

106.) In this manner pressure can be made which will be exceedingly powerful, and yet so soft and elastic as to be easily borne. Such pressure, constantly applied, on account of its elastic character, will cause an absorption of the fluids within the joint; and also, by this very pressure, we have a tendency to separate the articulating surfaces; therefore, to a very considerable extent, we secure the double advantage of pressure and extension and counter-extension, by forcing the fluid into the joint, thus preventing the articulating surfaces from being forced upon each other by muscular contraction. After a few days have elapsed, friction with the hand is of the greatest possible advantage; but to afford the best result it should be much more briskly applied, and continued for a much longer time, than has generally been done by the great majority of surgeons.

In fact, many cases of quite severe injury affecting the ankle-joint, or any other joint, such as a wrench or a sprain, will yield, in a comparatively short time, to manipulations and friction persistently applied for some few hours every day.

You may call this "*massage*" if you have a fancy for a new name, but I have employed this plan of treatment for many years, and long before the term "*massage*" was applied to it. It is, however, sometimes necessary that a method of treatment should go across the water and be baptized with a new name before it becomes popular.

So much, gentlemen, for the treatment to be adopted when the injury is first received. This is the important time for the application of measures which are to prevent the further development of the disease, and, could such treatment be faithfully carried out in every case from its earliest commencement, there would rarely be need of the mechanical appliances and surgical interference to be described at our next lecture.

LECTURE XIV.

DISEASES OF THE JOINTS.—ANKLE-JOINT (CONTINUED).

Treatment (continued).—Description of Instrument.—Mode of Application.—Cases.—
Disease of the Tarso-Metatarsal Articulation.—Case.

GENTLEMEN: At the close of my last lecture I was speaking of the importance of early treatment of injuries of the ankle-joint, hoping thereby to prevent destructive disease. Unfortunately, however, very many cases pass unrecognized, or, being recognized, are neglected, and gradually arrive at a stage in which surgical aid is sought, and then they probably are in a condition which will demand some more formidable method of treatment than that which has already been given; and it is to this part of our subject that I invite your attention to-day. When there is still hope of preserving the joint intact, which is to be determined by the length of time the condition has existed, the amount and character of the fluid in the joint, the degree of constitutional disturbance, and the general condition of the joint, I employ an instrument which I have devised for this purpose.

This instrument consists of a firm steel plate, made to fit the sole of the foot; at the heel is a hinge-joint, and attached to it a rod,

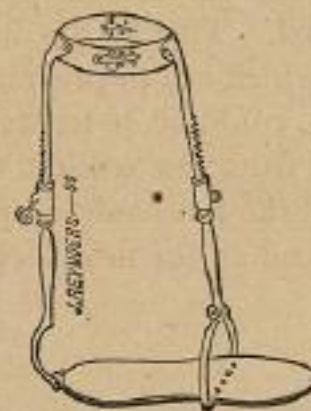


FIG. 107.

slightly curved at the bottom, and extending up the back of the leg to near the knee. Over the instep is an arch, like the top of a stirrup, with a hinge-joint at its summit from which springs another rod, which runs in front of the leg, of equal length with the

one behind. These rods are made with a male and female screw, or ratchet and cog, for extension, and connected at the top by a firm band of sheet-iron, on one side of which is a hinge, and a lock on the other, like a dog-collar. (See Fig. 107.) In front of the arch that goes over the instep is a joint in the foot-plate which permits flexion of the toes.

The instrument is applied with firm adhesive plaster, cut in strips about one inch in width, and long enough to reach from



FIG. 108.

the ankle to near the tubercle of the tibia, and placed all around the limb, as seen in Fig. 108.

The plaster is secured in its position to within a few inches of its upper extremity by a well-adjusted roller, as seen in Fig. 109.

The instrument is fixed, and the foot firmly secured, by a number of strips of adhesive plaster, as seen in Fig. 110.

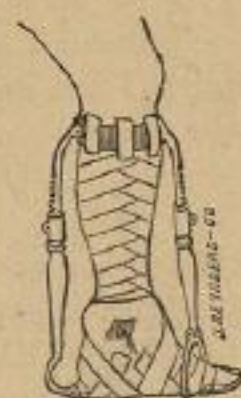


FIG. 110.

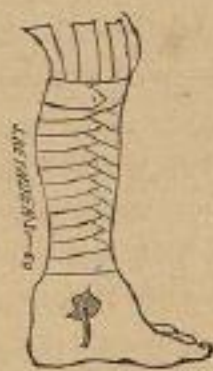


FIG. 109.

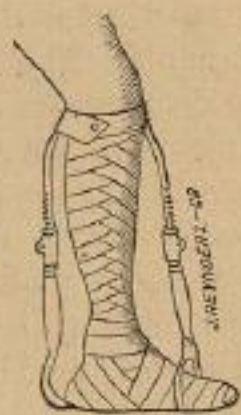


FIG. 111.

