anterior surface of the leg.

The foot is then placed on the board, *A*, and secured at the heel by a strip of the same adhesive plaster, *B*, passed over the ankle, and around the heel-part of the board, and additionally secured by a well-adjusted roller, which also extends above the ankle. The foot is now brought into its natural position, and the adhesive plaster, *C*, is firmly drawn up and secured to the leg by a continuation of the roller; the superfluous extremity is to be reversed, bringing its adhesive surface outward, and the roller, carried back over it, will be more firmly retained in position.

If the foot has a tendency to valgus, another strip of plaster, *D*, is made to nearly encircle it, and is drawn upon the inner side of the leg to correct the deviation, and secured by a roller-bandage. (See Fig. 43.) If the deformity is a varus, of course this last strip of plaster is applied in the opposite direction, and secured in the same manner. I have found that this simple dressing answers much better than "Stromeyer's foot-board," or any other complicated form of apparatus that I formerly employed. It is simple, inexpensive, and effective. It is a plan of treatment that can be adopted in the country, without being obliged to send to the city for some kind of machinery, and is far better for the reason that, in a majority of cases, if you send to the instrument-makers, they will send you an apparatus that will require the services of

a special engineer to adapt it to the case, and then operate it. In a few instances where contraction of the sole existed (see pages 00, 00), I have found that section of the plantar fascia was not sufficient to reduce the deformity. The integuments themselves had become so shortened that they would not yield, and their section was indispensable, and followed by a ready cure. I have

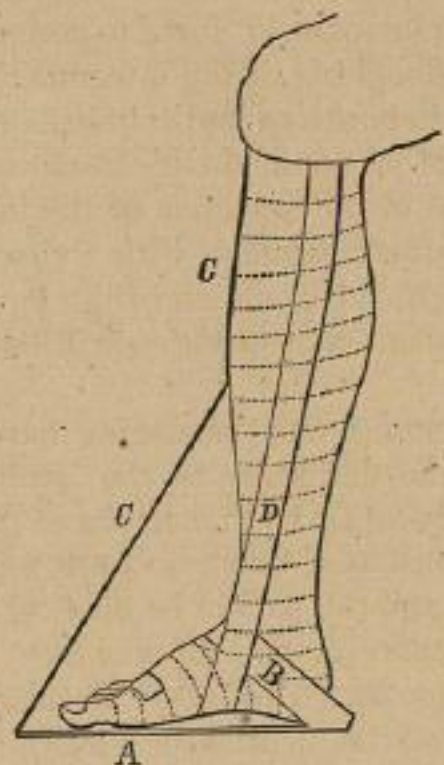


FIG. 43.

seen the same condition exist in long-standing deformities of other parts of the body.

Dr. Benjamin Lee, of Philadelphia, reported to the American Medical Association a case of severe talipes, of ten years' standing, in which he substituted *brisement forcé*, or forcible rupture of the contracted tissues, for tenotomy, the child being under chloroform. He says, in his report of the case: "These manipulations were made with all the force I was capable of exerting, and were occasionally accompanied by the audible rupture of ligamentous or fascial fibres. They were repeated every third day for three weeks." It remains for further experience to determine whether, in cases demanding operative interference, rupture or section is preferable. I am unable to offer any opinion, as hitherto I have used only the knife, or at least have never used rupture alone.

I have, however, several times been obliged to force into place tarsal bones, which have become dislocated, or rather subluxated, by the long continuance of the deformity. The complication occurs most frequently, I think, in varus, the projecting points being the head of the astragalus and anterior portion of the calcaneum, and sometimes the cuboid bone. This condition existed in cases recorded on pages 115, 117, 136. The latter case, in particular, demanded so great an amount of force to accomplish the reduction, that I anticipated sloughing of the integuments. Fortunately this did not occur, the indurations and callosities about the part being doubtless a source of protection in this instance. It is well, if much force has been used in the reduction of the luxation of the bones, to institute some after-treatment, with a view to diminishing the liability to inflammation; elevation of the limb, cold applications, and slight compression of the arteries, will be found most serviceable.

