

in the presence of a large class, and a number of physicians of the city, among them Drs. J. C. Nott, McIlvaine, Henry, and others. My house-surgeon, Dr. Cushing, had previously fitted to the *right* side of his body a plaster-of-Paris model, extending from his axilla to the foot for the purpose of counter-extension, when the abduction should be applied after the operation.

Ether was administered by Dr. Yale, when I divided the gracilis and the adductors subcutaneously, closed the wound with adhesive plaster, and applied a figure-of-8 roller. Then, laying him on his back and placing my knees on either ilium to hold his pelvis, I forcibly broke up the remaining adhesions and succeeded in bringing the limb into position. Adhesive plaster for extension was secured to the whole limb by roller, and the plaster-of-Paris mould fastened to the right side of the body and leg by another roller. The patient was then secured in bed, and extension

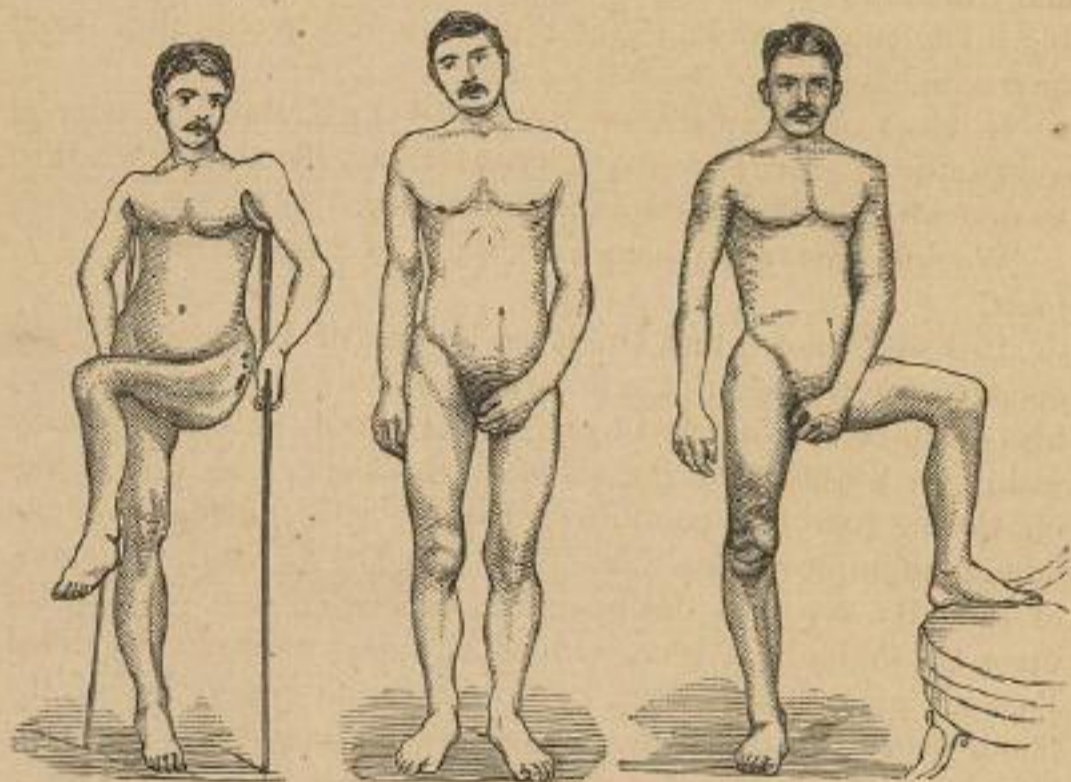


FIG. 248.

FIG. 249.

FIG. 250.

and abduction kept up by weight and pulley. Ice-bags were applied around the hip.

The wound healed without any suppuration, and no unpleasant symptoms followed the operation.

February 22, 1872.—Patient walked from my office to the

photographer's, and had Figs. 249 and 250 taken, which show his present position, as well as his power of motion, particularly his ability to *flex* and *abduct*.

LECTURE XXVIII.

ANCHYLOSIS (CONTINUED).


Bony or True Anchylosis.—Operation when present at the Hip-Joint.—Cases.—Bony Anchylosis at the Knee-Joint.—At the Elbow-Joint.—Case.

GENTLEMEN: At my last lecture I gave you the symptoms and treatment of false, or fibrous, anchylosis. I will this morning invite your attention to the symptoms and treatment of bony, or true anchylosis.

In cases of complete, or bony anchylosis, the deformity is sometimes so great as to require correction. To accomplish this, section with the saw is absolutely necessary.

We will first study bony anchylosis as it occurs at the *hip-joint*.

It is well known that Dr. Rhea Barton, of Philadelphia, first operated for the relief of a deformity of this kind in 1826, and his operation was followed by a perfect result. He operated by making a V-section in the shaft of the bone, and thus bringing the leg from that point down parallel with the other, and obtaining an improved position. The late Dr. J. Kearney Rogers, of this city, repeated this operation in another case, only higher up on the shaft of the bone, with equally good results. I modified Barton's operation in 1862, by making a curved section of the femur above the trochanter minor, and a straight section a few lines below the first curved cut, thus removing a block of bone.

My object was to go above the trochanter minor, so as to retain the insertion of the psoas magnus and iliacus internus muscles attached to the lower fragment for the purpose of flexion; and by cutting out a *semicircular* piece thus, , with its concavity downward, and then rounding off the upper end of the lower section, I would more nearly imitate the natural joint, and

give the patient a fair chance for motion at that point, with less danger of the parts slipping by each other when he walked than there would be if I cut out a parallelogram or a V-shaped piece.

This operation I have made in two cases, and both resulted in perfect success. The first case is still living. The other case died of another disease some months after the operation, but lived long enough for Nature to make an entirely new joint with capsular ligament, synovial membrane, and a double ligamentum teres, which is seen in the specimen before you. (See Fig. 262.)