A roller should be carefully applied over this plaster to prevent its slipping, and the ends of the plaster at the top of the

instrument turned over the collar, which has been previously locked, just tight enough to be comfortable, and secured by a turn or two of the bandage, as seen in Fig. 111.²

With the instrument accurately adjusted, the extension can be regulated by the key, so as to make the patient comfortable.

If, however, the symptoms show the system to be suffering from the poison of the pus retained in the joint, or if, the joint being open, the patient is sinking under the drain of prolonged suppuration, the diseased bone should at once be removed, and a perfect drainage established, so that no pockets or sinuses can be formed. If this latter accident be allowed to occur, the disease of the bone will not be arrested, and the operation will therefore be useless.

Now, you cannot in the ankle exsect the bone, as you can at the shoulder or hip, by a straight incision. In these orbicular joints the operation is simple; you have but to cut down to the bone, open the capsule, throw out the head of the bone through the "button-hole" slit, remove it with the chain-saw, and finish with the rongeur or forceps, if necessary.

But in the hinge-joints, as a rule, and especially such complicated ones as the ankle, you cannot safely operate in this way. To make the necessary incisions, the muscles and vessels must be divided transversely, and so much damage is thus done as to seriously interfere with the success of the operation. The elbow-joint is the exception to this rule, the ordinary operation for orbicular joints, i. e., a single incision parallel with the muscular fibres and vessels, being applicable to it. In view of this, I have for many years refused to operate by exsection upon the ankle and wrist joints. The method which I substitute I shall now proceed to demonstrate to you, as by so doing I can much more clearly explain and more firmly impress the essentials of the operation than by any amount of lengthy description. The history of the case before you is, in brief, as follows:

Lewis R., aged nine; last winter, in December or January, sprained his ankle while skating. For some time he experienced no trouble in the joint, but eventually it began to swell, and the disease ran the usual course, till he was admitted to Bellevue Hospital in July with an open joint. On the 22d of that month I removed what dead bone could be found, and passed a seton of

² The figures represent the instrument as applied to a joint which has been setoned.

oakum through the joint from side to side below the malleoli. The joint was fixed by a plaster-of-Paris splint, which was changed in a few days for one of leather. The case remained under my care but a short time. The surgeon to whose care he next passed, holding different views regarding the treatment of these cases, removed the seton a month after it had been inserted, and after that the treatment was simply applying poultices and stimulating dressings. The surgeon now having charge of the case has kindly consented to surrender it to me for one year, at the end of which time it is to be returned to him for an amputation. You see, he has no faith in my plan of treatment.

You will notice the foot and ankle present the usual appearance found in chronic inflammation and suppuration of this articulation complicated with caries of the tarsal bones. (See Fig. 105.)

The usual contours of the joint are obliterated, and it presents an irregularly rounded tumefaction, nearly twice the size of the opposite ankle, of a purplish color from venous congestion, which has been aggravated by long-continued poulticing of the part, and a boggy, doughy feel, with several open sinuses, through which the probe readily passes to dead bone. I would remark, in this connection, that the long-continued use of hot poultices to a joint in the condition of this one is always injurious. The heat solicits more blood to the part, and the relaxing effect of the fomentation favors the passive congestion of the capillary vessels, and thus adds to the œdematous and "boggy" condition of the part.

While the patient is under the chloroform, I shall remove the carious bone *sub-periosteally*. If I destroyed the periosteum, I should defeat the chief object of my operation, namely, the regeneration of bone and the formation of a *movable joint*.

Into the sinuses already existing I pass this instrument (Fig.



FIG. 112.

112), which I have formerly called an "oyster-knife," as its form most resembles that of the implement used to open oysters, but it is more properly called a periosteal knife, or elevator.

The blades are strong and wedge-shaped, the edges not being sufficiently sharp to cut the soft parts. With it I can enucleate the diseased bone without fear of lacerating the vessels, periosteum, or other important parts. Make your excavation thoroughly, seeking to remove not only all the dead bone, but especially the gelatinous matter so abundant in these diseased joints. In this case you see I have removed, besides a mass of detritus, a piece of carious bone about the size of a hickory-nut, which is from the lower end of the tibia, including a part of the articular surface. If I can, I generally, before finishing the operation, place my finger within the joint, to more perfectly assure myself that I have reached all the diseased structures.

Now, I draw completely through the joint, and also through the other sinuses, a large seton of oakum, saturated with Peruvian balsam, letting the ends extend beyond the ulcers for several inches. The advantage of the oakum I will mention in a moment.

The operation proper is now complete. We now place the foot in a comfortable position, and at a proper angle with the axis of the limb, and fix it there by an anterior splint of plaster of Paris, from which arms extend around the foot and leg below and above the wound, so as to leave the latter entirely free for daily dressing. (See Fig. 116, with plaster-of-Paris splint.)

When the plaster has "set," envelop the joint with a thick pad of oakum, filling with it the fenestræ in the plaster dressing, and bandage the foot and ankle as firmly as possible.