When the tenotomy and bandaging have thus as nearly as possible restored the deformity to the condition which existed before inflammatory action had taken place, the *treatment proper* can be continued just as if the case were one of uncomplicated congenital talipes, and the patient be made to wear such dressings as Barwell's apparatus or the shoes which have already been described. (See Figs. 36, 37, and 39.) There is one practical point, however, which may be mentioned relative to obtaining a shoe for a deformed foot, and that is, do not measure the foot until it has been *unfolded* and *lengthened* by the operation. If this precaution is neglected, it will almost invariably happen that the shoe will be made too small and too short, as seen in the last two cases brought before you.

The next important part of the management of a case of club-foot is the treatment after the operation has been performed. When you have done the cutting which may be necessary, you have simply put your patient in a favorable condition for the *commencement* of the treatment which is to *cure* the deformity. The operation may be necessary, but the case must receive a proper after-treatment, if you expect to have any benefit follow it. The simple application of an instrument also, however perfect it may be in its construction, is but a small part of the treatment of club-foot. As soon as the external wounds are healed, which is usually within a week or ten days, the foot is ready for the com-

mencement of those passive movements, manipulations, etc., that contribute most to the cure of the deformity. Handling the foot, gentlemen, is the great secret of curing it. Friction, shampooing, whipping of the paralyzed muscles, and the manipulations so fully referred to in our second lecture, should be repeated daily. Cases are constantly coming to us in which tenotomy has been performed as many as five or six times, and yet the deformity remains as bad as when first operated upon, perhaps worse, and why? Simply because the treatment adopted *after* the operation has been that by means of *fixed apparatus*, which was regarded as sufficient. What has occurred in such cases? The parts being permitted to remain in a quiescent state, adhesions have taken place which render the case as bad as it was before the operation.

The more frequently the foot of the patient is manipulated, the greater will be the benefit derived from the operation, providing the manipulation is performed *thoroughly, but gently, and never carried to over-fatigue*. Electricity is a very powerful adjuvant for restoring lost muscular power, and should be used in accordance with the rules already laid down, namely, always approximate the origin and insertion of muscles to such an extent that they will not be compelled to carry any weight whatever, and maintain them in that position by some artificial support, while the battery is being used. Again, never continue the current sufficiently long to produce *exhaustion*. Strychnia is another valuable agent in many of these cases, and is to be administered according to the directions already given under the head of general treatment of deformities. The nurse should be instructed to watch for the occurrence of excoriations, as they, if allowed to take place, seriously retard the treatment. To prevent this, the application of astringents should be frequently repeated. If the treatment adopted is such as to require bandages, extreme care should be taken in applying and reapplying them. It may appear to you like an insignificant matter, but a single thread of ravelings from a bandage may upset the most seemingly complete surgical dressing; and it may do this by girdling the limb. If at any time the dressing gives the patient very much discomfort, remove it at once, and endeavor to find out why it does so; for such timely precaution may save you weeks, perhaps months, of needless anxiety and care. You should always bear in mind

the fact that these feet and limbs are much more sensitive to heat and cold, and all forms of irritation, than is natural, and at the same time, having much less vitality, will slough much more readily. A very common place for sloughing to occur is over the astragalus, where pressure often becomes necessary in order to restore the parts to their normal position. Care, therefore, should be exercised in applying such pressure. Pressure about the ball of the toe is frequently complained of, hence that part should be especially protected.

The treatment should be persevered in for a long time. In the most favorable cases a few months may suffice for a cure, but, as a rule, the treatment should not be relaxed when the deformity is apparently cured, but should be continued with the hope of developing the paralyzed muscles to the same or nearly the same degree as those of the sound limb. If this be accomplished, relapse can hardly take place.

