

meet these indications. With these objects in view you may construct an apparatus in the following manner:

Take a thin piece of board, a piece of cigar-box or thin shingle, a little longer than the child's foot, cover it with adhesive plaster, and fasten it to the sole of the foot, allowing the board to project somewhat *behind* the heel. When fastened to the anterior portion of the foot, bring the foot into position, and then carry the long piece of adhesive plaster attached to the posterior extremity of the board up along the posterior aspect of the leg, and there secure it by means of a roller-bandage. Such an apparatus should be constantly worn until the child is old enough to walk, when a shoe will be required. For this purpose an ordinary shoe may be used, having a steel sole. From the heel, projecting a trifle behind like a spur, is an eylet. Two upright bars are attached to the sole of the shoe, one upon either side, having a joint opposite the ankle-joint. These bars terminate in a band which goes around the upper portion of the leg. At the posterior portion of this band an artificial muscle is attached and extends to the eylet before mentioned. (See Fig. 20.)



FIG. 20.

One or more artificial muscles are to be used, according to the amount of traction required, and are to take the place of the paralyzed muscles until they are able to perform their functions without artificial aid.

The after-treatment of talipes calcaneus is to be conducted upon the same plan as the other forms of talipes. This will be fully considered when we come to the subject of general treatment.

LECTURE VIII.

TALIPES.

Talipes Varus.—Causes of.—Case.—Complications.—Case.—Talipes Valgus.—Causes of.—Paralytic Variety, with Cases.—Treatment of the same.

GENTLEMEN: At the close of my last lecture I was speaking to you upon the mechanical treatment of talipes calcaneus; to-day I invite your attention to another variety of talipes which has received the name of talipes varus.

Talipes varus is that variety in which the foot is inverted, and more or less rotated, in such a manner as to bring its inner surface upward, and the outer edge to a greater or less degree upon the ground. (See Fig. 21.)

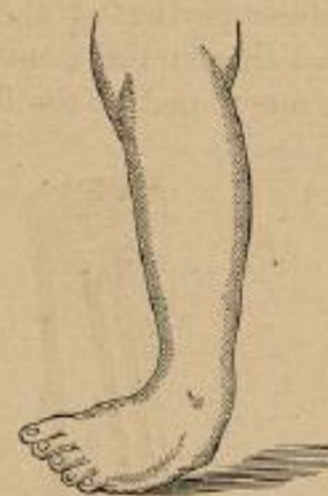


FIG. 21.

The muscles chiefly affected in the paralytic variety are the peroneals.

This variety of talipes may be congenital, and, when combined with equinus, usually is of such origin. Complicated with equinus, it is one of the most common forms of deformity of the foot. Indeed, uncomplicated talipes varus is exceeding rare.

When congenital it is usually of a paralytic nature, but it may be spastic, as the result of some influence exerted upon the fetus. When the deformity is acquired, it is also most frequently of a paralytic nature. The most common cause, probably, is that form of paralysis known as "infantile." The child may go

to bed apparently in perfect health, and awake in the morning with the lower extremities paralyzed; or the child may have convulsions in consequence of some peripheral irritation, such as teething, the presence of some irritating substance in the intestines, etc., etc., and these may be followed by paralysis which perhaps may affect all four extremities. Gradual restoration may go on until perfect motion is restored to some of the parts involved, but there still remains a paralysis of certain muscles or groups of muscles, and consequently, motion is lost and deformity developed.

CASE. *Talipes Varo-Equinus Paralytica, relieved by Elastic Tension.*—Catharine N., aged four years, No. 16 Washington Street. The mother states that the child, when two years of age, went to bed in perfect health. In the morning both lower extremities were completely paralyzed. The probable cause was an apoplectic effusion into the lower portion of the spinal cord.

