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SECTION OF CONTRACTURED TISSUES ESSENTIAL

BEFORE

MECHANICAL TREATMENT CAN BE EFFECTUAL.

BY

LEWIS A. SAYRE, M.D.,
OF NEW YORK.

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1876-77

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1878-79

SECTION OF CONTRACTURED TISSUES ESSENTIAL BEFORE
MECHANICAL TREATMENT CAN BE EFFECTUAL.

SECTION ESSENTIELLE DES TISSUS CONTRACTURÉS AVANT D'EFFECTUER LE
TRAITEMENT MECANIQUE.

DURCHSCHNEIDUNG DER VERKÜRZTEN GEWEBE WESENTLICH, EHE MECHANISCHE
BEHANDLUNG WIRKSAM SEIN KANN.

BY LEWIS A. SAYRE, M.D.,

Of New York.

Distortions or deformities which are the result of *contractured* tissue can only be removed by forcible rupture of the same, or by cutting before traction is applied; but similar deformities resulting from simply contracted tissue may frequently be rectified by manipulation and constant traction properly applied, without section of the tissue.

A *contracted* tissue is one that is simply shortened, but which can be elongated by careful, continuous and judiciously applied traction and manipulation, and, therefore, does not require to be divided.

A *contractured* tissue is one which has undergone some change of structure in the fibrillæ of the muscles, and which cannot be elongated or stretched unless the tissues are severed or torn, and, therefore, section in such cases is absolutely necessary. Mr.

Little, of London, describes this condition as one of "structural shortening;" but I prefer to call it *contracture*, to designate it from the simply *contracted* muscle. Upon the recognition of which class of shortened tissue we are dealing with, will depend the selection of the means most proper for the treatment and consequent removal of the resulting deformity. And as the two classes demand somewhat different treatment, it is well to have some positive rule to aid us in our diagnosis.

How are we to know whether the tissue is *contracted* or *contractured*? The following simple rule, which I have very carefully observed in many hundreds of cases for the past twenty years, without a failure in a single instance of its proving to be correct, leads me to feel almost justified in laying it down as a law of universal application in all cases of *contractured* tissues.

If, in any case of club-foot or other deformity from muscular contraction, we stretch the shortened parts to their utmost tension by manual force or mechanical aids, and when the parts are thus stretched, we suddenly add to the tension by pressing with the thumb or finger on the part thus stretched, or by pinching the stretched tissue between the thumb and finger, and if, by either of these acts, we produce a *reflex* spasm or sudden shivering of the whole body, that muscle tendon or tissue thus yielding this *reflex* spasm is *contractured* and cannot be elongated *without severing* of its fibres.

If, on the contrary, when the test is applied, as above described, and no *reflex* irritation or muscular spasm is produced, it is evident that the parts are simply *contracted* and can be further elongated by persistent constant traction and proper manipulation, and, therefore, do not require division.

This is a very important rule to observe in practice, as it will save the surgeon a great deal of valuable time, the patient months of useless and unnecessary torture, and will always yield the most satisfactory results.

To attempt to stretch a *contractured* tissue is to subject the patient to a great amount of unnecessary pain, and at the same time run the chance of producing serious disturbance of the nervous system, as the involuntary contraction or "reflex spasm" of the muscular system is produced in a less degree, may be, every time the *contractured* tissue is stretched, and we are all aware of the disastrous results which sometimes follow long-continued irritation of the nervous system, both from "reflex" and other causes.

If a ship is fastened to the dock by a cable stronger than the engine can possibly break, she cannot leave her moorings until some one has severed the hawser or else loosened it from its attachment.

The same with any deformity, the result of *contracture* of any tissue. The deformity cannot be removed until the *contractured* tissue is divided.

In all such cases it is infinitely safer to make such division by *subcutaneous section* than by manual or mechanical force, as a force sufficient to tear these dense tissues could not readily be released before damage to other and more yielding tissues might be done.

By dividing subcutaneously all the shortened or *contractured* tissues, and hermetically closing the wound made by the tenotome, and *immediately* placing the parts in their normal positions, and retaining them there, the space between the severed ends of the tendon, muscle or fascia becomes filled with bloody serum or lymph, which being protected from atmospheric influences, becomes organized, and makes the tissue thus divided as much longer than it was before, as the distance between the severed ends.