It is true that in some cases the disease of the nervous system is so great that we may not restore the muscles to their normal contraction so soon as we would wish; but even in these, the most unfavorable of cases, by the use of an instrument for retaining the foot in place, we shall at least have preserved the natural position of the feet, and thus have prevented the hideous deformity that would otherwise have resulted; and, by the application of artificial muscles, to take the place of the paralyzed ones, have enabled the patients to walk without limping. The exercise they are thus enabled to take, while the blood-vessels are held in their natural relation to other parts, is the very best method of developing the growth and nutrition of the limbs. Whereas, if they are permitted to walk without the feet being retained in their natural position, the weight of the body has a tendency to increase the deformity, and the abnormal position of the blood-vessels, both arteries and veins, interferes with the natural circulation of the parts, prevents development, and in fact tends to atrophy. The faradaic and galvanic currents will also have a much more beneficial effect upon the limb when retained in its natural position, than they have when applied with equal power while it is distorted.

This, gentlemen, concludes what I have to say upon the subject of club-foot in the theoretical course; but in my clinical lectures I shall take occasion to reiterate the principles now laid

down, while I demonstrate them upon the cases brought before you.

The following cases, most of which were treated before the class, will serve to illustrate the principles I have endeavored to inculcate. Some of them have been already published in my "Manual of Club-Foot."

CASE. *Double Talipes Varus, congenital; treated by Sole-Leather and Adhesive Plaster; Recovery perfect.*—On the 25th of March, 1863, I was requested by Dr. C., of New Jersey, to see his little child, five days old, who had been born with talipes varus or varo-equinus of both feet.

I saw the child on the same day, and found him very vigorous and robust and exceedingly well developed, with the exception of his feet, which exhibited a very severe form of varus, with slight equinus, and which are well represented in Fig. 44.

The feet were much colder than any other part of his body, and quite blue or purplish in color.

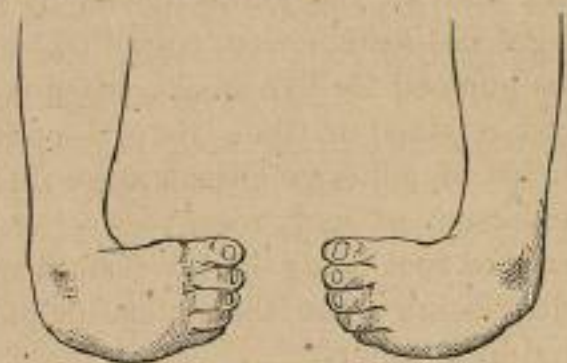


FIG. 44.

By grasping the foot in one hand, and the leg in the other, I could with some considerable effort, continued for a few minutes, evert the foot, and slightly flex it. The capillary circulation seemed to be arrested entirely when I did this, and the foot became as white as snow. After holding it in this position a few minutes, I would relax my hold, when the foot would immediately resume its abnormal position, and in a short time circulation would return to it as at first.

I then performed the same operation on the other foot. After repeating these manœuvres a number of times on each foot, allowing some minutes to elapse between each effort at straightening them, I found that I could bring them into almost a natural position, and retain them there by a very slight force.

I then wrapped the feet and legs in cotton, and applied a piece of sole-leather previously softened in cold water, and cut into the shape of a half-boot.

After the roller had been carefully adjusted, and the leather accurately modeled upon his foot, the foot was forcibly held as nearly as possible in its natural position, while the roller secured the rest of the leather to his leg.

It was then held in this position with the two hands for a short time, until the leather had received its form, and, when perfectly dry, it held the limbs very securely in place.

These bandages were removed on the third day, and the feet and legs well rubbed and moved in all directions. The leather was then again softened by soaking in cold water, and reapplied as at first, with the only difference that at this time the feet were forced completely around into a natural position, and held there, until the leather became dry and retained them there. The bandages and leather were removed every day, and the feet and legs freely rubbed and all the joints moved by the nurse, after which the bandages and leather were reapplied.