After a few weeks she began to move the right limb a little when it was tickled or pinched; these movements gradually increased until she had recovered perfect motion of that side. The left leg remained paralyzed on the outer side, causing a severe form of varo-equinus, as seen in Fig. 22. When her weight was



FIG. 22.

put upon it the varus was very much increased, the foot making almost a complete rotation at the medio-tarsal articulation.

The limb was very much wasted, blue and cold. The peronei muscles would not contract under a strong Kidder's battery.

On the 16th of August, 1867, I applied the India-rubber muscles over the tibialis anticus and peronei muscles in order to elevate and evert the foot. The muscle was applied with only a moderate degree of tension, but in less than half an hour it had produced a marked change in the form and position of the foot.

The chain was shortened a few links, and in three hours she could stand upon her foot, touching the ground both with the heel and great-toe, as in Fig. 23.



FIG. 23.



FIG. 24.

Electricity was applied in this case to the outer and anterior portions of the leg from ten to fifteen minutes every other day, and the child encouraged to run around as much as possible. The plasters and tin had to be readjusted occasionally; but at the end of eight months she had so far recovered as to require only the slightest elastic, hooked into the eyelet of an ordinary shoe, and attached above to her garter. With this slight force she could elevate the toes and walk perfectly naturally, as seen in Fig. 24.

Again, talipes varus may be developed by blows or other injuries to the muscles, by which their nervous supply is impaired, and loss of power caused.

In this connection I present a case which is worthy of your especial attention. It is one of varo-equinus. The foot, as you see, is strongly inverted, the heel elevated and very much diminished in size, and upon the outer side of the foot are large callosities which have resulted from walking upon it in this abnormal position. Again you will notice that the little toe of the affected foot is very much larger than that upon the sound one. It has been irritated and tormented by the almost constant pressure made upon it, thereby keeping up an excessive amount of circulation, and genuine hypertrophy has resulted. (See Figs. 25 and 26.) Here, then, we have a practical illustration of the same law I shall so often lay down to you, that constant manipulation, friction, shampooing,

electricity, etc., are of the utmost service in an attempt to restore muscular power, for the reason that they serve to increase the amount of circulation through the parts to which they are applied.



FIG. 25.

This foot is not at present in a condition to be cut, for the reason that these callosities are inflamed. This is a point to be

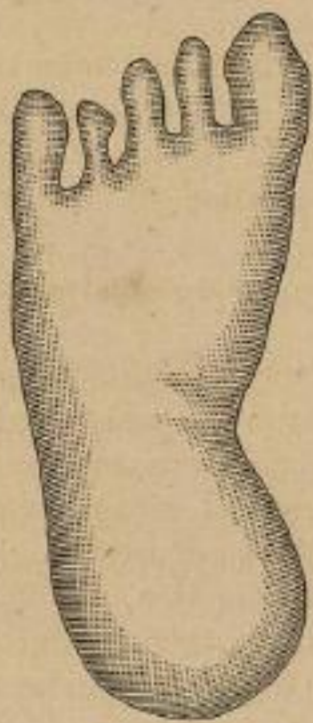


FIG. 26.



FIG. 27.

taken into consideration in the treatment of all varieties of deformity. This foot should not be walked upon for several days,

and these callosities should have cold-water dressings applied to them until all inflammatory action has subsided.

[The case was subsequently operated upon, and section made of the tendo-Achillis and plantar fascia. The first dressing applied was the ordinary board and adhesive plaster apparatus illustrated in Fig. 43. The Barwell apparatus, Fig. 37, was subsequently used, and the appearance of the foot when cured is illustrated in Fig. 27.]

Talipes valgus presents the converse of *talipes varus*, the inner border of the foot being downward. (See Fig. 28.)



FIG. 28.

This deformity is much more likely to arise from traumatic causes than any other deformity of the foot. It frequently results from inflammation of the ankle-joint. It may result from a pull or wrench of the foot, causing inflammation of the peronei muscles and subsequent spastic contraction.