Should the skin be *contractured*, as is frequently the case, it must also be divided freely and the wound stretched until the parts are brought into their normal position, allowing the gap to become filled with a clot of blood, *which is to be left in situ*, and being dressed antiseptically, it soon becomes organized and fills the space, without the formation of any pus, as has been frequently proved by Dr. Schede, of Hamburg.

Of course the parts must be kept in their normal position, and at absolute rest until

the new tissue has become thoroughly organized, which generally takes about twelve to fourteen days.

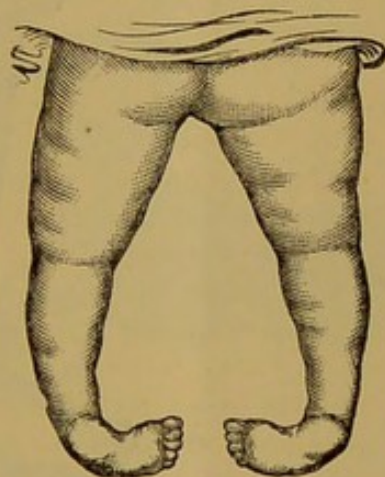
After this has taken place, massage, frictions, active and passive motions, with the use of electricity to develop the weakened muscles, together with such mechanical appliances as may be required in each particular case, will be demanded and must be thoroughly practiced in some cases for many months before the cure will be complete.

The following cases are very good illustrations of the principles here expressed:—

CASE I.—Congenital double varo-equinus. Eversion shoes with strong traction applied when child was eight weeks old, and continued for 14 months. No improvement. Subcutaneous section of contracted tissues and immediate replacement, followed by rapid recovery.

Helen A. G., aged sixteen months, daughter of George H. G., of Bergen Point, N. J., was brought to me on January 14th, 1887, with congenital double varo-equinus, as seen in Fig. 1, from drawing by R. H. Sayre. The mother states that the feet were in the same position they are at present when the child was born. When two months old was taken to a prominent orthopædist of the city, who had made for her the extension shoes she now has on, and who has had charge of the case for the past 14 months. Finding no improvement, they brought the child to me on January 14th, 1887, but I

Fig. 1.



refused to take charge of it without consultation with the former attendant. On the following day I received a very kind note from the Doctor, stating his inability to be present, but requesting me to take charge of the case.

The condition at the time was as seen in Fig. 1. Both heel cords were very strongly *contractured*, also the tissues in the sole of the feet, especially on the left side; both tibiae curved out and knees bent in. Child walked with feet at right angles to front axis of body. Reflex spasm very marked on point pressure of both tendo-Achillis and plantar fascia of each foot, thus showing *contracture* of these tissues, which had not yielded in any perceptible degree to fourteen months of faithful stretching.

January 17th. Tendo-Achillis and plantar fascia of both feet subcutaneously divided by Dr. R. H. Sayre. Feet put in right-angle position and retained by footboard and adhesive plaster.

February 1st. Removed dressings for first time; wounds healed; outside of foot still lower than inside border. The feet were easily forced by the hands into their normal position, and retained there by plaster-of-Paris bandage. The feet being held in nearly natural position until the plaster "set."

February 10th. Removed plaster-of-Paris boots; feet improving. Massaged feet

and legs and reapplied the plaster boots, inserting a hook in the plaster bandage on the outside of each leg, about the middle of the calf. When the plaster was "set" a strong India-rubber band, such as are slipped over letters, was attached to each of the hooks, and passing behind the legs, tended by its contraction to evert the feet. These bands can easily be increased in number, or made of thicker and stronger rubber, as the case requires. When the plaster was "set" and the India-rubber attached, she could walk quite well with the toes everted.

March 1st, 1887. New plaster-of-Paris boots applied. Position of feet improving.

May 1st, 1887. Various plaster boots have been applied from time to time, as it is necessary to change them frequently in a rapidly growing child.

Is now quite well, as seen in Fig. 2.

Fig. 2.



Fig. 3.



The feet can now be retained in a very good position when the boots are removed. The boots, which had been made on the feet, over a very nicely fitting stocking, were cut through stocking and plaster in front, from top to bottom, and opened wide enough to slip off the feet. The feet and legs were then well rubbed—massaged, electricity applied for five minutes, and then the plaster boots were reapplied and secured by a roller bandage, and the India-rubber bands attached as before.