This plan was pursued for five weeks, when it was found that the feet could be retained in their natural position by a very slight force. Strips of adhesive plaster were then applied, commencing on the dorsum of each foot, passing around the inner margin, and then, the foot being held well outward and flexed as much as possible, passing upon the outer side of the leg, where they were secured by a roller.

This answered the purpose of holding the feet in a natural position, and at the same time admitted of slight motion at the ankle-joints.

This plan was continued for some weeks, until the feet remained in their normal position without artificial aid, when it was discontinued.

The child began to walk when sixteen months of age, with the feet perfect in form and development.

The photograph, Fig. 45, taken April, 1868, five years after all treatment was suspended, shows how well the feet are developed, and the perfectness of the recovery.

CASE. *Congenital Talipes Equino-Varus; Tenotomy performed Three Times without Relief of the Deformity; Permanently relieved by India-rubber Muscles and Electricity.*—Walter

C., aged three, New York City, was brought to me, May 17, 1863, for well-marked talipes varus, which was congenital. The mother stated that "at birth the left foot was much smaller than the right, and was almost without any heel; the whole leg was a



FIG. 45.

little smaller than the right; and that the sensation of the limb was very imperfect, but never entirely absent." The note of treatment at that time in my record-book is: "I divided contracted muscles (tendo-Achillis and tibialis anticus), and brought the foot into position by adhesive straps. Progress rapid and result satisfactory."

I had divided the muscles, having full faith in the necessity of this treatment. The deformity was reduced readily, but, as will be seen, the true disease was not removed, and consequently the deformity returned.

May 22, 1867.—The boy returned, being then seven years old. Tenotomy had been performed three times in all, but with no satisfactory result, although he had worn a variety of club-foot shoes. The foot was much smaller than the other, as was also the leg. When standing, the foot became almost completely inverted, and the heel drawn up, the weight coming upon the dorsum of the foot, just behind the little toe, and the one adjoining, near the metatarso-phalangeal articulation, at which place was a large callosity, which was very tender. The astragalus was subluxated forward, and could be distinctly felt in front of the tibia, making a serious deformity.

The foot could be quite readily brought into an almost natural

position, with only a moderate amount of force, showing conclusively that the deformity was one from paralysis, and not dependent upon any abnormal contraction.

I applied the India-rubber tubing on the outer side of the leg—according to the plan of Mr. Barwell—and the foot was almost immediately brought into its natural position. By a very slight addition to the thickness of the heel and sole of his shoe, to equalize the length of the limbs, he walked almost naturally in a very few days.

He was directed to run around as much as possible, and to have electricity applied over the peroneal muscles ten to fifteen minutes daily.

July 1st.—The mother states that after three or four weeks the leg and foot had so much increased in size that she had to get a larger shoe. Readjusted the bandages, and applied new plaster. Continue treatment as before.

September 1st.—Has improved so much that, when all the bandages and India-rubber are removed, he can slightly evert and flex the foot by making a strong effort to do so. I ordered a well-fitting shoe, with a steel spring on the outer side to run up the leg, with a hinge at the ankle-joint, and a rubber spring sewed fast opposite the little toe, and secured to a chain at the top of the steel spring, near the head of the fibula.

January 1, 1868.—He has improved so much that he can tread flat upon his foot without any assistance. I therefore took off the steel support and rubber spring.

His foot and leg are well nourished, and very much increased in size. The sole and heel require about one-fourth of an inch more than the other shoe, to equalize the length—otherwise there is no deformity.