The reason why I insist upon the use of oakum is this: it is elastic and makes an equable pressure, but at the same time it is always pervious to the escape of pus. You know how dense compressed cotton is, how it cannot be wetted thoroughly for a long time; lint has much the same qualities. I sincerely believe that the life of many a soldier was lost during the late war, simply from the lint with which his wounds were dressed, or rather plugged. Beyond this advantage, oakum is particularly serviceable as a seton by reason of its strength, and the tar with which it is so thoroughly impregnated prevents its becoming readily foul. Therefore, gentlemen, I use lint only to arrest or prevent hæmorrhage, and never after suppuration is fully established.

In this case, then, I have accomplished what? By my excavation I have removed the essential morbid cause; by the

splint. I prevent motion, which would be a cause of a relapse; and by the firm pressure I have given the enfeebled and stagnant circulation of the parts the best possible support. The seton will be moved daily, and the soiled part cut off; you can easily twist on more oakum, and thus continue it as long as necessary, and what *débris* of carious bone has been left behind will be drawn out entangled in the fibres of the oakum. By-and-by, when the reparative process shall have been fully established, the extension instrument, which I have already described to you, will be applied, and the boy allowed to go about. Even before that, if your patient is of sufficient age to take proper precaution against injury, he may be allowed to go about a little on crutches. In this event, however, you will be especially careful that the bandages be applied with sufficient accuracy and firmness to counteract the congestion from gravitation of blood to the part.

I hope, gentlemen, before this winter session closes, to be able to present you the result of the case I have just operated upon, but a longer time may be necessary for a perfect cure.¹ I have, however, here several persons upon whom I have already operated, and who, living in the city, have consented to come before you in order that you may see what degree of success you may anticipate. And first, let me present one which should follow the case just operated upon, because they both exemplify the danger of the too speedy removal of the setons. This one, moreover, will satisfy any doubt which may have arisen in your minds, regarding the propriety of *repeating* the gouging and setoning process, if necessary.

CASE. —John R., Davenport, Iowa, aged twenty-seven; laborer. In November, 1866, while ploughing, he sprained his left ankle. He did not, however, experience sufficient inconvenience from the injury to prevent him from working until four months had elapsed, although during this interval he was aware that the joint was not quite sound. From the time he was obliged to give up work, until he came to New York, in April, 1868, he had been under surgical treatment. His attendant advised him, last spring, to come to New York to consult me.

The foot presented the general appearances already described

¹ This child was presented to the class February 25, 1875. The wounds all healed but one, and from it there was very slight discharge. Motion of joint good, and the child's general health perfectly restored.

in relating the other cases. Below both malleoli were openings, and through each dead bone could be recognized by the probe. Still another fistula opened on the outer side of the tibia, about five inches above the articulation. The general health of the patient was considerably impaired, and he was quite thin.

At that time, April, 1868, I dug out a large quantity of carious bone, consisting of the scaphoid bone, a part of the astragalus, and pieces which appeared to be parts of the smaller tarsal bones. The calcaneum was then quite sound. The dressing, with the seton and plaster-splint, was applied as you have already seen done. Three weeks after the operation, I sent him to Bellevue Hospital, as his lodgings were not suited to his wants. The surgeon to whose care he fell, removed the plaster-splint at once, and four weeks later removed the setons. This change of treatment was due to the fact that the surgeon holds the opinion that *motion* is necessary to the cure of the joint, in order to excite a healthy action. Now, I have already insisted upon the absolute necessity of *rest* in certain stages of the diseased joint, but there is a period when motion becomes necessary, and I should do well, I think, to explain to you when motion is injurious, and when it is demanded.

So long as there is active inflammation in a joint, motion is injurious, and rest absolutely necessary. In the first stages of inflammation of any joint, rest is also imperative, and, in fact, is the essential element of the treatment; and, as long as acute pain is produced by pressing the synovial surfaces and articular cartilages together, rest must be enjoined; or, if motion of the joint is requisite, in order to prevent ankylosis, then this motion must be always accompanied with extension, in order to relieve this pressure. But, when pressure can be borne without pain, and the difficulty in motion depends upon the contraction of tissues around the joint from want of use or from deposits, as the result of an antecedent inflammation, then motion—passive motion—applied with discretion, is just as much a part of the treatment as rest was in the earlier stage of the disease.

So, too, when a joint has been opened for suppuration and caries, as long as there is dead bone remaining and excessive suppuration, rest is imperative and motion injurious; but when the dead bone has all been exfoliated and removed, the pus diminished and of a healthy character, then the setons can be discarded, the

sinuses allowed to close up, and passive motions commenced, which can be increased with judgment and discretion, in order to make a new or artificial joint in the new bone formed from the original periosteum, which, as I stated to you before, must always be left for this purpose when making your resections.