The mother was instructed to remove the boots daily, and after giving similar treatment to reapply them. July 1st, 1887, very greatly improved, as seen in Fig. 2, from photo; can walk well in bare feet, with both feet flat on ground. Ordered ordinary laced boots, with high counters to sustain the ankles, in which she walks very well.

CASE II.—Equino-varus, from post-diphtheritic paralysis, tibials of left foot, followed by *contracture* of tendo-Achillis and plantar fascia.

Strong traction applied daily for fourteen months without improvement. Section of contracted tissues and *immediate* replacement to normal form resulted in perfect restoration of natural position and limited voluntary motion inside of four weeks.

Julius G., aged eight years, son of Sigmund G., of E. 116th street, was brought to me May 28th, 1887, with equino-varus of left foot, as seen in Fig. 3, photo, from Dr. R. H.

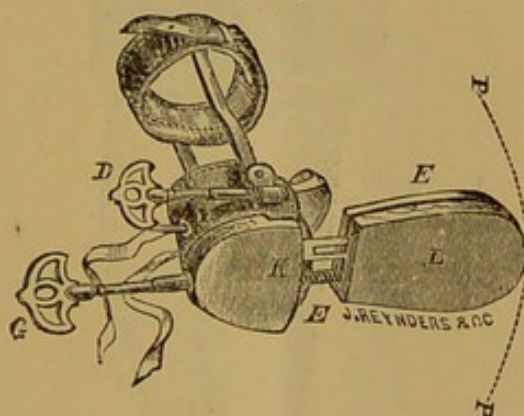
Sayre. He had had scarlet fever and diphtheria when three years old, which left him with more or less deafness of both ears and paralysis of posterior and anterior tibial muscles of left foot.

His father says that he brought the boy to me in the fall of 1885, and that I advised an operation at the time; but that I was sick at the time, and unable to perform the operation personally; he sought other advice.

The surgeon consulted did not think an operation necessary, but advised massage, electricity and the application of "Shaffer's Extension Club-foot Shoe" (see Fig. 4) for a few minutes at a time, twice a day.

This treatment was carried out very faithfully for more than a year, without, as the father states, any improvement. His present condition is seen in Fig. 3. Severe pain accompanied with strong reflex spasm was produced by point pressure on the plantar fascia when stretched, and the same result followed point pressure on pinching of the tendo-Achillis when stretched, thus proving both to be in a state of *contracture*, and requiring section before they could be relieved. As the most faithful efforts to stretch the parts with Shaffer's extension shoe had been made for more than a year without any apparent improvement, the father readily assented to the operation. I at once administered the chloroform and my son, Dr. L. H. Sayre, divided subcutaneously the plantar-fascia and tendo-Achillis of the left foot. Immediately closing the wound, and restor-

FIG. 4.



ing the foot to its normal position, he retained it there by my usual form of dressing, with footboard, adhesive plaster and bandage. A few hours after the operation he had to go to Harlem (116th street) to remove the bandage, on account of the pain under the great toe. On removing the bandage a small blister was discovered under the great toe, from the pressure of a splinter in the wadding. This was removed and the foot redressed as at first.*

This dressing remained undisturbed for 14 days, without the slightest inconvenience to the patient, and without any change in the position of the foot or bandage.

On removing the bandages on the fourteenth day the wounds were found entirely healed, without any pus, and the effused material between the severed ends of the tendon was so firmly organized that the patient could voluntarily extend the foot against a quite firm resisting pressure.

* After an operation for club-foot and dressing it in the manner I have described, if the patient complains of any pain after a few hours, do not give him an anodyne to allay it, but immediately remove all the dressing and ascertain the cause of the pain; by removing it before you replace the bandages, you will save your patient from all pain, and avoid any danger of sloughing from undue pressure at any point, or of abscess from injury by foreign body, as in this instance.