Talipes valgus may be combined with equinus or calcaneus, making valgo-equinus, or valgo-calcaneus.

In some cases this deformity is of a purely paralytic origin. This cause being unappreciated, the projecting bones which make their appearance at the front portion of the foot are very liable to be mistaken for "diseased bones," "periosteal inflammation dependent upon scrofula," etc., and are treated accordingly. These cases I regard as worthy of special consideration, and shall dwell upon them sufficiently, I trust, to make them perfectly clear. In the severer cases the deformity is so conspicuous as to be readily recognized, but the less marked cases are very liable to be overlooked.

In the majority of cases this kind of trouble occurs in persons who are obliged to stand or walk for many hours in succession,

thereby giving constant exercise and strain to the tibialis-anticus muscle, which supports the arch of the foot. Finally, from overwork this muscle becomes partially paralyzed, the arch of the foot settles, and valgus begins to be developed; and, as it increases in consequence of the loss of the arch of the foot, the head of the scaphoid bone begins to project, undue pressure is produced on a part of the foot not intended by Nature to receive it, and inflammatory action is excited, which affects the scaphoid on the inner border, and also the articulations between the two cuneiform, cuboid, and the fourth and fifth metatarsal bones, and gives the patient the most exquisite and torturing pain.

When the arch of the foot is properly supported by a healthy tibialis-anticus muscle, the articulating facets of the bones composing it press upon each other, so as to sustain the weight of the body without producing pain. These articular cartilages having no blood-vessels or nerves of their own, are insensible to pressure; but, when the arch of the foot loses its proper support in consequence of a complete or partial paralysis affecting the tibialis-anticus muscle, these articulating facets no longer press upon each other equally, but are made to tilt a little, and the pressure is brought to bear upon the edges of the articular surfaces, where the supply of blood-vessels and nerves is most abundant, which gives rise to indescribable pain and suffering with every step that is taken.

The pathology of these cases is, first, paralysis of the anterior tibial muscle; second, settling of the arch of the foot; third, abnormal pressure upon the edges of the cuneiform and scaphoid bones.

The pressure in this abnormal position produces periosteal, it may be osteal, or synovial inflammation, and then it is that the case is so often regarded as one dependent upon constitutional disease.

Now, having arrived at the true pathology, let us study their symptoms. The paralysis of the tibialis-anticus muscle can be detected by its wasted and flabby condition when compared with the same muscle upon the sound leg, or with a normal muscle when both the anticus muscles are affected. The spine of the tibia will be much more prominent than normal, the foot will be slightly abducted, and any increase of the abduction, either by traction or by bringing the weight of the body to bear upon it,

causes pain at the points heretofore mentioned. Pressure with the thumb over the borders of the articulating surfaces of the cuneiform and scaphoid bones, when in the abnormal position, produces extreme pain; but when the pressure upon these borders is removed, which may be done by rotating the foot inward and raising the arch, the foot will be able to bear the weight of the body without producing pain. Usually, there is *but very slight deformity* in these cases, hence they require the manipulation indicated in order to detect the precise nature of the difficulty.

The following case, which I saw in consultation with the late Dr. Krackowizer, is a very good illustration of the disease or deformity of which we are now speaking:

CASE.—On the 28th of December, 1872, I was requested by Dr. Krackowizer to see in consultation with him Mr. H., of Thirtieth Street, New York, as he had been lame more or less for the past three years. As the patient had been singularly affected, and as all the treatment which he had adopted had not relieved him, the doctor was anxious to have me examine the case.