When I came on duty, the following July, I found the pa-



FIG. 113.

tient's foot presenting nearly the same appearance as at first. The premature removal of the setons had allowed the accumulation of pus within the joint, and the caries had been re-established. Examination with the probe showed the calcaneum to be now involved. The operation of excavation was repeated, and a large



FIG. 114.

portion of the os calcis removed, a seton passed through the joint, another from each of the openings on the side to an artificial opening at the point of the heel, so that, in any position the patient might assume, the drainage would be perfect. By reference to Figs. 113 and 114, you see the condition of the patient at the time the photographs were taken. The setons had all been

removed, and the wounds had closed. There was no pain in the joint. The patient walked without limping, showing that there was no tenderness. The fistula on the leg and that on the point of the heel were so perfectly healed that the cicatrices could be found only with difficulty. The contour of the foot was so perfect that one would naturally doubt that so much bone had been removed: This was, I think, evidence that the bones of the tarsus had in some sort been reproduced by the periosteum. I have never had the opportunity of examining, *post mortem*, any of these reproduced ankle-joints.

This man at that time appeared to be perfectly cured (see Figs. 113 and 114), and you might think that treatment should be suspended. On the contrary, after this point has been reached, the limb must be carefully bandaged for months to come, until all the discoloration from congestion shall have disappeared. If you neglect this precaution, there is great danger of a relapse. You will notice in these cases, when you let the foot hang down, that the skin becomes discolored from capillary congestion, and the roller should be reapplied with considerable firmness, in order to support the circulation in these new tissues, and this accurately-adjusted compression must be continued for months after the cure has been apparently complete.

CASE.—Annie L., aged four, came to my clinic January 13, 1875, with the following history:

She was injured, as the father states, by jumping down two steps, on December 26, 1873. She went to the German Dispensary from January 4 to March 11, 1874, when she went to the Forty-second Street Hospital. Continued under treatment there until four days since. The only symptom for which she was sent to the German Dispensary was the inability to walk.

She is now much emaciated and suffering intense pain; the mother says she screams out at night every time she gets asleep, and cannot be moved without hurting her—cannot have the slightest motion at the ankle-joint without extension. Appetite bad; position as seen in Fig. 115; ankle much swollen, with openings on inner and outer side.

Before the class at Bellevue College, I dilated the sinuses, and gouged out a large quantity of dead bone; passed an oakum seton from side to side through the ankle-joint (Fig. 116, 1, 1), and another from front to heel (Fig. 116, 2, 2), and, putting the

foot into its natural position, secured it there with plaster-of-Paris bandage, leaving fenestræ as seen in Fig. 116.

January 20, 1875.—Child was at clinic, much improved. Her appetite has returned, she is free from pain, and she sleeps well; the wound presents a healthy aspect. Can bear weight of



FIG. 115.



FIG. 116.

body on foot when plaster dressing is applied. Only complains when oakum setons are drawn through. One or two small pieces of bone have come out on the oakum.

27th.—Very much improved; runs around without pain; ankle simply stiff from the plaster. Discharge much diminished and more healthy.

February 3d.—At clinic, rosy-cheeked and playful; discharge very slight. Mother has dressed the ankle daily.

March 31st.—Was at the clinic, looking the picture of health. Seton through heel had been out some days; no discharge from antero-posterior opening, and very little from lateral sinuses. Child runs on plaster splint without any pain. Removed plaster casing, and she could bear her entire weight upon her foot. As there was still a slight discharge, left seton in as seen in Fig. 117, from sketch taken March 21, 1875.

August 1, 1875.—Recovery perfect, with motion (see Fig. 118).

CASE. *Suppuration and Caries of both Ankle-Joints from Injury; Double Talipes Equinus; Operation; Recovery, with Motion.*—Elizabeth B., aged sixteen. Admitted to Bellevue Hos-

pital, January 29, 1864. Her father died of phthisis. In 1862 she sprained her right ankle. The injury produced a chronic form of inflammation, and in two months it had increased so much that she could bear no weight at all upon it. She now moved about by hopping on the well (left) foot, and in about six weeks



FIG. 117.



FIG. 118.

she had excited the same form of inflammation in that one as in the other. Two years after the first injury, when admitted to the hospital, her appearance was cachectic and miserable. The disease in her ankles had gone on to the formation of abscess, and several sinuses led into the joint, through which disintegrated bone had escaped.

The gastrocnemius of both sides were so contracted as to extend the feet nearly to a straight line with the tibia. She could not bear the slightest pressure on either foot, and could not use crutches, as she could not poise herself on the ends of her toes, which were the only points that could touch the floor when in the



FIG. 119.

erect posture. She was, therefore, compelled to move about upon her knees, as seen in Fig. 119, which also shows the sinuses connecting with either joint.

All active disease about the joints had subsided; but the dis-

charge from the various sinuses was considerable, and, by probing them, several small pieces of bone escaped.

On the 17th of February, 1864, in the presence of the class at Bellevue Hospital, I divided subcutaneously the tendo-Achillis on both sides, and restored the feet to their natural angle with the legs. Leather splints were then applied, to retain them in this new position until I could have a pair of instruments manufactured, which I am in the habit of using to extend the ankle-joint. (See Fig. 107.)