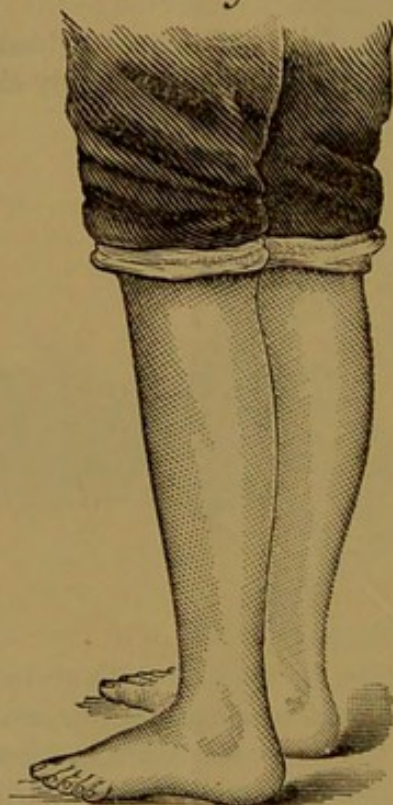
This is a very important rule which I wish to enforce strongly.

A nicely fitting stocking was put on, and the foot being held at a right angle with the leg, and perfectly straight, was encased in a plaster-of-Paris bandage from the toes to near the knee. The leg being slightly shorter than the other, an oval pad of the plaster-of-Paris was placed under the foot to elongate the limb, and when the plaster was set the patient was able to walk remarkably well, the oval sole under the foot almost compensating for the stiffened ankle joint. He walked upon this plaster support for one month, when he was fitted with a nice pair of laced boots with a very high counter and elongated heel and sole, in which he walks very well, and no deformity, as shown in Fig. 5 (from photo.).

CASE III.—*Talipes equino-valgus paralytica*; subsequent contracture of tendo-Achillis, and plantar fascia.

Treated daily for two years and a half by a strong screw extension apparatus without any improvement, but producing great disturbance of the nervous system. Subcutaneous section of the *contractured* tissues and immediate replacement of parts to

Fig 5.



normal position resulted in perfect recovery of form and partial voluntary motion, in two months. The only deformity remaining being the shortness of the limb.

G., aged six years, 743 Broadway; always healthy until three years of age, when she was confined to bed for a week with severe indigestion and a very high fever (probably spinal meningitis). When she attempted to get up it was discovered that she had lost the power of moving either lower extremity. She recovered partial power of the left leg in about two months, and could flex the right thigh slightly, but could not extend the leg upon the thigh. The right heel began to draw up and the foot to evert; was treated for six months by electricity and massage, but made no improvement. A brace was applied, which she wore for two months, but it caused so much pain that it was abandoned. She was then placed under the charge of a specialist, an orthopaedic surgeon, who applied his peculiar club-foot shoe, with a powerful screw worked by ratchet and key, for the purpose of stretching the tendo-Achillis and plantar fascia.

The child was taken to the surgeon's office daily during the winter, and every other day during the summer (when they were at their country seat, out of town) for two years and a half, for the purpose of having his personal adjustment of the apparatus. Another special shoe was worn during the night. As there was no improvement in her condition, her uncle, Dr. Purron sent her to me on the 27th of June, 1887. I sent her back with a request to bring her former attending surgeon, if they wished me to examine the child. Dr. Purron came with the child himself, on the 29th, and requested me to take charge of the child, as her former surgeon was absent from the city.

On removing the apparatus I found the limb two and three-quarter inches shorter than the other, with extreme equino-valgus, with contracture of tendo-Achillis and plantar fascia, both giving reflex spasm on point pressure when stretched.

As the most faithful efforts had been made to stretch the parts for two years and a half, without, as the Doctor stated, the slightest improvement, he readily assented to my operating.

Assisted by Dr. Purron and my son, Dr. L. H. Sayre, I subcutaneously divided the tendo-Achillis and plantar fascia, and dressed in my usual way, on June 29th, 1887.

The tendon was unusually hard and very difficult to cut. I have noticed this fact in many cases where they have been subjected for a long time to extreme traction.

Fig 6.



Does this severe traction produce inflammation and condensation of the tissues?

June 30th. Perfectly comfortable; slept well all night; foot in good position; went to the country.

July 30th. To-day dressed the foot for the first time since operation. Bandages and footboard exactly as when applied fourteen days ago. Aunt says the child is very much less nervous, and sleeps well.