October 31, 1868.—Boy has not been seen since last entry till now, as he has been away from the city. Has given up the use of the elastic shoe, and has been wearing an apparatus consisting simply of a firm iron sole, with no joint, which is too narrow for the foot, and a stiff upright bar, jointed at the ankle, which is fastened about the calf. This change in treatment has hindered the progress of the cure. The skin is warm and of a good color, but the muscles are weak. In walking, he is unable to evert the little toe, and allows the weight of the body to fall upon the outer edge of the foot, thus endangering a relapse. The cure

is, however, so well advanced, that I think an ordinary neatly-fitting, broad-soled shoe, with an upright bar, and a rubber for everting the foot, similar to that shown in Fig. 59, will be sufficient for its completion.

Since the above date Walter C. has again called at my office. The cure is now perfect, the sole of the foot coming flat upon the floor without any artificial aid. The leg has grown to very nearly the same size as the sound one.

CASE. *Talipes Calcaneo-Valgus Paralytica; Cure by Elastic Extension.*—May 4, 1867.—G. B. M., aged three, New York City. During dentition the child suddenly lost the use of his lower limbs. He was unable to stand. His dorsal muscles were so weak that he had to be propped up in a sitting posture. After the expiration of three weeks he began to creep, dragging his body. A weight was then attached to each foot. After two months he was able to stand, when it was noticed that his right foot had less power than the left. The toes were elevated and turned outward, and the heel depressed. In March, 1866, an upright support was made for his leg, and elastic extension ap-



FIG. 46.

plied in the popliteal space, to take the place of the gastrocnemius. He has worn this above a year. He is able to walk well with a boot on; but when it is removed there is no improvement upon the condition existing before treatment. There is no tendo-Achillis visible; the anterior muscles are very prominent; the heel is atrophied, and the internal malleolus displaced. (See Fig.

46.) Artificial muscles were applied, after the manner of Mr. Barwell, over the gastrocnemius and tibialis-anticus muscles.

Fig. 47 shows the condition after the use of the rubber muscles, galvanism, and strychnia hypodermically, from May to September.



FIG. 47.

CASE. This case shows very well the effect of only a few hours' tension on the distorted feet, particularly the left one.

Fig. 48, from photograph, shows his condition at time of



FIG. 48.



FIG. 49.

application of dressing. Fig. 49, also from photograph, shows the result after only three hours' application.

The India-rubber springs were worn with the tin splint and adhesive plaster, as seen in Fig. 49, for two months.

After this time he wore the improved shoe with ball-and-socket joint, which answered much better, as the spring from the back of the heel to the little toe materially aided in everting the feet, and when this was properly adjusted he could walk remarkably well.

This boy went to the country, and I lost sight of him; and I am therefore unable to tell the ultimate result of the treatment in his case; but I hear that he recovered perfectly in less than two years.

CASE. *Congenital Varus of Right Foot, and Varo-Calcaenus of Left Foot, cured by Elastic Tubing.*—John F. C., 432 Second Avenue, aged six months (Fig. 50), was brought to the



FIG. 50.

out-door department of Bellevue Hospital, November 7, 1867, under care of Dr. W. H. Young. Parents healthy; no other children. Treatment by elastic tubing (*see* page 00). The right foot was dressed November 11th, the foot being quite easily brought round and retained in the straight position. November 15th, dressings have given no pain or uneasiness to the child. Reapplied by Dr. Sayre.

20th.—Deformity of right foot about one-half; dressings applied to left foot to-day, which is retained in position by a very small amount of elastic force.

The dressings were reapplied about once a week, until January 2d, when they were removed, the feet being nearly in the normal position, and easily retained in a straight position by a common pair of laced boots. The India-rubber will be reapplied as soon as the child commences to walk, if necessary.

The photograph, Fig. 51, showing the improvement, was taken April 8, 1868.