I found Mr. H., a young man of about twenty-five, in apparently perfect health, rather muscular in development, and able to walk around the room at that time with very little discomfort. The doctor stated that this had been his condition for the last three years whenever he remained quiet in his house for a number of days together, but very moderate exercise for one or two days would cause him to complain of great pain over the inner border of the scaphoid, and in a narrow line on the top and outer side of the foot, which corresponded precisely with the junction of the second, third, and fourth metatarsal, with the middle and external cuneiform and cuboid bones. Any attempt to bear the weight of his body upon this single foot very greatly aggravated the pain in these situations. He had been frequently blistered over these points, but at the time of our visit they were painted with iodine. The doctor stated that at first, looking upon it as a rheumatic affection, he had treated it accordingly, and the patient had recovered; but, finding that exercise always caused it to return, he had suspicions of his diagnosis being correct, and was unable to satisfactorily explain the case. There was no evidence of specific taint or he would have suspected that as its origin; but the man had never been affected with syphilis, and the doctor, to make assurance doubly sure, had

several times treated him with iodide of potassium, and each time he would recover from the pain, but he was disposed to attribute his freedom from pain to the rest he secured during the time he was confined to his room and not to the medicine.

The history of the case was as follows: Three years previous, when crossing the ferry to Astoria, one of the horses suddenly became alarmed when going on the boat, and he jumped from the wagon, used considerable exertion to get his horses on the boat, and finally was compelled to jump or spring very forcibly to get on the boat himself. Before he had crossed the river he began to feel a slight pain on the outside of his shin-bone, and when he arrived at Astoria found himself quite lame, but not sufficiently so to call in a physician. In a few weeks this all passed off, and he never complained of pain along his shin-bone or leg from that time, but after some months began to complain of pain at the inner border of the scaphoid, and at the junction of the two cuneiform and cuboid bones with the metatarsus, as before described. Upon a very careful examination of his two legs, the foot upon the right side was found to be a distinct *valgus*, and upon the outer side of the spine of the tibia there was a deep sulcus in which the finger could be readily placed, indicating that the tibialis-anticus muscle had probably been partially ruptured at the time of the accident. The diameters of the two legs at this point showed an inch and an eighth difference. The peroneals on the right side were very rigidly contracted, and could not be extended so as to allow the foot to be brought around to its normal position.

The diagnosis was, therefore, rupture or paralysis of the tibialis-anticus muscle, eversion, abduction, and flattening of the foot. In consequence of this loss of the support to the arch, pressure upon these abnormal parts occasioned the intense pain at the points previously described, and the reflex contraction from this pain produced the spasmodic contraction of the peroneals.

Dr. Krackowizer was so charmed with the diagnosis that he requested me to take charge of the case, allowing him the privilege of seeing it from time to time.

I dressed him with the Barwell dressing, as seen in Fig. 37, placing a tin on the outer side of the leg, and connecting its top with an eyelet secured to adhesive plaster on the inner border of the foot by India-rubber elastics, so that by their contraction

they took the place of the tibialis-anticus muscle. The relief to the pain was instantaneous upon the application of this elastic force, and the patient was able to walk about with great comfort. The cure, however, was not perfect until section had been made of the contracted peroneal muscles, which was done by Dr. Krackowizer at my suggestion in the following March.

When I first saw this patient I was not aware of the principle which I have since established, viz., that point-pressure upon a contracted tendon, producing reflex spasm, is an indication of the necessity of section, or we should have divided these muscles before any other treatment was adopted. Finding that I had simply gained relief from pain without making any improvement in the position of his foot when the elastic force was removed, I then examined him, and discovered that pressure upon the contracted peroneals produced a reflex spasm. Dr. Krackowizer subcutaneously divided them, as before mentioned, when the foot was immediately brought with ease into its normal position and retained there by adhesive plaster and a roller. The wound healed in a very few days, and at the end of a month, with a slight elastic to take the place of the tibialis, he was enabled to walk and exercise as well as he ever did, and is able to do so to this day, simply using a steel sole with an elevated arch to support his foot.

I have seen many cases, of which the one just reported is a specimen, but will only narrate one or two, for still further illustration.