Mr. Adams, of London, has very much simplified this operation by making a simple subcutaneous single section through the neck of the femur in these angular deformities of the hip, with very satisfactory results. Dr. Sands, of this city, has repeated Dr. Adams's operation, with the result of a movable joint. Reasoning *a priori*, I would suppose that by the single section through the bone, although you might by it remove the deformity, you would be in danger of effecting a cure by ankylosis. The case of Dr. Sands, and some of those reported by Dr. Adams, seem to disprove this position, but sufficient time has hardly elapsed to judge whether they may not after a while become ankylosed, although in an improved position.

The plan of my operation is fully given and illustrated in connection with the two cases here appended:

CASE. *Ankylosis of both Hip-Joints; Tenotomy and Brisement Forcé in one, and in the other Excision of Semicircular Segment of Bone above Trochanter Minor; Recovery with Artificial Joint.*—Robert Anderson, native of Lexington, Kentucky, age twenty-six, was admitted into Bellevue Hospital in May, 1862, and gave the following history of himself: During the summer of 1849, when fourteen years of age, he was accustomed to go in the river every evening to swim, and on one occasion remained in the water some hours, having previously taken very severe exercise in running and jumping.

About the middle of September he was taken with a dull pain in the right hip, which continued about one week, so gradually and imperceptibly developed that the exact date of commencement is not known. During this time he continued in attendance at school, and enjoyed the usual sports and games of his schoolmates. One day, after having exercised more freely than usual, he was attacked with fever, and the following day stupor

set in, which lasted nearly three weeks, with the exception of intervals; when aroused by the family, was totally indifferent to anything that transpired around him, except when thus diverted by his friends. All this time he suffered intense pain in the right hip, which was sharp and lancinating. The hip was red, hot, and greatly swollen, which extended half-way to the knee.

At the end of a month the swelling had much subsided, and the pain very greatly diminished, though when moved it was still very intense—of the same character felt in the hip, and never at the knee.

About this time began to have pain in hip-joint of left side, and also in the knee, which was dull, and never of that sharp, lancinating nature which he suffered in the other joint. This continued two months.

Ten days after the commencement of the disease, pillows were placed under his knees to relieve the pain. These were increased in thickness and continued all the time he remained in bed, which was six months; also during the next six months, whenever he was in bed; but during this latter period he sat up occasionally in a chair. From the position assumed during this prolonged confinement, the legs were flexed upon the thighs, and the thighs upon the pelvis, and have been immovably fixed in that position ever since. Had occasional pains all this time in both hips, but most severe in the right.

At the end of two years from date of attack, an abscess formed in left groin, which remained and discharged pus for two years. Abscesses also formed about the right hip; one beneath the gluteal muscle, and another near the anus. These discharged very freely, and continued open for nearly a year and a half.

At the end of the first year, began to use crutches—compelled to use them ever since. For the last six or eight years, general health has been perfectly good.

On admission he had ankylosis of both hips in the position seen in the figures 251 and 252, from photographs.

The left thigh was immovably fixed at nearly a right angle with the pelvis, by bony cementation, or true ankylosis. The right was very firmly attached at an angle not quite so acute, and by a very careful examination I thought some slight motion could be detected, which indicated that the attachments were fibrous in character, or at most were osteophytes only, and external to the

joint, and that there was no agglutination between the femoral head and the acetabulum, whereas the opposite side seemed perfectly cemented together. He could not walk, except by whirling himself in semicircles, first on one leg as a pivot, and then the other—or else by swinging himself on his crutches from the axilla. In order to get both feet upon the ground at the same time, his back was curved inward very much at the sacro-lumbar junction, the left knee flexed at an angle about forty-five degrees with the



FIG. 251.



FIG. 252.

thigh, and the right side of the pelvis was some inches higher than the left. He could only sit by assuming a most awkward posture, half-reclining on his side upon a couch or sofa; and, in lying down, was curled up either on one side or the other, or, if upon his back, he had to be supported by pillows under his knees, and under the lumbar vertebræ. In fact, he was the most pitiable object I ever saw, and one that would excite the sympathy of any surgeon.

On the 4th of May, I divided subcutaneously the adductor muscles, the rectus, tensor vaginae femoris, and femoral fascia of the right hip, and, breaking up the adhesions by some considerable force, obtained very good motion of the joint. Extension was made to the limb by a weight and pulley, and the hip enveloped in cloths wet in cold water; no serious trouble followed the

operation, and in six weeks he could flex and extend, abduct and adduct his right limb with considerable freedom.

On the 11th of June, 1862, I removed a semicircular segment of bone above the trochanter minor of the left femur, for the purpose of establishing a new joint. Drs. I. P. Batchelder, Woodhull, and Osborne, of this city, Drs. Hooker, of New Haven, Connecticut, Hichborne, of Massachusetts, and Dr. James S. Green, of Elizabeth, N. J., were present at the operation.

The plan of this operation will be seen in the annexed figure (253).

The description of the operation and notes of the case are taken from the hospital records, which were kept by Dr. Shaw, house-surgeon at that time, and at present in the United States Navy:

“An incision of about six inches was made over the trochanter major, in the axis of the limb. The cut was slightly lunate, with the concavity looking downward. The lips were then separated, and the deeper structures, including the periosteum, were detached from the bone.

“A curved instrument, armed with the chain-saw, was passed around the bone between the trochanters, and the femur first sawn transversely across. A roof-shaped piece was then sawn out of the upper fragment.¹ The limb was then put upon moderate traction, longitudinal and lateral; the margins of the wound approximated by adhesive straps, and cold dressings applied.

“June 15th.—Wound begins to suppurate, and looks very well; no constitutional excitement.

“16th.—He has considerable pain in the limb, and has been unable to sleep. Relieved by increase of extension.

“20th.—Patient finds that pain is relieved sometimes by less extension.

“July 4th.—He has less pain; purulent discharge free.

“September 1st.—Since last report patient has experienced no

¹ In my second operation, I sawed the curved section first, and should advise the operation to be performed in that way, for reasons which are there given.