On the 24th of February, just seven days after the section of the tendones-Achillis, these instruments were applied in the presence of the class at Bellevue Hospital, in the manner above described. (See page 164.)

The sinuses were enlarged, and a seton of oakum drawn through the ankle-joint, as indicated in Figs. 108, 109, 110. A wad of oakum thoroughly wet in cold water was placed over each ankle, and secured by a firm roller. The screws were extended, and the difference in the appearance of the ankle before and after is well represented by comparing Figs. 110 and 111.

These drawings were taken from life by Dr. Henry C. Eno, House-Surgeon of Bellevue Hospital, and are as accurate as any photograph could be.

As soon as the instruments were properly adjusted, she stood upon her feet without the aid of crutch or cane, for the first time in two years, and without any pain whatever; but, the instant the screws were shortened, the pain was most intense.

She was directed to have the oakum around the joints kept constantly wet with cold water, and firmly supported by a bandage and changed as often as necessary. The seton was to be pulled through, and the soiled part cut off daily, and to be continued as long as any bone was exfoliating, until the matter should change from its sanious condition to a consistent pus, when it was to be removed, the wounds allowed to heal, and, if possible, passive motion made. If motion could not be attained, then the feet were to be ankylosed in their natural position, deeming that a stiff ankle was better than an amputation.

The following notes of the case, copied from the hospital records, which were taken by Dr. Irving W. Lyon, House-Surgeon, now of Hartford, Connecticut, will show the progress and the result of the treatment:

"February 28th.—She is very comfortable, and there is no pain about the ankles.

"March 15th.—Has been out of bed most of the time since the operation; but remained sitting at the bedside until to-day, when, with the aid of crutches to balance the body, she walked about, bearing her *entire weight* upon the feet, the extension made by the instrument being so perfect as to prevent pressure upon the joint-surfaces.

"April 6th.—Apparatus removed from both feet, and motion made at the ankle-joints, which are perfectly free and movable, but pressure is yet *very painful*. The apparatus is reapplied. It should be stated that the patient was put upon the best diet the hospital could afford, together with cod-liver oil and iron.

"7th.—The adhesive plaster having become disarranged, necessitated its readjustment. It was now discovered that the sinuses had all closed completely; but pressure while extension was off still gave her some pain. Her general health very materially improved.

"July 20th.—All extension being removed, she is able to stand erect without pain in either ankle; but attempts at walking occasion a considerable amount of pain and uneasiness. The



FIG. 120.

motions of the ankles are all unimpaired. Her health is thoroughly restored; and she has not only grown taller since her admission, but has also grown much more fleshy, and will weigh at least thirty pounds more now than in February. The splints are reapplied, and will require to be worn a little while longer to complete the cure."

In a foot-note I find the following record: "It should be mentioned that since the 15th of March (the date of her commencement to walk upon the shoes) she has continued to walk upon her feet, bearing the entire weight of her body upon them, and only needed crutches to supply the place of the muscles of the leg, which, on account of being confined by the apparatus, were unable to balance the body."

Dr. Lyon left the hospital about this time, and I can find no further notes of the case on the records of the institution. She wore the instruments, however, until about the middle of January, 1865, when they were permanently removed. The motions are almost perfect, and she can walk without pain. Fig. 120 is an illustration of her legs and feet after recovery.

CASE. Suppuration and Caries of the Ankle-Joint; Operation; Seton; Extension; Recovery with Motion.—In January, 1855, I was sent for by Dr. L. C. Ferris to amputate the leg of Ella S., aged five years—for disease of the right ankle-joint. In March, 1854, ten months previous, she had fallen from a chair, striking her right ankle against the sharp corner of a bedstead. The injury was immediately followed by considerable swelling and very great pain. The pain soon subsided, but the swelling continued.

For two or three weeks she seemed tolerably well, but at the end of that time she began to limp badly. She was then put upon crutches, and various lotions applied to the foot and ankle.

The disease, however, continued to progress, her general health became much affected, with loss of appetite and sleep, and she was greatly emaciated. The limb was much smaller than the other, but the foot and ankle were swollen into a shapeless mass. In November she began to have repeated chills and hectic fever, and in the early part of December the ankle opened in several places, giving exit to a large amount of ill-conditioned or strumous pus. Her general health became much impaired, and in January, 1855, I was sent for to amputate the limb. Her suffering was most intense; she would not permit the limb to be handled, and, until she was under the influence of chloroform, crepitus could not be detected; several sinuses around the joint discharged quite freely a curdy pus mixed with a material very much resembling quince-jelly.

A probe passed into one of these sinuses, just posterior to the internal malleolus, went into and through the joint, making its exit at a point in front of the external malleolus. A strip of linen (in default of anything better) was torn from the child's dress, passed through the eye of the probe, and drawn through the joint.