Wounds perfectly healed. Tendo-Achillis firmly united, and can extend the foot voluntarily.

Put on stocking, placed foot at right angles and applied plaster-of-Paris bandages, with extra roll of plaster under foot, to equalize the length of legs, as shown in Fig. 6.

July 13th. Walks well on plaster boot, the rounded and elongated sole almost compensating for the stiffened ankle joint.

Aug. 12th, 1887. Has been running with the other children for the past month, and is in perfect health, as seen in Fig. 7.

Removed the plaster boot, and had her measured for a pair of laced boots. The one on the left foot to be elongated and rounded, similar to the plaster-of-Paris-boot.

A photograph of her in her shoes was taken at this time by Dr. R. H. Sayre (see Fig. 8).

The two following cases have already been published in the *New England Medical Monthly* of November 1886, but as they very strongly illustrate the principles I have endeavored to inculcate in this paper I have concluded to add them to my report.

CASE I.—Some three years since, Dr. T. Gaillard Thomas brought a gentleman to my office with his little son, about six years old, who was suffering from congenital equino-varus of both feet in a very marked degree.

He had been subjected to various treatment since early infancy, and for the past twelve months had been visited daily at his house by a prominent orthopædic surgeon of this city, who had applied for a few minutes to each foot daily, during all this time,

Fig 7.



Fig 8.



a shoe of his own construction, which was capable of making *very powerful* traction upon the contracted parts; but as the father and Dr. Thomas both stated, without having produced the slightest change in the deformity.

But the effect of the torture had made such an impression on the child's nervous system that he was almost ungovernable and would submit to the treatment no longer. Upon stretching his foot with one hand, and pressing with the fore-finger of the other on the tense plantar fascia, an instantaneous spasm of almost all the muscles of the body was produced, and the child screamed in agony. The same result was produced when the same test was applied to the plantar fascia of the other foot, and also when applied to the tendo-Achillis of either side.

Dr. Thomas was convinced, after this examination, of the folly of attempting to stretch such tissues, and advised the father to place the child under my care.

The same afternoon I went to his house in the upper part of the city, and assisted by my son and Dr. Develin, who administered the chloroform, and in the presence of Dr. Walker, Dr. Thomas' assistant, I divided subcutaneously the plantar fascia, tibialis anticus, and tendo-Achillis of either side, and *immediately* restored the feet to their normal position, and dressed them in my usual way while he was still under the anæsthetic; but this plan of dressing is so fully described in my "Manual of Club-Foot," and in my lectures on "Orthopædic Surgery," that there is no occasion to repeat it here. I visited him on the following day, and to my surprise he put out his hand and greeted me with a cordial welcome, instead of screaming, as the mother said he had always done before when any doctor came to see him. The father said that he behaved so differently from what he had ever done before, and seemed so happy, that he acted like a "reconstructed" boy.

The dressings were removed for the first time on the fourteenth day, when all the wounds were perfectly healed, without a drop of pus, and the Achillis tendon of either side was so firmly united that he could voluntarily extend either foot even when quite firm resistance was made against the bottom of the same. He was measured for a new pair of shoes, as his feet were so much longer that he could not wear his old ones, and the foot-board and adhesive plaster re-applied for another week, as a means of protection until the organization should become more firm. Three weeks from the time of the operation he walked very well, with both heels upon the floor, in an ordinary shoe, simply requiring Hudson's elastic attachment to aid in flexing the feet.

These he wore for nearly a year, when, by the daily use of electricity, massage and manipulation, his cold and atrophied legs had become so well developed that he could run and play with the other children, without any artificial support whatever, and has remained well until the present time, with constant improvement in the development of his lower extremities.

CASE II.—John S., of Brooklyn, aged nine, was brought to me on the 15th of July, 1886, with a very marked equino-varus of the right foot, with severe contraction of the plantar fascia, standing on the ball of the great toe, as seen in Figure 9.