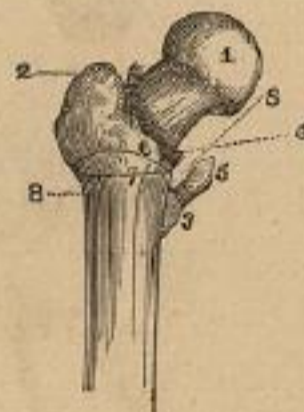


FIG. 253.

1, head of femur; 2, trochanter major; 3, trochanter minor; 4, line of insertion of capsular ligament (variable); 5, tendon of psoas mag. and iliacus internus muscle; 6, line of curved section; 7, line of transverse section; 8, 8, dotted lines indicating rounding off of lower fragment after removal of the segment.

untoward symptoms; discharge from wound is now very slight. All extension is removed, and he begins to sit up. General condition very good, and has improved very much in flesh since admission.

"October 12th.—Since last report patient has been walking around the hospital on crutches, which had to be lengthened seven inches, as he is that much taller than he was before the operation, and is now quite straight, except the lateral curvature of the lower lumbar vertebræ, which raises one side of his pelvis more than the other, and makes the right leg apparently shorter than the one from which the segment of bone was removed; but this is easily rectified by a higher heel on that side. He can sit down in a chair, and get up without assistance, except such as he obtains from his crutches. To-day he walked into the amphitheatre by the aid of his crutches, and exhibited himself to the class, and left the institution well, and with very good motion at both hip-joints."

About three weeks after he left the hospital, he was attacked with acute pain in the region of the wound, which became inflamed, and soon suppurated. In a few days a small semicircular piece of bone came away, and four days after another similar piece; the two together making almost a ring, and seemed to be exfoliations from the lower fragment. All the pain immediately left him, and the wound healed in a very short time.

Mr. Anderson remained in the city until late in December, when he left very unexpectedly for Kentucky.

The night before he left he walked to my office, and could go up and down the steps without any difficulty; could stand on either leg without crutch or cane; could take a step with either foot twenty-seven inches, and, when he supported his body on his crutches, could abduct his legs so that his heels were thirty-six inches apart. He could cross either leg over the other below the knee, without assistance, but could not cross them upon the thigh.

The following extract is from a letter of his, dated the 20th of January, 1863:

"My leg is getting on famously, since I came to Kentucky. The first day after leaving New York I grew very tired, but continued night and day until we arrived at Cincinnati. I believe that when I got to Cincinnati I was fresher than when I started. We were in the city about half a day, and then came on to Lexington,

staid all night, and again resumed our journey. So far from being exhausted at the end of the trip, I started next morning in a buggy and drove some twenty miles. I think, if I had been compelled to travel a thousand miles before stopping, I could almost have danced a jig at the termination of the trip. But to speak seriously, I think I am doing very well indeed, and my leg gains strength continually."



FIG. 254.

Fig. 254 is engraved from a *carte de-visite*, which was received in a letter dated Spring Station, Woodford County, Kentucky, April 11, 1863, in which letter he states: "I can now 'rough it' a little without apprehension of having to suffer for it afterward. I can bear my whole weight on my left leg without inconvenience, and can walk very well without other assistance than a walking-stick, and the improvement is as great in a month now, as at any previous time."

CASE. *Anchylolosis of Left Hip, Section of Elliptical Segment of Femur above Trochanter Minor; Recovery, with False Joint and Good Motion.*—Miss Susan M. Losee, of Buffalo, New York, aged twenty-four, of healthy parents and of a robust and vigorous constitution, was attacked with pneumonia in March, 1856; attended by Dr. F. H. Hamilton. After three weeks went

down-stairs, contrary to the advice of her physician, and the following day was attacked with intense pain in the left hip and thigh, which was constant, persistent, and most severe for several months. She did not fall or receive any injury that she was aware of, but it was supposed that she must have wrenched her hip in some way going down-stairs, as she was very weak and went down without any assistance. During the first few weeks her leg was straight and could not be flexed, abducted or adducted without intense suffering. Bed-sores by this time had become so extensive as to make it imperative to change her position, and in doing this her limb was forcibly flexed at the knee and hip, but with the most intense pain; and when flexed in this position it could not be extended again without the greatest suffering, and was therefore permitted to remain in the flexed posture.

New sloughs appearing over the right trochanter, she was placed in a large chair and was not removed for two months, when sloughing occurred over the tuber ischii, and at the extremity of the coccyx, and she was again compelled to assume the horizontal position, and, being forced to lie upon the right side, the left thigh was thrown over the right, in a flexed position, and thus became permanently and perfectly ankylosed, at the expiration of about seven months from the commencement of the disease.

No local application was made to the hip, but the pain and constitutional difficulty were combated principally by morphine, and no extension was applied to prevent the muscular contraction and deformity. When she recovered, her left thigh was permanently flexed, at about forty degrees with the pelvis, and strongly adducted across the lower third of the right thigh, as seen in the accompanying drawings, which were taken from life. Fig. 255 represents her standing; Fig. 256 in the act of walking.

In the erect posture, the heel of the left foot was ten and a half inches from the floor, and on the right side of the right leg. In attempting to walk, it was brought to the floor, still on the right side of the opposite limb, or cross-legged; and was made to reach the floor by a remarkable curvature forward of the lumbar portion of the spinal column; but walking was attended with great fatigue, and a peculiar dull pain in the lumbar region. Urination produced constant excoriation of the limbs, requiring great care and trouble in drawing a handkerchief or soft rag between the closely-compressed thighs, to keep them clean and comfort-

able. Several efforts were made to insert a catheter, in order that the urine might be led off without irritating her limbs; but it was impossible to insert the finger so as to reach the orifice of the



FIG. 255.



FIG. 256.


urethra, either from the anterior or posterior position, although every effort was made, and with great perseverance.