CASE. *Double Talipes Equino-Varus treated by Section of Plantar Fasciæ and Elastic Extension; Section of Integument ultimately required.*—July 22, 1867.—Annie L. W., aged three and a half years, New Jersey. The deformity is congenital, and is attributed by the father, a physician, to "a fright of the mother at a deformed cripple while the babe was *in utero*." When three months old the child was brought to me. I then



FIG. 51.

succeeded in bringing the feet nearly into their proper position by handling, and then applied a leather splint, as described in Lecture X. The father continued the treatment for three months, with benefit. He then entered the army, and the treatment was changed for another plan. During the last eight months the child has been treated by a fixed modification of Scarpa's shoe, which caused ulcers upon the dorsum of both feet, and the condition has become worse rather than better for the treatment. The feet are now strongly inverted, and the plantar fasciæ firmly contracted. She walks by separating her feet as far as possible, and taking short, awkward, waddling steps. On the sides of the feet are scars of former tenotomy. On each dorsum is a cicatrix of a large ulcer, caused by treatment, which, I fear, seriously complicates the treatment of the case.

July 22, 1867.—Cut both plantar fasciæ. The feet were then bound down to thin board-splints.

August 6th.—Applied two rubber muscles to right foot, one to the left. In less than an hour she began to run about the office.

20th.—Has much improved. Only suffering complained of is the pressure of the plaster on the callus produced by the shoes

formerly worn. Readjusted plasters, so as to relieve the difficulty.

December 17, 1868.—The father again brought the child to my office. He complains that for some reason the eversion of the feet is still painful: the child has defeated the treatment by turning her feet in such a manner as shall bring the outer edges upon the ground, by that means relaxing the strain upon the plantar fasciæ; when this manœuvre fails, she forcibly inverts the feet with her hands. Examination showed the fasciæ to be tense and contracted, reunion having taken place. Accordingly, the child being under chloroform, I cut the plantar fasciæ, but the deformity did not yield, the integuments having become contracted and rigid. I accordingly made an incision about an inch long, and brought the foot into position. The straightening of the foot caused the edges of the wound to separate about three-fourths of an inch.

Since this last operation the father reports the progress as perfectly satisfactory.

CASE.—S. S., Brooklyn, aged seven, was born with double club-foot, according to the mother's statement; was operated upon when three months old by a surgeon in this city, who cut the tendo-Achillis of both sides; a few months afterward the tendons of both anterior tibials were cut, and about two years since the tendo-Achillis was cut again. Shoes of different kinds had been worn all the time, and at last the surgeon had abandoned the case to Mr. Ford, the instrument-maker, who brought the child to me.

The feet at the time were secured in shoes with a firm steel sole, and, although they had, opposite the ankles, joints in the rods running up the legs, which were acted upon by screws, and intended to elevate the feet, still, as they were only moved when the attendant applied force to the screw, and then fixed in the position obtained, the muscles of the leg, even the normal ones, from being so long in a passive condition, had become atrophied; and his legs, from the ankle to the knee, were more like two straight sticks, or nearly equal in size at top and bottom, than like an ordinary leg with well-developed muscles.

When the shoes were well adjusted, he could walk by the aid of canes, on the outer corner of the little toes, for a little distance, the feet crossing over each other; but the pain was so great that in a few minutes he would give up his exercise, and could not

again be induced to walk until the shoes had been removed, and the feet allowed to rest.

When he attempted to walk without the shoes his feet dropped and were inverted, so that he walked upon the outer part of the foot, where there was an extensive callus. (See Fig. 52.)

On the 27th May, 1868, Dr. L. M. Yale put the child under chloroform, when I found that by moderate force I could bring the left foot into nearly a natural position.

On the right side, the heel could be brought down to a natural position, but it was impossible to elevate the foot, or rotate it outward; in fact, the whole anterior part of the foot seemed like a solid plaster-cast, with no motion at any of the joints, except the toes.

I therefore made a free subcutaneous section of all the resisting structures in the hollow of the foot, closed the wounds with adhesive plaster and a roller, and immediately brought the foot almost straight. It was secured in this position by a board under the foot, and a roller, as indicated above.

I directed Mr. Ford to make a pair of shoes, with orbicular



FIG. 52.