A piece of firm sole-leather, cut to fit the front of the leg and dorsum of the foot, having been thoroughly soaked in cold water, was then applied over the top of the foot and secured by a nicely-adjusted roller; the foot was firmly extended so as to separate the tibia and astragalus, and the roller then carried up the leg, over the leather, which, when dry, served to extend the joint and at the same time prevent all motion. This gave her great relief, and her limb could be moved with comparative comfort. The child was put upon the most nutritious diet, with quinine, cod-liver oil, and iron.

The dressings were removed and changed as often as they became soiled with pus, and, in the progress of the case, compression with sponges and cold water was resorted to. Her improvement was most marked and rapid. At the end of a few weeks the instrument was applied, as in the other cases, and with the same happy results, enabling the patient to walk with crutches and obtain the benefit of out-door exercise, which added materially to the improvement of her general health.

The setons were retained nearly ten months, being gradually reduced in size as the bone ceased to exfoliate and the pus became more healthy, until for a number of weeks they were hardly larger than a single thread. When they were finally removed, the sinuses healed in a few days, and passive motion was commenced as in the other cases. The patient continued to wear the instrument for nearly a year after she was perfectly well, as a means of prevention against accident, and then left it off entirely.

It is now twenty-one years since this case was operated on, and she is as well in the one leg as the other, and the motions are almost as perfect. The foot is one size smaller than the other, and the leg a little shorter; but the limb is perfectly developed, as represented in Figs. 121 and 122, which were taken from a plaster cast of her limb, and which also represent the cicatrices where the seton passed through the joint. Since recovery her limb has continued to increase in size until it is now as well de-

veloped as the other, and the motions are equally perfect; in fact, she is the prize female skater of the city.



FIG. 121.



FIG. 122.

CASE. *Caries of the Ankle-Joint; Seton; Recovery.*—B. W., aged seven, of healthy parents, and whose brothers and sisters were all healthy, had himself always enjoyed good health, until in the summer of 1854, when he injured his left ankle by a fall.

The joint swelled immediately, and was quite painful; but still did not confine him to his bed until after four or five days. It then became so painful as to prevent motion, and for a number of days he was treated by perfect rest, and alternate applications of hot and cold water. As he made no improvement, after a few weeks his ankle was blistered, and this was repeated every eight or ten days for a great number of times, but without any improvement in his ankle.

His general health became much affected, with loss of appetite and of sleep; he became greatly emaciated, and suffered intense pain constantly, which was greatly aggravated at night by frequent spasms, or "jerkings of his foot" as he described it.

The development of the leg and thigh on the affected side became arrested, the ankle and foot very much swollen and shapeless, a number of sinuses formed, leading into the joint, and the bones crepitated when the joint was moved.

Dr. Valentine Mott saw him in July, 1855, and advised amputation as the only means of saving his life. The mother, however, would not consent to the operation, and I was called to see him in consultation with Dr. David Green in October, 1855. Several sinuses then existed, leading into the joint, through which the probe was passed without difficulty, but coming in contact with carious bone in almost every direction.

On the 21st of October, 1855, I opened the joint freely on either side by connecting some of the sinuses, and found the joint carious throughout.

Two setons of oakum were passed through the joint, the one laterally, and the other antero-posteriorly, and the foot extended by the instrument described in the case of Elizabeth B. As the seton was pulled through, a number of small pieces of bone were drawn out, entangled in its meshes.

When he recovered from the effects of the chloroform he could bear pressure on the foot without pain, and would permit it to be handled in any direction without complaint, although before its application he would not permit it to be touched, and it was impossible to move it in any direction, even in the most careful manner, without giving him the most intense agony.

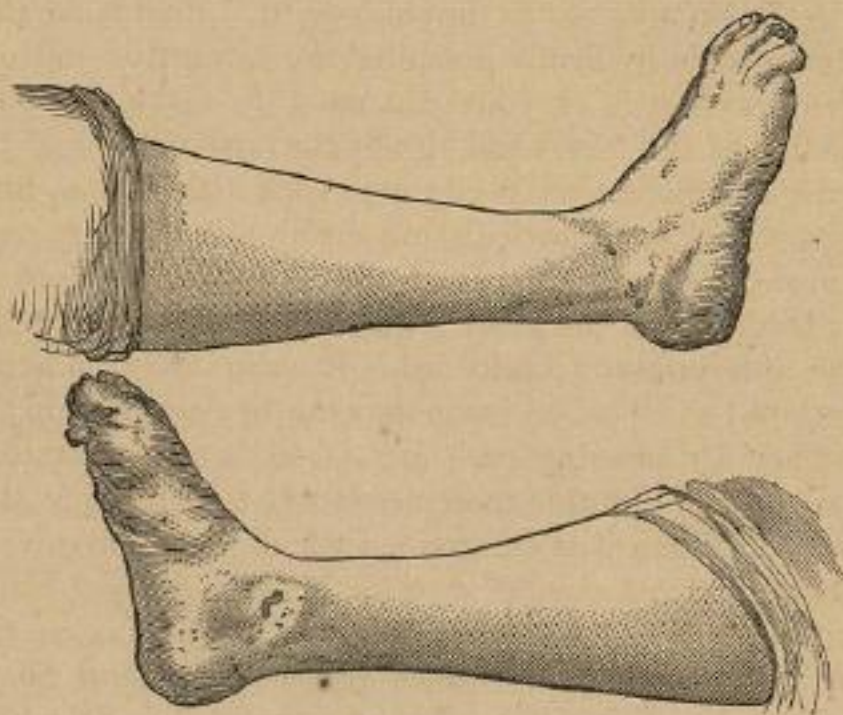
He slept quietly the night after the operation, without any anodyne, although he had been compelled to use anodynes freely for many months, but never resorted to them again during the time he was under treatment.