She remained in this condition until the 6th of November, 1862, seven years. She came to New York and placed herself under the care of Dr. C. F. Taylor, in the fall of 1861, who thought the ankylosis was simply fibrous, and capable of being relieved by passive movements. Dr. Van Buren saw her at this time, and diagnosed the case as one of true bony ankylosis. I saw her in April, 1862, in consultation with Drs. Taylor, Peaslee, and E. Lee Jones, and confirmed the diagnosis of Dr. Van Buren; but it was thought by all present that I might possibly break up the adhesions if I preceded the attempt by section of the tendons of the contracted muscles.

Accordingly, on the 10th of April, assisted by Drs. Peaslee, Taylor, and Jones, I divided, subcutaneously, the adductors longus and magnus, the gracilis and pectineus, the rectus, sartorius and tensor vaginae femoris, and immediately closed the wounds with adhesive plaster, and applied a firm roller. No hæmorrhage followed the operation. The pelvis was then firmly secured, and every effort was made to give motion to the joint, that was consistent with safety or prudence, but without the slightest benefit

whatever, and we were all satisfied that an entire section of the bone by the saw was the only way that the limb could be moved from its flexed and fixed position. The patient was under the full influence of chloroform, administered by Dr. Jones, and was entirely insensible during the whole operation. The wounds healed kindly in a few days, without suppuration, and she was then in exactly the same condition as she was previous to the operation. As the weather was getting warm, I determined to leave her until fall, and then make a section of the bone above the trochanter minor, and give her a chance to form an artificial joint, similar to Anderson's case.

On the 6th November, 1862, assisted by Profs. Peaslee and Raphael, and in the presence of Dr. J. P. Batchelder and Mr. Doane, medical student, I performed the following operation: The patient having been put under the full influence of chloroform, a longitudinal incision six inches in length was made over the trochanter major, commencing just above its crest, and as near as possible to its centre, and carried directly down to the bone. About the centre of the incision I made another at right angles to it, in the posterior flap, but only carried it through the tegumentary and adipose tissue and the femoral fascia. The blade of the knife was then laid aside, and, with its handle and an elevator something like an ordinary oyster-knife, I carefully peeled off the attachments from the bone, on its anterior surface, until my fore-finger could reach the trochanter minor in front. The same thing was then done on the posterior surface of the bone, and the two fingers could then surround the bone, with the exception of a thin, firm fascia, between them on the front. This was readily pierced by a steel sound, curved to fit the femur, at this part, and a chain-saw was then drawn through above the trochanter minor, which could be distinctly felt and was my guide.

About half an inch above it I commenced to saw, and carrying it first *upward* and outward, then outward, and then *downward* and outward, I made a curved section with its concavity downward, thus . The saw was again passed around the bone,

¹ It will be seen that in this case I reversed the order of the section of the bone from what I did in Anderson's case, and made the *curved* section *first*, and I should advise the operation to be performed in this way, as it is much easier, and you are more certain to make your saw enter at the part desired when the shaft is complete, besides having the limb to keep the parts steady while the section is made. And, as

as at first, and inserted about an eighth of an inch below the first section and the bone sawed square off, at right angles with the long diameter of the bone. The segment thus removed was one-eighth of an inch in front or internal margin, three-fourths at its middle, and nearly half an inch at its external margin, as seen in Fig. 257.

The bone was very dense in texture, almost eburnated, as seen in Fig. 258, which represents the lower section.



FIG. 257.



FIG. 258.—View of Lower Surface.

There was not more than two ounces of blood lost in the operation, and no ligature was necessary.

The wound was brought together by two sutures and adhesive plasters, except the posterior incision, which was kept open by a tent of oakum. Adhesive plaster was applied below the knee, for the purpose of making extension, and a roller applied tolerably firm, from the toes up, over the entire limb, and around the pelvis.

She was then put in bed, the foot of which was raised some twelve inches higher than the head, and a pulley applied, over which a weight was attached by a cord to the adhesive plaster, for extension, the same as in a case of fracture of the thigh. Lateral extension was also applied to the upper portion of the thigh, to keep the upper end of the femur from crowding against the femoral vessels, by means of a broad band passed around the thigh and a cord attached to its outer aspect, which played through a pulley fixed in an upright by the side of the bed, just below the pelvis, and a weight attached. By this means the limb was brought in its natural position, parallel with the other and ap-

it requires some little delicacy of manipulation to carry a chain saw in this position in the curve required, it is well not to add to the complication by having a movable bone.

It may be asked, why not make both sections curved? Because it is so difficult to do it with accuracy, when one end of the bone is movable, and, as the rounding off of the lower section is more simple and equally satisfactory, I prefer it.

parently of the same length. Ten drops of morphine were given, with instructions to repeat if necessary.

The following record of the case is an abstract from my notebook:

November 17th.—Has had a very comfortable night; urinated without scalding her limbs, for the first time in seven years. No hæmorrhage, or much heat of limb; pulse 94; complains of pain in the back, otherwise perfectly well.

11 P. M.—Pain in the back very severe, just at the lower lumbar vertebrae, which is carried very much forward, and can only be relieved by being well bolstered up, and by raising the head and shoulders almost to the sitting posture.

18th.—Slept well all night, with only sixty drops of Magendie's solution; pulse 94, and only complains of her back, which requires to be pressed frequently and quite firmly to make her comfortable; as it was difficult to use a bed-pan, and without it the urine soiled the bed and excoriated her person, I drew it by the catheter, which can now be inserted without the least difficulty.

19th.—Wound commencing to suppurate, at the tent, the rest of the wound united by first intention; removed the sutures without disturbing the adhesive plaster; pulse 94; bowels moved naturally, and, with the exception of pain in the lower part of the back, feels well.

December 1st.—No particular change since last report; supuration healthy and not profuse. The only complaint she makes is from her back, and the difficulty she has in using the bed-pan. I put her to-day upon Dr. Nelson's fracture-bed, which is a triple inclined plane, with an opening for defecation, and it has made her very comfortable indeed; and the extension was accomplished by simply flexing the legs at the knee, over the inclined plane, as seen in Figs. 259 and 260.