CASE.—Some years since a gentleman called on me with his little boy, who, he stated, had been suffering for several years with scrofulous disease of the bones of his foot. He had applied to various physicians and had used all the constitutional remedies, as well as local means, for its relief without benefit, and wished me to examine it. I found an open sore about an inch in circumference over the junction of the cuboid and two cuneiform bones with the metatarsal bones, which was kept discharging by some ointment which was daily applied. The peroneal muscles were very rigidly contracted; the foot was a splendid specimen of *valgus*; the sulcus at the side of the tibia was very distinct, in contrast with the plump condition of the other leg; there were an enlargement and projection of the scaphoid bone, the skin over which was covered with the tincture of iodine. As I was going to my lecture at that moment, and as I was lecturing upon club-foot at the time, I asked the gentleman if he would be kind

enough to get into the carriage and let me take the boy before the class. He stated that, as my explanation was the first clear one he had ever had in regard to the boy's condition, if it would be of any benefit to science, he would go with me most cheerfully. I took him to Bellevue Hospital Medical College and subcutaneously divided the peroneal muscles. The foot was then restored to its natural position, and secured there by a strip of adhesive plaster passed around the foot, and carried up the inside of the leg, the plaster being secured by a well-adjusted roller, care having been taken to put a cotton pad on either side of the inflamed scaphoid where the adhesive plaster passed over this bone. I then ordered him a shoe to be made with an elevated inside steel sole, so as to support the arch of the foot; an iron rod, running under the sole, came up on the inner side of the ankle, where it had a joint; from this point a steel spring long enough to reach above the calf, terminating in a band to go around the leg. When this steel was bent outward, and secured to the calf of the leg, it necessarily bent the foot inward, and the steel sole in the bottom of the shoe sustained the bones of the foot in such manner as to allow them to receive pressure in their normal position, and gave perfect relief from pain.

One week from the day of the operation, this gentleman again brought his boy with the shoe to my lecture at the college. The adhesive plaster was removed; the wound occasioned by the tenotomy had firmly united. The sore upon the top of the foot not having entirely healed, a greased rag was put upon it; his stocking and shoe having been put on, and the spring around the calf properly adjusted, the boy immediately walked around the room with perfect ease.

CASE. *Double Talipes Valgus, or Flat-foot, from Weakened Anterior Tibials, mistaken and treated for Rheumatic Gout; cured by Artificial Forces to take the Place of the Weakened Muscles.*—Mr. M., aged thirty-two; a very large and heavy man, weighing two hundred and forty pounds; proprietor of a public saloon. He had been for some years afflicted with great pain in his feet, upon taking the slightest exercise, more particularly when standing behind his bar. Being a free-liver, it had been supposed that he had rheumatic gout, and had been treated accordingly. Finding no permanent relief, except in the horizontal posture, he changed his medical adviser, and his new attendant, suspecting

there might be a syphilitic taint in the disease, placed him upon a liberal use of potassium and iron, in addition to the colchicum, the use of which he was directed to continue. By a few weeks' confinement to his bed, he would invariably get relief from the pain in his feet, but his stomach and other digestive organs had become so impaired by the constant use of colchicum and potassium, that after some years of treatment he abandoned all medical advice, and simply resorted to his bed when his painful attack came on, and discovered that he recovered about as quickly by rest alone as he had before through medical treatment, and, at the same time, his digestive organs were much improved; but one or two days' standing behind his bar would invariably compel him to keep to his bed the three or four succeeding days.

In this condition, and with this history, he came under my care. Upon his naked feet he walked in the most awkward manner, his feet being very much everted, and the arch completely broken down. Pressure over the junction of the cuboid, external, and middle cuneiform bones with the three median metatarsals, and over the lower and inner border of the scaphoid, gave intense pain. The tibial muscles on either side were very deficient in development, and he had no power of inverting or elevating the inner border of his foot.