His general health began to improve almost immediately from the time of the operation and the application of the instrument, his appetite returned, and he was able to ride out in the open air with comparative comfort. The setons were pulled through daily and the soiled parts cut off; and the whole ankle constantly surrounded with oakum saturated in cold water, and sustained by a tight bandage.

For two or three months small pieces of bone were frequently found entangled in the fibres of the seton, when pulling it through; but the discharge gradually diminished in quantity, became more consistent in character, and, as it did so, the setons were gradually reduced in size, until finally they were a mere thread or fibre. At the end of eleven months from their first insertion they were removed entirely, and the sinuses closed up in a short time after, never to be reopened.

The extension was continued for nearly two years before it was removed permanently, although he had walked about for many months before the instrument was removed. As soon as the sinuses had become closed and he could bear moderate pressure upon the foot, when the extension was off, without suffering pain, I commenced passive motions daily, by acting on the anterior and posterior screws alternately, thereby imitating the natural motions of the joint. In about two years from the first operation, the instrument was removed permanently, when he could walk without difficulty, having considerable motion in the affected joint. This motion has very materially increased, and is now (twenty years after the operation) almost as perfect as the other. The foot is smaller than the other, and about half an inch shorter, but he supplies the deficiency by a thick sole inside his boot, and can run and skate without the deformity being detected.

Drs. Mott, Stephen Smith, and other surgeons of this city, saw this case when under treatment, and therefore know that the



Figs. 123 and 124.

setons passed through the ankle-joint; but, as there has been some question about it by others who have not seen the case, I have had his foot daguerretyped on both sides by Mr. Gurney, and the cicatrices on either side, giving the entrance and exit of the

setons, show conclusively that they did pass through the ankle-joint. (See Figs. 123 and 124.)

DISEASE OF THE TARSO-METATARSAL ARTICULATION.—Disease affecting the foot at this articulation is sometimes mistaken for disease of the ankle-joint, and must receive a passing notice.

This articulation, like the ankle-joint, has its articular cartilage, synovial membrane, and ligaments, and the same causes that produce disease in one may produce it in the other. You may have then, a fall, blow, or sprain, producing an extravasation of blood into the bone-cells beneath the articular cartilages, in the same manner as occurs in connection with injuries of the ankle-joint. The extravasation instead of being absorbed may go on to suppuration, and osteitis and chronic softening of the bone result. The symptoms by which this condition is to be recognized are essentially the same as those which aid us in diagnosis of ankle-joint disease. The only method of arriving at a safe diagnosis in these cases is to make a thorough examination (by means of pressure and compression, extension and twisting) of each and every articulation anterior to the ankle-joint. First make the ankle-joint immovable by firmly grasping the astragalus and os calcis, and then the foot is at your command to make motion at each articulation of the tarsus and also at the tarso-metatarsal junction. Pressure may be made directly over each articulation, but, when you wish to bring the articulating surfaces in contact, pressure is to be made, not by holding the leg and pressing the foot upward, but by holding the posterior part of the foot firmly, and crowding the anterior part backward. If pain and tenderness can be developed at all by pressure, they can be developed in this manner. Then, by pressing each metatarsal bone backward in this manner, you will be able more accurately to determine the point of disease. When it is determined which joint is involved in the disease, the patient should at once be placed upon his back in bed, and extension made from the toes, by slipping an "Indian-puzzle" over each toe and attaching them to a cord fastened in the ceiling (see Fig. 125). The weight of the foot forms the counter-extending force. This treatment is applicable to diseases of all the articulations, anterior to that of the astragalus with the os calcis, where extension and counter-extension are required. If the disease has gone on to suppuration, such extension will probably do no good, and, if absorption of the material poured

out into the structures within and about the joint cannot be obtained by means of compression and iodine, an opening must be made, and the bony structures gouged and drilled until all necrosed or carious bone is thoroughly removed. When that is



FIG. 125.

done, fill the wound with Peruvian balsam, cover with oakum, and give firm support and compression to all the parts by means of a roller-bandage. In all these cases of caries of the bone, poulticing, the continued application of hot fomentations, and such like treatment, are injurious. They are injurious from the fact that they relax the tissues, give rise to engorgement of the blood-vessels, not only by inviting more blood to the parts, but by weakening the coats of the veins, and diminishing their power of contractility. Such treatment, therefore, tends to a more rapid and more extensive destruction of tissues.