This fracture-bed was first constructed by Dr. Robert Nelson, of this city, formerly of Canada, and for convenience and comfort, as well as fulfilling all the indications required, is the most perfect contrivance I have ever used, and I cannot speak too highly in its favor.¹

¹ In Hesselbach's "Handbuch der Chirurgischen," printed in Jena, 1845, will be found an almost exact duplicate of Nelson's bed on plate xxxix., with a description on page 1036, as having been constructed by Weckert; but, as Dr. Nelson made his bed in 1820, we must give him the preference of priority.

From the time the patient was placed upon it until she entirely recovered, a period of nearly four months, she was perfectly comfortable; could be raised or depressed to any desired angle, as often as required, without inconvenience, which greatly added



FIG. 259.

to her comfort, by the change of position. The wound healed entirely within four weeks, except a very small opening in the posterior cut, which was at the most dependent position, and from which a small discharge of pus escaped; this discharge gradually diminished and finally ceased about the 1st of March, four months after the operation. Two small pieces of bone escaped during this time the size of a pin's-head. For some weeks before its stoppage the discharge consisted of only a few drops in a day, of a very peculiarly whitish-yellow semi-fluid, of the consistency of thick starch-water, and upon examination proved to be nearly pure albumen.

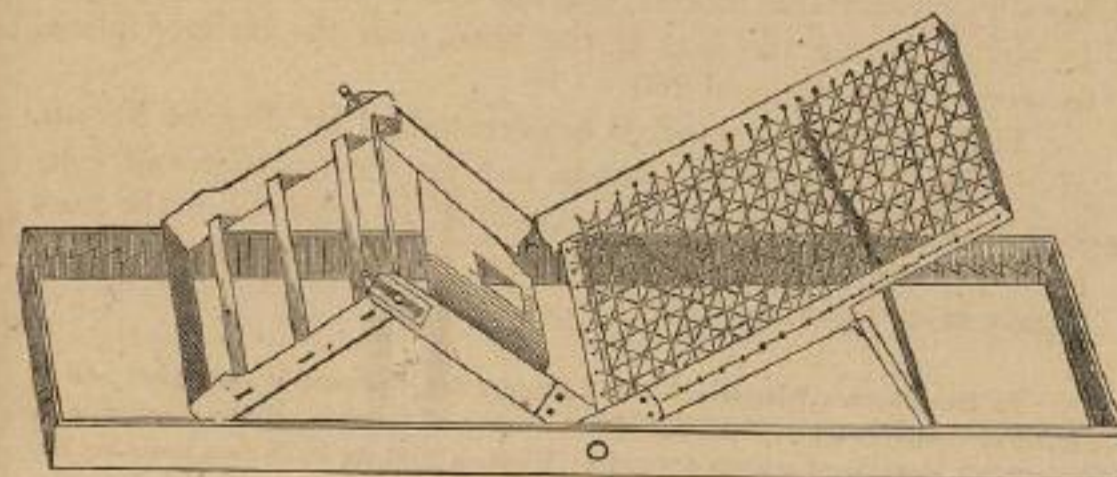


FIG. 260.—Dr. Nelson's Fracture-Bed.

After the first ten days from the operation I made slight movements of the limb very frequently, in order to prevent ankylosis, and this was also accomplished by the extension, which kept the severed bones from coming in contact with each other, and thus prevented osseous adhesion.

I gradually increased the extent of these motions, until, about the 1st of February, I could flex and extend, rotate, adduct and abduct the limb with almost the freedom of a natural joint, and could also press the bones together with considerable force without pain.

On the 8th of February, 1863, she got out of bed for the first time—the limbs are perfectly symmetrical and parallel—the left nearly three-quarters of an inch shorter than the right, when her weight is put upon it; but, when she stands erect upon the other limb, it falls down, and is nearly if not quite as long as its fellow. By pressing it up you can shorten it a full half-inch, and by concussion it gives a smooth, cushioned feel to the hands, without any crepitus or pain to the patient.

February 20th.—She begins to have some control over the



FIG. 261.

movements of her limb by voluntary muscular contraction, and can bear nearly her whole weight upon it, as seen in Fig. 261.

The motions are nearly as perfect as those of the natural limb.

From the perfect success attending the operation in these two cases of true ankylosis, and the freedom from all danger, as well as ease of its performance, I feel justified in recommending it to the profession as safe, and am satisfied that it will become established as one of the proper operations in surgery.¹

SEQUEL.—The patient progressed rapidly and favorably during several weeks, being able to bear her entire weight on the affected limb, with perfect freedom in passive motion, and gradual increase of control over the voluntary movements.

She was acquiring sufficient command over the limb to enable her, as the result of practice, to walk around her room, the exercise conducing to the improvement of her general health, as well as to the education and development of muscles which had long remained dormant; when, about the 1st of March, in opposition to my advice, she removed her flannels. She remained with them off for several days, and, on the 4th and 5th of March, being exposed for some hours to the intense cold then prevailing, she had a severe chill, followed by great difficulty in breathing, pain in the chest, cough, etc., arising from congestion of the lungs.

She neglected to send for me at once, and, when she did, I was out of town, and she refused other medical attendance. She grew worse rapidly, and, when I saw her upon my return, I at once recognized her condition as one of extreme danger, and requested the presence of Dr. Flint in consultation.

We found the left lung had become almost hepatized, and for some days no respiration could be detected on that side. Under treatment resolution gradually took place, with the exception of an abscess in the upper lobe of the left lung, which Dr. Flint thought was the result of an apoplectic effusion. Dr. Flint did not at this time diagnosticate tubercles, but did at a later period.

To the pneumonia was superadded, in a short time, pleurisy of the left side. The urgent symptoms of the pneumonia were subdued, but the cough, which was very distressing, continued. There was no expectoration at any time.