In this case, I injected strychnia (one sixtieth of a grain) into the tibial muscles, and repeated it every twelve days, and applied the Barwell dressing to both feet, in such a manner as to take the place of the deficient tibial muscles, and the following day he resumed his avocation of waiting upon customers at his bar. Electricity was applied to the tibial muscles, every other day, for about three months, during which time he constantly wore the Barwell dressing. After this period, steel soles, made to fit the arch of the foot, so as to sustain them in the natural position, were worn in either shoe, and from that time to the present, over five years, he has remained in perfect health and attends to his business, never having an attack of rheumatism, gout, or any of his former suspected maladies.

On reviewing my note-book, I find more than a score of cases almost identical with the three just described, but I will only quote one more.

CASE.—“Mr. M. D. F., aged about fifty years, a very large and heavy man, civil engineer by profession, was brought to me

in the fall of 1857, from Halifax, to see if it were possible to have an operation performed upon his feet that might relieve him from his intense agony, and render him capable of following his profession, or else to have his feet amputated at the ankle-joint, as standing for any length of time, or locomotion, had become almost impossible. During the last three years he had been confined either to his tents on the island of Newfoundland; and various places where he had been engaged in placing the telegraph-wire from Port Aulasque to St. John's, or else in St. John's, or Halifax, to which places he had been carried several times for treatment.

"In all his confinements he had been supposed to have had rheumatism, gout, or a complication of the two, and had been treated for these diseases according to the best lights of science. He then resorted to all the various specifics that are advertised for the cure of gout, such as Blair's pills, White's pills, Lavoille's specific, Reynolds's specific, and all the other remedies that promise to cure the gout, but all without any result except to greatly injure his digestive organs. His attacks recently had become so much more frequent and severe, that he was compelled at last to abandon the work, another engineer taking his place. He had formerly been an exceedingly active man—a great athlete—scorning the idea of fatigue or over-exertion, and during the first two years of his work on the island of Newfoundland had walked several times from Port Aulasque to St. John's, leaping creeks, climbing crags, and descending cliffs, until at last his muscles had become over-fatigued. The tibials having become wasted in tone, flat-feet resulted, and, when the weight of the body was placed upon them, pressure was brought to bear upon the upper border of the edge of the junction of the cuboid external and middle cuneiform with the upper edge of the articulating facets of the corresponding metatarsal bones of each foot. The under and inner surface of either scaphoid was also exquisitely sensitive, like an attack of acute periostitis, a perfect counterpart of the other case already described.

"I asked him to walk into my inner office. This he started to do upon his crutches, and, as he reached the doorway, I stopped him and asked him to place each of his feet over the sill of the door (which happened to be about the proper height to sustain the arches of his feet), and, after some persuasion, induced him to lay aside his crutches and see if he could bear his weight upon

his feet in that position. He at first hesitated to make the attempt, but, being assured that I would not let him fall, he handed me his crutches, and stood erect upon his feet and instantly burst into tears, telling his brother who was with him, that from this they might think his disease and the agony he suffered was all pretense, but it was not so, and he could not understand how it was possible that resting only three days on the ship this time had cured him perfectly, for he was just as bad when he left Halifax as he had ever been in any of his numerous attacks, and now he felt no pain whatever. He was not aware that the support to the arches of his feet had anything to do with his relief, and was very urgent in trying to persuade his brother that he had not been playing this game in order to be relieved from labor in that distant country, but that his disease was real. I gave him his crutches, and asked him to step off from the sill of the door and stand upon the even surface of the floor without any support to the arches of his feet, when he screamed out, in the most intense agony, "There is that old pain back again!"

"I took two pieces of sole-leather, and, marking them to fit his feet, cut out a pair of soles. These were dipped in cold water until they were perfectly soft, and then carefully moulded to the bottom of his feet and secured by a nicely-adjusted roller. The feet were then pressed into their natural shape, the leather firmly pressed up under the arch of each, and the feet held in this position for some time, until the leather had accurately assumed the shape of the bottom of his feet. He was then permitted to go home. From these leather models Messrs. Otto & Reynders, of Chatham Street, constructed steel soles exactly similar and inserted them into well-fitting boots, securing them at the heel by a rivet or screw.