FIG. 53.

joints in the soles, and rubber elastics to elevate the foot and rotate it outward, as I have already described, and to return with the child when the shoes were completed.

He returned on the 10th of June, thirteen days after the op-

eration. The wounds had partly healed without suppuration, and the child had suffered very little pain from the operation. The bandage had been removed once or twice by my assistant, and the foot well washed and rubbed.

Mr. Ford had constructed the shoes remarkably well, from the model I had given him. They were put upon the child, and fulfilled all the indications desired most admirably. The rubber was hooked on with only a very moderate tension at first, but this was gradually increased a link at a time for an hour or more. At the end of about three hours his feet were in a perfectly natural position, and he could walk without a cane, with his heels upon the ground, and his feet parallel with each other. He walked to the photograph-gallery without assistance, and had his picture taken (*see* Fig. 53), thirteen days from the operation.

Electricity was applied to the anterior portion of the leg and foot every other day, and very free handling and motion made to all the joints of both feet.

June 20, 1868.—He can flex his feet slightly without the aid of the rubber; his feet are much warmer, more natural in color, and the legs have increased around the calf nearly three-quarters of an inch in circumference.

January 1, 1869.—The improvement has continued up to the present time. The mother has applied faradism, frictions, and has manipulated the feet daily with great care, and the result has been a perfect cure.

CASE.—H. F., Hudson, New York. A girl four years of age was sent to me to divide the tendo-Achillis for club-foot of the right side. The history of the case as given by the mother was, that the child presented as a "cross-birth," and was delivered by the doctor by turning, and the deformed foot was the one seized by the doctor in the delivery; and, in the opinion of the physician who delivered her, the foot was injured at the birth.

When the child was old enough to walk, this foot was found to drop in front, the ankle was stiff, "and the heel seemed to be pinned to the back of the leg." "Dr. Taylor's Swedish movement-cure" was tried for two years, but with no result beyond making the ankle more flexible.

When the foot is permitted to hang in its natural position, there is a remarkable protuberance of the astragalus, as seen in Fig. 54, which was traced from her leg. By taking hold of the

foot, however, with a very slight force the tendo-Achillis could be stretched, and the heel easily brought down to its natural position, at a right angle with the leg, as seen in the dotted lines.

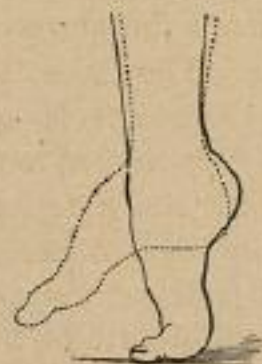


FIG. 54.

But the foot, in front of the medio-tarsal articulation, still drooped, as seen in Fig. 54, and could not be elevated.

In my note-book I find the following entry, made at the time of my first examination, by my assistant, Dr. Yale: "It is quite possible that the plantar fascia and short flexors of the foot will require division, but shall at first attempt to accomplish the restoration of the foot by manipulation, and shoe with elastic extension." The result of the treatment proved the wisdom of this decision.

I put her under chloroform, and by very firm pressure and extension, continued for some time, I found that I could make a very decided diminution of the arch in the hollow of the foot, and very materially increase its length; and, as I never cut tissues that will stretch under a moderate degree of force, I resolved to use the shoe, without resorting to tenotomy.

The foot was handled with great freedom every day while the shoe was being made, and stretched as much as the child could bear without suffering much pain; and electricity was applied to the anterior muscles of the leg every other day.

On the 24th of June, the photograph (Fig. 55) was taken, and then an ordinary shoe with steel supports on either side, jointed opposite the ankle, and buckled around the leg above the calf, to give attachment to a rubber elastic which ran from a stirrup over the ball of the toes, for the purpose of elevating the foot, was applied, and the photograph (Fig. 56) was taken about one hour afterward. With this shoe on, and the rubber proper-