Under a sustaining plan of treatment, with spirits of turpentine locally over the hepatized lung, she improved, and I was encouraged in the hope that the abscess might become sacculated, and remain circumscribed.

The weather up to about the middle of April had been too

¹ See Mr. Adams's improvement on my operation, in *Lecture on Ankylosis*, p. 424.

inclement to allow her the advantages of passive out-door exercise, which, together with nourishment, was now considered the principal treatment required.

During all this time the cough had remained of the same racking, distressing character, and without expectoration.

On the 20th of April, she complained of some pain in the vicinity of the cicatrix of the wound left by the operation, and the lower part of the wound became inflamed and puffed out, although it had been closed several weeks.

On the 22d, an abscess having formed, the wound opened, and a small curved piece of bone escaped, about one-eighth of an inch long, and of the thickness of an ordinary probe, quite rough and jagged.

The wound discharged a little bloody pus for a few days, after which it gradually merged into the same kind of oily fluid as had exuded during some months subsequent to the operation.

This, in a few more days, began to diminish, and gradually the wound again closed, leaving no tenderness upon pressure, or motion of the new joint.

She could again bear her whole weight upon the limb without inconvenience, and her command of its movements materially improved.

About the 1st of May she changed her residence, and for a number of days improved rapidly in strength and flesh, the principal annoyance being the cough.

On the 10th of May, having business out of town, I left the case in charge of Dr. Flint, who prescribed, for the cough, codeia, four grains, to simple syrup, four ounces, with directions to the nurse to give the patient a teaspoonful once in three hours while the patient remained awake, but to discontinue it while she slept.

During the night, as the result of larger and more frequently repeated doses of this mixture than had been ordered—which appeared from the admission of the nurse, and the small quantity left in the bottle—the patient had become thoroughly narcotized, and subsequently suffered, for more than forty-eight hours, with most alarming symptoms of narcotic poisoning.

The utmost exertions on the part of Drs. Flint, Peaslee, and Wells, were required to sustain life, in consequence of the stomach rejecting stimulants, coffee, etc.

The cough had now entirely ceased, and never returned.

Great distress in the lungs was complained of, and partially relieved by counter-irritants. The stomach continued so weak as not to retain even a teaspoonful of iced water.

On the 12th she had recovered from the severe symptoms, when a relapse occurred from the administration of another dose of the codeia, in direct violation of orders that no more should be given, which it seems were misunderstood by the nurse. During the night the patient was violently delirious, her screams arousing and disturbing the household until morning, when Dr. Wells administered, by inhalation, a small quantity of chloroform, which at once calmed the patient, and she slept for several hours.

I returned on the 13th, and found her still in a wild and distracted state of mind, and excessively prostrated, the stomach not having retained anything for several days.

The process of nutrition was necessarily suspended, and the patient was dying in consequence.

The stomach had lost all tone as the result of protracted narcotism, induced carelessly, but with humane intent, and she was now sustained by enema.

On the 14th she had rallied, and become quite cheerful, but had no recollection of the terrible ordeal through which she had passed. Later in the day, while I was sitting by her bed, she suddenly had two severe convulsions, during which her lower limbs were flexed at a right angle, and strongly adducted, the left one requiring almost as much force to straighten as the right.

The nurse stated that the patient had had a similar fit during the preceding night, the limbs being fixed in the same manner for a long time, and that when the spasm passed off she voluntarily straightened her limbs.

On the 16th she sat up about an hour, and, after getting back in bed, discovered that the wound had again opened and discharged a few drops of bloody serum.

She passed a remarkably good night, and on the following day felt so much better that she begged me to allow her to take a ride the next day.

I tried to persuade her that she was too weak, but she was quite importunate, and after I had left, in order to test her strength in view of the anticipated ride, she got out of bed, and sat up in a chair for two hours.

The exertion was too much, and she fainted.

I was hurriedly summoned, and found her cold and pulseless, except at the carotids. Pupils much dilated; jaws relaxed; respiration very feeble and slow; unable to swallow. Brandy was given in enema, but not retained.

She gradually recovered consciousness and ability to talk, which she did rationally, but grew weaker and weaker until about six p. m., on the 17th, when she died from exhaustion.

Post-Mortem.—An examination of the body was made about thirty-six hours after death, in the presence of Profs. Bush, of Lexington, Kentucky; Parker and Raphael, of New York; and



FIG. 262.—*a, a, a, a*, capsular ligament opened and reflected; *b, b*, round ligament in imitation of ligamentum teres; *c*, articulating head of lower section, covered with cartilage; *d, d*, new acetabulum, covered with cartilage; both lined with synovial membrane.

Drs. Spencer, of Watertown; Batchelder, Dewees, Stone, Bernachi, Elsburg, Wells, Swift, Doyle, and Peck, of New York.

The body was extremely emaciated; the left leg being parallel with the right, the foot lying in the natural position, and was

found to be half an inch shorter, and admitted of free, passive motion in all directions without crepitation. Upon opening the thorax, adhesions were noticed of various portions of the pleura and lungs, and a large abscess in the anterior portion of the upper lobe of the left lung. Two quite small abscesses were found in the lower lobe of the right lung, but neither of them communicated with the bronchi.

There was infiltration of deposit throughout the substance of the upper lobe of the left lung, which, under the microscope, was determined by Dr. Dewees to be tuberculous.

Upon examination of the artificial joint, it was found to be provided with a complete capsular ligament, and the articulating surfaces were tipped with cartilage, and furnished with synovial membrane. (See Fig. 262.)