The mother says that the child was perfectly natural at birth, but that when eleven weeks old it rolled over on its face in the bed and was nearly suffocated. Two days later it had convulsions, which were repeated at intervals for two days, during which time the bowels were obstinately constipated. After forty-eight hours a passage from the bowels was effected and the convulsions ceased. Some weeks afterward it was noticed that the child had lost full control of the muscles of the eyes, being unable to move the eyes in all directions as it formerly had done. This gradually disappeared, and when he began to sit up the mother noticed that the feet were strongly drawn backward, and the knees widely separated. When he began to stand he did so on his toes, the heels of both feet being strongly drawn upward. Wore braces of different kinds, without benefit, and when he was twenty-four months old was taken to a public institution in this city, where the surgeon divided the tendo-Achillis of either side, and succeeded in obtaining an excellent result on the left side, but the right one was very unsatisfactory.

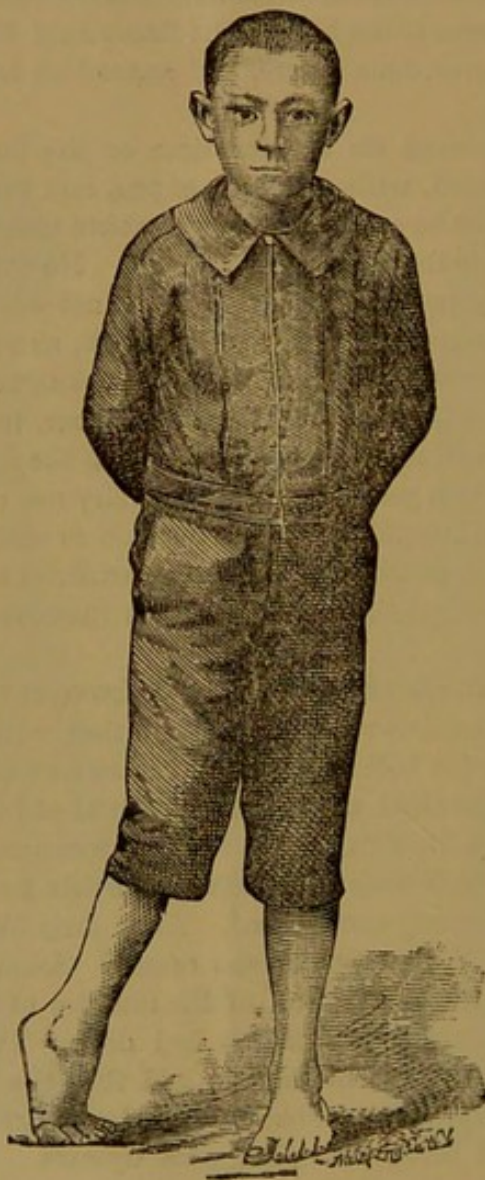
He remained under treatment for two years after the operation, without any improvement in the right foot, and in February, 1885, he went to another institution in the city, where the surgeon applied an "extension shoe," similar to the one described in the previous case.

This shoe was personally applied by the surgeon once every day from February until the 1st of May, and from May until July it was applied twice a day by the parents, but, as they state, without producing the slightest change in the position of the foot, although

the traction power of the instrument was so great as to cause the child to suffer intense pain, which frequently lasted for some time after the "extension shoe" had been removed.

The parents therefore decided to try some different treatment, and brought him to me on the 15th of July, 1886. On extending the foot and making pressure with the finger on the plantar fascia an instantaneous *shivering* of all the muscles in the body was produced. The same result followed point pressure on the tendo-Achillis when stretched, only in a much more marked degree. This shivering or tremor of the whole body is what I mean by the *reflex spasm* produced by point pressure on stretched tissues, and

FIG. 9.



proves that those tissues are *contractured* and must necessarily be divided before any elongation can be produced.

As the case was one in which traction had been thoroughly tested by a perfectly competent surgeon, and without any improvement, according to the parents' account, I decided to cut him. I sent a request for the surgeon who had attended him to be present at the operation, and sent the boy to the photographer's, and Fig. 9, from the Moss Engraving Company, gives an exact representation of his deformity. At 3 P.M. of the same day, July 15th, assisted by my son, Dr. L. H. Sayre, Dr. J. Woodbury and Dr. E. Develin, who administered the chloroform, I divided subcutaneously the plantar fascia and the tendo-Achillis, and *immediately* brought the foot into its normal

position by considerable force, and dressed it in my usual way, as above described. Only a few drops of blood were lost in the operation, but the space between the severed ends of the divided tendo-Achillis was much greater than in any of my previous operations. Unfortunately the gentleman whom I had invited to see the operation was out of the city, and therefore could not be present.