The parts are much more readily restored to their normal condition by giving proper support to the circulation, such as can be secured by a well-adjusted roller-bandage. This has a tendency to remove from the tissues infiltrated material, which, if permitted to remain, contributes largely to the subsequent destructive changes that may occur. When a free outlet has been made for

the discharge of retained pus, *firm compression* is one of the best sedatives that can be employed. If the disease is within the joint, extension must be made before compression is resorted to. If the disease does not involve the articulating surfaces, then the extension will not be required, and this is a rule that is applicable to the management of all joint-affections.

The following case illustrates the method of managing this disease:

CASE.—Catherine D., aged three years and three months, in May 1872, began to be lame in the left foot. The foot began to swell on the outer side, and over the tarso-metatarsal junction, which was purple in color, and “boggy” in feeling; not very painful to the touch. Several medical men have treated her for the past year by internal remedies. Condition on April 6, 1873, was as seen in Fig. 126. Tumor semi-fluctuating, purple, and hot.

April 7th.—I covered the whole foot and leg with a thick flannel blanket, fitting it very nicely, and over it applied a plaster-of-Paris roller, with a sufficient number of thicknesses to make a



FIG. 126.



FIG. 127.

firm support. After the plaster was partially set, I cut a fenestra over the tumor, which immediately bulged up through the open-

ing, and was almost blue-black. A wad of oakum was placed over it for a compress, and a very firm roller carried over the whole, Prof. W. H. Pancoast, of Philadelphia, being present.

8th.—Removed roller and compress in presence of Drs. Pancoast and Clay, and we were so much surprised at the improvement in color, and diminution in size of the tumor, that I decided not to open it, but to try to absorb it by pressure. Child had slept well, and was comfortable.

9th.—Still further improvement, but, an indistinct fluctuation being obtained, I made a number of small punctures, at the request of Prof. Pancoast, discharging considerable blood. One of the punctures showing *pus*, I made a free incision and evacuated a large quantity of broken-down cellular tissue, tough sloughs, and *pus*. The finger detected exposed bone at the outer portion of the scaphoid only. The wound was filled with Peruvian balsam and oakum, and firm roller applied as before.

10th.—Appearance much improved.

June 20th.—Wound has cicatrized. Pressure continued. Plaster dressing removed. Toe elevated by adhesive plaster.

August 12th.—Has continued to improve. Has not confessed to any tenderness for nearly or quite two months. Can walk on foot. Has a slight tendency to valgus. Adhesive plaster continued to retain foot in position.

November 1, 1873.—Perfectly well, without deformity, and in robust health. (See Fig. 127.)

LECTURE XV.

DISEASES OF THE JOINTS.—KNEE-JOINT.

Anatomy of.—Structures affected by Disease.—Synovitis.—Disease of Ligaments.—Extravasation of Blood into the Cancellated Lamellæ of the Bone.—Causes.—Early Symptoms, and those developed as the Disease progresses.—Pain over the Attachment of the Coronary Ligaments.

GENTLEMEN: This morning we begin the study of diseases of the knee-joint.

This joint is more subject to accidents than any other articu-

lation in the body, on account of its more exposed position. I think it is even more liable to injury than the ankle-joint, judging from the relative number of cases presenting themselves daily in my practice.

ANATOMY.—I will first briefly state the principal anatomical components of the knee-joint, a knowledge of which is essential to a full understanding of what I shall afterward explain when I come to speak of my views in respect to the origin, pathology, and treatment of diseases affecting its structures.

The condyles of the femur above, the head of the tibia below, and the patella in front, are the bones that enter into the formation of this joint.

These bones are held in position by ligaments, some of which are exterior to, while others are within, the joint. Those which are exterior are the anterior or ligamentum patellæ, the posterior or ligamentum posticum Winslowii, the internal lateral, the two external lateral, and the capsular.

The ligaments found within the joint are the anterior or external crucial, the posterior or internal crucial, the transverse, and the coronary.

The two semilunar fibro-cartilages of this joint are also placed among the internal ligaments by some writers.

In addition there are the ligamentum mucosum and the ligamenta alaria, which are merely prolongations from the synovial membrane.

There are also two bursæ: one situated between the patella and the skin, covering its anterior surface; the other smaller in size, situated between the ligamentum patellæ and the upper part of the tuberosity of the tibia. The posterior surface of the ligament is separated above from the knee-joint by a large mass of adipose tissue.

Inflammation of these bursæ sometimes gives rise to appearances very much resembling those presented by the so-called "white swelling" of the knee-joint. The synovial membrane of this joint is the largest and most extensive in the body, and forms various *culs-de-sac* in the process of enveloping the internal surfaces of the joint. The articular surfaces of the bones are covered with cartilages which subserve the purpose of "buffers," or cushions (the same as buffers upon railway-cars), to mitigate jars and concussions which otherwise might do serious injury to the inter-