There was a very small spicula of bone, which had exfoliated from the lower section in the orifice of the external wound, and which would have escaped in a few days. Four other small fibrillæ of bone, about one-half inch in length, and the thickness of the lead of an ordinary pencil, were found attached at one of their extremities, by periosteum, to the margin of the new head of the femur; their free extremities were thrust into the tissue around the joint. They were easily pulled off, having nearly

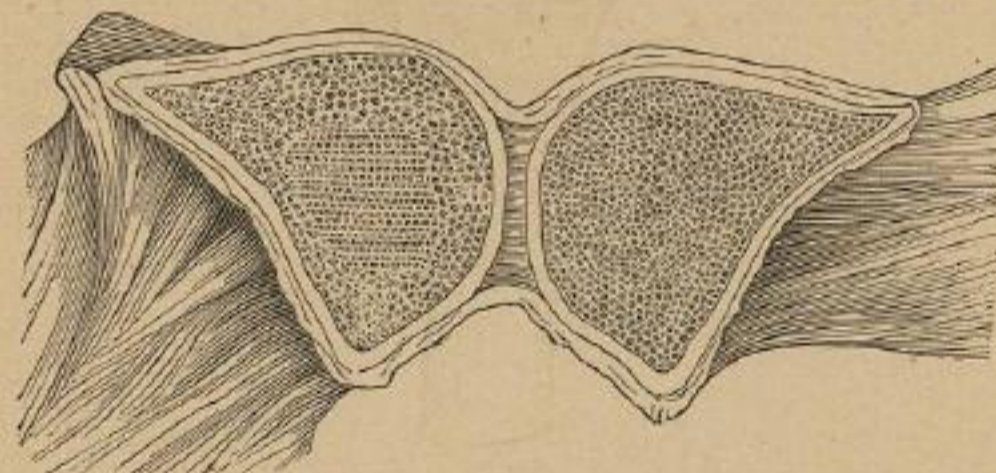


FIG. 263.

exfoliated, and doubtless would have come away as the other pieces had done, had the patient lived.

All the other parts of the head and the new acetabulum were smooth, and covered with cartilage.

The conjunction of the articulating surfaces was perfected by

the formation of two round ligaments springing from the surface of the new acetabulum, and, by their convergence at the same point of attachment to the new caput femoris, formed a new ligamentum teres.

These converging portions of the ligament were fan-shaped, and united at the sulcus of the new head of the femur.

A portion of the ilium, together with the cotyloid cavity, containing the anchylosed head of the femur was removed, and, upon section through the original acetabulum and caput femoris, only a slight line of demarkation was discoverable, the whole joint being fused into one solid bony mass. (See Fig. 263.)

Dr. Austin Flint, Jr., examined the specimen by the microscope, and reports that the lining is true cartilage, and it is therefore as perfect in all its physiological characters as any natural joint.

The annexed diagram (Fig. 264) shows the cartilage, cavities and cells, as taken by Dr. Flint under the microscope, from the artificial joint of Miss Losee.

With respect to the case of Miss Losee, Bauer, in his work upon "Orthopedic Surgery," published by William Wood & Co., 1868, misstated the facts concerning the appearances found at

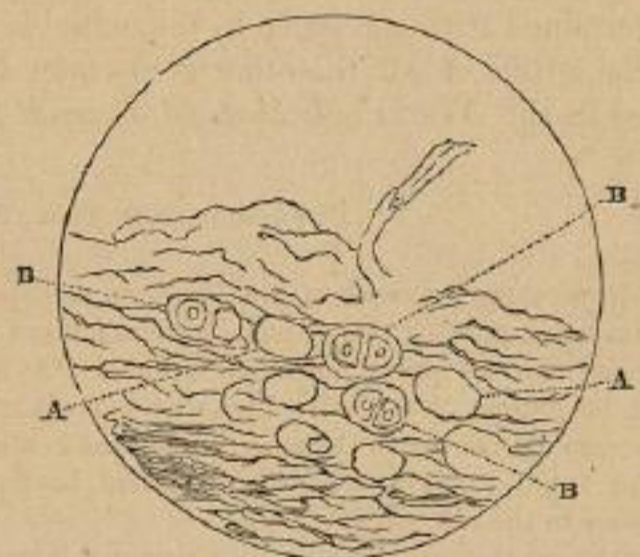


FIG. 264.—CARTILAGE, CAVITIES AND CELLS: A, cartilage, cavities without cells; B, cartilage, cavities and cells.

the *post mortem*. On pages 234 and 235 of his work may be found the following statement:

"True bony ankylosis of the hip-joint finds its relief in

Rhea Barton's operation. I have never had occasion to perform it, and can therefore offer no suggestions drawn from personal experience, but it would seem to me that the attempt at establishing an artificial joint at the line of division is unattainable for two reasons: 1. An artificial joint could never give a sufficient support to the superstructure of the body; 2. It inevitably protracts the suppuration, with its impending danger of pyæmia. Sayre a few years ago performed this operation, as he alleged, with success, but his patient nevertheless died a few months after of pyæmia.

"The specimen derived from the case did not sustain the assertion of that gentleman; no cartilaginous covering, synovial lining, or a new capsular ligament, having been formed."

I have taken pains to secure letters from every gentleman who was present at the *post-mortem* examination, with the exception of two who are dead, and they all concur in the statement that there was mobility, and that a false joint was formed at the point where section of the bone was made.

The following letters, however, from Dr. Doyle, Dr. Austin Flint, Jr., Prof. Parker, and Dr. Bush, Professor of Surgery in Transylvania University, I regard as all that are necessary to publish in this place to correct any misapprehension that may have been entertained with reference to the actual results of that operation. The letters of all the other gentlemen have already been published in the *New York Medical Journal* for January, 1869.

"BINGHAMTON, NEW YORK, April 24, 1868.

"PROF. SAYRE—

"DEAR SIR: In perusing the work of Dr. Bauer on orthopedic surgery I was somewhat surprised to read there (page 235) as follows: 'Sayre a few years ago performed this operation' (artificial hip-joint), 'as he alleged with success, although his patient died shortly after with pyæmia. The specimen derived from the case did not prove the assertion of that gentleman; no cartilaginous covering, synovial lining, or capsular ligament, having been formed.' The quotation refers to the case of Miss Losee.