No local or constitutional irritation of any kind followed the operation. The child slept soundly every night without opiates, and ate his meals with perfect regularity.

The bandages were never changed in the slightest degree until the 31st of July, just sixteen days after the operation, when they were removed for the first time, in the pres-

FIG. 10.



ence of my son, Dr. Develin and Dr. John F. Ridlon. The wounds were all healed, without the formation of a drop of pus; could flex and extend the foot, showing that the tendo-Achillis had united, and could stand erect with heel upon the floor. Left for his home in Brooklyn that afternoon.

August 6th. Boy at office; foot in perfect condition, but from too much exercise and the pressure of a tight-laced shoe there was a slight abrasion of the skin near the wound in the tendo-Achillis.

The mother stated that he was so happy in being able to walk that he got a number of boys in the back yard with some goats, and as some of the boys had seen the lassoing by "Buffalo Bill" in the "Wild West," then performing on Staten Island, they

attempted the same performance on the goats, and in this way he had hurt his heel, and finding a little moisture on his stocking she had brought him to see me. Fearing that too much motion might extend the irritation to the deeper and just newly-organized tissues, I put on his stocking and applied over it a plaster-of-Paris bandage, thus immobilizing the ankle joint. When the plaster was hard I cut a fenestra through the plaster and stocking on the abraded part and dusted it with iodoform.

He was able to walk without any trouble, but with no motion at the ankle.

He wore the plaster cast until the 16th of August, when I removed it and found the abrasion entirely healed, the foot in good position, and he was capable of flexing and extending it quite freely, and walked with his heel firmly on the floor.

Figure 10 was taken on that day, August 16th, just one month and a day after the operation, and illustrates practically the result of the treatment.

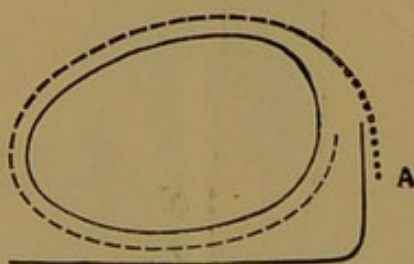
August 28th, walked across the Brooklyn bridge without assistance, a distance of half a mile or more, and can run up or down stairs without limping.

Foot in natural position; requires merely time, massage, electricity and exercise, to develop his atrophied muscles, to make the cure complete.

DISCUSSION.

Dr. A. B. JUDSON, New York.—The treatment of congenital club-foot should be divided into two stages by the arrival of the time when the child begins to try to stand. Before that time, in the period during which the child's weight does not interfere with corrective procedures, the varus should be reduced by whatever means may be at hand—a succession of carved-wood splints, tractable metal splints, adhesive plaster, plaster-of-Paris splints, the artificial muscles, or a combination of these methods, one with another, or with tenotomy, as the case may require. Whatever the plan adopted, by the time the child begins to put his weight on the foot, the varus should be so far reduced that the sole is presented squarely to the ground. Of course, if nothing further be done, the varus would return when walking begins, and would soon be as bad as ever, and what is now required in this, the second stage of

FIG. 11.



treatment, is a slight splint extending up the inner side of the foot and leg, and so furnished with buckles and webbing that pressure may be applied from within outward along the inner border of the foot and at the inner and upper part of the leg, and from without inward in the neighborhood of the ankle. This club-foot shoe or splint is more efficient if made without a movable joint at the ankle. It should be made of tractable steel, so that it may be bent from time to time, and thus take the lead as the foot improves in shape, and requires patient attention on the part of the surgeon to secure at all times an efficient and comfortable fit. Its efficiency may be greatly increased by the untwisting force of a strip of adhesive plaster and webbing wound around the foot and buckled to the upright portion of the foot piece, as shown in Fig. 11, which represents schematically a transverse vertical section of the foot and foot piece, the broken line representing the plaster, the dotted line the

webbing, and A the place for the buckle. The object of the splint is to give the foot a push toward the position of valgus, so that when the child steps the sole will present squarely to the ground or a little more than squarely. Every footfall will then be an impulse in the right direction, applied with the force of the rapidly increasing weight of the child.