"Some days after Mr. Reynders informed me that the boots were done, and had been sent to the brother's house in this city. I called there, on my way to the hospital, to see him, and to my amazement found that he had put them on and was coming down-stairs with his carpet-bag in hand, and going to the depot, Fourth Avenue and Twenty-seventh Street, to leave for his home in Massachusetts. By the use of this artificial support he has been entirely relieved from his gout, rheumatism, and rheumatic gout, without the employment of any internal remedy."

The muscle chiefly concerned in this paralytic variety is the

tibialis anticus, which fails to sustain the arch of the foot. There are various methods of relieving this particular class of cases, but the following are among the most serviceable: In the first place, a steel spring may be constructed of the exact shape of the arch of the foot in its normal position. Such a spring may be placed in a shoe and fastened at the heel, leaving the anterior portion free to move as the weight of the body is thrown upon it. A pattern for the spring can be obtained by making a plaster cast of the foot with its arch elevated to the normal position, and afterward the steel can be easily fitted to such a model. A shoe and spring arranged in this way will give support to the arch of the foot, but before permanent relief can be obtained vitality must be restored to the paralyzed anterior tibial muscle. Mr. Reynders, the instrument-maker, has made an ingenious contrivance which is very useful in this class of deformities, which consists of an upright bar on either side of the leg, with joints at the ankle, and secured to the sole of the shoe. These uprights extend nearly to the head of the tibia, secured by a band behind and buckle in front. From the top of these bars a web-



FIG. 29

bing passes down inside the boot under the arch of the foot, the inner webbing having a few inches of elastic insertion. This webbing can be made taut or loose at the top of the bars by a buckle, so that the arch of the foot is sustained when stepping by the extra support given it by this piece of webbing. (See Fig. 29.)

Another method of treatment is to attach to the inner side of the sole of the shoe an upright strip of spring-steel, having a joint opposite the ankle-joint and diverging from the side of the leg with a considerable angle. When the foot is secured in such a shoe, the spring is brought in contact with the tibial side of the leg, and then secured. The action of the spring is to adduct the foot and give additional support to the arch.

The most convenient method of treatment, however, and one equally serviceable, is that by means of the elastic tension which is afforded by Barwell's apparatus. This apparatus will be fully described when we come to the subject of treatment of talipes, and it is, therefore, only necessary to say here that you simply have to reverse this apparatus as applied for varus, to make it applicable to the treatment of valgus. (See Fig. 37.)

The apparatus must be made proportionately strong, according to the weight of the patient.

There are a few points with regard to the application of the dressing which deserve special mention. One of the points of tenderness may be over the articulation of the scaphoid with the internal cuneiform bone, which is exactly in the line of traction made by the chain to which the artificial muscle is attached. The precaution should, therefore, be taken to pad around this inflamed point, by means of adhesive plaster and cotton, applied one strip upon another, until a sufficient thickness is obtained to prevent the chain from doing any harm by pressure. The origin and insertion of the artificial muscle are to be applied respectively over the origin and insertion of the tibialis-anticus muscle, and one or more muscles may be attached as the case may require. You should always cut a hole in the stocking for the chain to pass through, so that the artificial muscle can act freely upon the outside. If low shoes are worn they will cause no obstruction to a free action of the muscle, but if a high shoe is worn it will be necessary to cut a hole in the upper leather through which the chain is to pass, as through the stocking. When arranged in this way the artificial muscle can act without restraint. (See Fig. 59.)

In moderate cases, all that may be necessary is a broad strip of adhesive plaster applied in such a manner as to give support to the weakened tibialis-anticus muscle, and firmly secured in position by means of a roller-bandage. (See Fig. 43, D.)