MR. EDMUND OWEN, London.—Mr. Balkwill has come forward as the representative of the old-fashioned treatment of club-foot, and as such he narrows the issue to the difference between that and the modern or American method. This being so, I am glad to say that I am, and have been for some years, as heartily devoted to the American plan. The old plan consisted in dividing first the tendon of the *tibialis posticus*, and, perhaps, also that of the *flexor longus digitorum*, and then in putting the foot up in only a slightly improved position; then, when it was supposed that plastic effusion had connected the divided ends of the tendon, to begin with Scarpa's shoe to correct the inversion. Later on, perhaps weeks afterward, when the inversion had been fairly dealt with, the tendon of *Achilles* was divided, and in a few days flexion of the foot was started with. This plan is now, even in England, giving place to the method of dividing all the tendons at one and the same time; and not only that, but bands of fascia and ligaments were also divided. I wish to call particular attention to the need of dividing the anterior part of the internal lateral ligament of the ankle joint, which was much concerned in keeping the front part of the tarsus flexed and inverted on the head of the astragalus. Scarpa's shoe, together with mechanical spinal supports, should be relegated to the limbo of extinct surgical instruments; the introduction of the plaster-of-Paris method of treatment had rendered them superfluous. There need be no fear of failure of union occurring in the divided tendon after putting the foot at once in the correct position; plastic effusion and blood in the sheath of the tendon quickly prepared the way for an efficient splicing of the tendon.

I cannot accept entirely all that Dr. Sayre has said as to the difference between contracted and contractured tendons. I do not deny its existence, in fact, but am not prepared to accept it, but commend in the highest terms Dr. Sayre's teaching and practice.

DR. LEWIS A. SAYRE, New York.—The treatment of congenital talipes should be begun immediately after birth. If prompt treatment were the rule, section of tendons would rarely be called for.

DR. E. R. LEWIS, Kansas City, Missouri.—The distinction made by Dr. Sayre between contracted and contractured tendons, if it proves to be a reliable guide, is an important diagnostic sign in considering the question of operative interference. If I mistake not, the late Prof. S. D. Gross taught, years ago that the administration of chloroform would lead to a correct decision of the question. I have used this method in *torticollis* and talipes with good results, but I shall resort to the method of Dr. Sayre, and feel amply repaid for my trip to Washington if it proves as certain as I think it will.

DR. W. N. HINGSTON, Montreal.—I would like to ask Mr. Balkwill if, in stating he had operated on no child under fourteen months of age, he intended it to be understood that he discountenanced operations on children at an earlier period. My views on the question of the time of operating have undergone great modifications. Formerly, it was usual to delay operating till after the period of teething, at least, but the terse words of Dr. Sayre, written some years ago, that one is warranted in delaying an operation only till the tenotome can be procured, is an advice

which I have followed from the time they were uttered, with almost invariable satisfaction.

A very marked distinction is made by Dr. Sayre between contracted and contracted tendinous tissue. Does he apply the latter term to a tendon which he has already divided, and which, having united in a faulty manner, the question of re-division or stretching presents itself? How soon after division was the foot put into restraining apparatus?

Mr. BALKWILL.—I am in favor of early operations for club-foot. I have never operated earlier than fourteen days, and do not think anything is to be gained by operating earlier than that. I have also postponed the operation for three or four months, for what appeared to be sufficient reasons, and have secured as good results as could have been obtained by an earlier interference.

Dr. LEWIS A. SAYRE.—I place the foot, forcibly stretched to its position, in plaster immediately after section. If I see the case as an original one, I never have to re-divide; but frequently cases come to me from other practitioners who have failed, and then I do not hesitate to re-divide the tendon.

Dr. D. A. K. STEELE, Chicago.—I came to the Section a strong partisan of American surgery, but if Mr. Owen's views and methods prevail in England, I am as firm an adherent of English surgery. The results of our experience in Chicago have suggested the following rules: (1) Operate as early as the child is brought, provided the tendon is shortened. (2) Divide all tissues that prevent perfect restoration of the foot. (3) Retain the foot in a correct position by plaster-of-Paris dressing applied over cotton batting and carried above the flexed knee, to prevent rotation. (4) Leave the toes uncovered, in order to watch the circulation. (5) Let the entire procedure be clean, aseptic and antiseptic.