"As I frequently saw the patient and took a personal interest in her case, I feel it my duty to disabuse the public of the false impression which his statements are likely to produce. You can, therefore, if you deem it proper, publish the following facts, to which I can clearly testify: Miss Susan M. Losee, on whom you performed the operation for artificial hip-joint, was seen by me several times during the month previous to her decease. As far as the operation was concerned, it seemed in every way a complete success, but it

was very evident to me that she was in the last stage of phthisis pulmonalis, in consequence of which her death took place on the 17th day of May, 1873.

"In company with several other medical men, I was present at the autopsy, which revealed important facts, which go strongly to sustain not only the feasibility, but also the justice of the operation. On opening the thorax, the lungs were found to contain a large amount of tuberculous deposit, much of which had broken down, leaving several cavities. Our attention was next turned to the limb on which the operation had been performed. It was found to possess the property of being moved with ease in any direction without crepitation. The artificial joint was then dissected down to, and was found to be provided with a capsule, very much resembling the capsular ligament of the normal hip-joint, being complete and lined with a synovial surface. On opening the capsule to get an interior view of the joint, we found the articular surfaces covered with cartilage and provided with a double ligament, which seemed to answer all the purposes of a veritable ligamentum teres. In order to leave no doubt as to the substance on the artificial surfaces being true cartilage, a portion of it was examined under the microscope by an eminent physiologist of New York, and found to contain cartilage-cells.

"The ligament was found to be bifurcated, having a single origin in the head of the bone, and then separating and finding an insertion at two different points in the new acetabulum.

"The specimen was taken from the body and I prepared it for preservation. I also made drawings of it while fresh, and took it to the photographer's and had a picture taken from it, in order, as you remarked at the time, that there might be no room for any one to think that the drawings were incorrect.

"Engravings made from the photographs were shortly after published in the "Transactions of the Medical Society of the State of New York."

"Now, the conclusion which I draw from the case in question is this: if the operation succeeded so well in a tuberculous subject, how much better and more practicable would it have been in a perfectly healthy person!

"Dr. Bauer makes great mistakes in his assertions as to there being no cartilage, synovial lining, etc. He knows, as every surgeon ought to know, that very often cases are met with when artificial joints are accidentally formed as a consequence of non-union of fractures, the distal ends and proximal extremities being covered with true cartilage. Now, if Nature, under all the disadvantages of accidental contingencies, can form a new and nearly perfect joint, how much more effective would be her reproductive powers if judiciously assisted by the skillful resources of art!

"In conclusion, then, I feel justified in saying that the case of Miss Losee was a success as far as the operation for artificial hip-joint was concerned; and it clearly illustrates the practicability of the operation, and affords a precedent for similar operation, which will yet be performed for the relief of suffering humanity.

(Signed) "I remain, as ever, yours truly,
"GREGORY DOYLE."

"LEXINGTON, KENTUCKY, April 23, 1868.

"MY DEAR DOCTOR: Yours of the 14th of April just received. I was present with several professional gentlemen, Prof. Parker among the number, at the *post mortem* of your artificial hip case, which proved satisfactorily that the patient died of tubercular consumption.

"The specimen derived from the case offered a beautiful illustration of artificial joint with cartilage, capsular, synovial, and ligamentous structure produced by the operations of Nature after surgical skill had prepared the parts. You may remember, I pointed out the interarticular ligaments, one of which had been separated at one of its attachments, by the too-free manipulations of the limb by one of the gentlemen present. These interarticular ligaments were the most remarkable feature in the development of the joint; and you may not have forgotten my remark to you upon the examination of the specimen subsequently at your office: 'How wonderful and beautiful was Nature in this reproduction of even the ligamentum teres, in constructing the new hip-joint for your patient, imitating so well the anatomy of the normal articulation!'

(Signed) "Most truly your friend,
"J. M. BUSH."

"BELLEVUE HOSPITAL MEDICAL COLLEGE, April 29, 1868.

"PROF. LEWIS A. SAYRE—

"DEAR SIR: In May, 1863, I received from you a specimen of a portion of the ilium, with the upper extremity of the femur, taken from a patient upon whom you had operated just below the great trochanter, for the purpose of making an artificial hip-joint, being completely and irremediably ankylosed.

"The patient's name was Susan M. Losee, and she died, as I heard, of tuberculosis some time after the operation. The specimen which I examined was the cut end of the femur, with a portion of the pelvic bones, forming a new joint. I found this end of the femur incrustated with true articular cartilage, and sent you at the time a report of the microscopical examination, with a drawing showing the cartilage, cavities, and cells.

(Signed) "Yours very truly,
"A. FLINT, JR."

"NEW YORK, September 27, 1868.

"DEAR DOCTOR: In reply to your inquiry, I beg to state I was present at the examination of the body of Miss L. in the spring of 1863.

"I made a full examination of the limb operated upon, and the motion was *free* at the new joint. The parts were then laid open; the new joint consisted of a firm structure surrounding the point of operation, and made a capsular ligament. On opening this capsular ligament the cavity was found to be lined by a synovial membrane smooth and lubricated. Between the sawed surfaces of the bone an interarticular cartilage and ligament were found. The case was of great interest, inasmuch as it verified views which we had under discussion.

(Signed) "Yours, etc.,
"WILLARD PARKER."

"TO PROF. LEWIS A. SAYRE."

KNEE-JOINT.—In bony ankylosis of the knee-joint, unless the deformity is such as demands interference, it is better to let it remain undisturbed.

If the deformity is sufficient to demand operative interference, a wedge-shaped piece of bone may be removed of sufficient size to permit the limb to be brought into the straight position.

Dr. Gurdon Buck, of this city, performed this operation in the New York Hospital in 1841 or 1842. The operation is performed in the following manner: Two incisions are made, one upon each side of the knee-joint, at the lower border of the condyles of the femur, and these are connected in the middle by an incision over the patella, thus making what is known as the H-incision. The flaps are then dissected up, and a narrow, leaden spatula worked through behind the joint from side to side to protect the blood-vessels from injury while the bone is being removed with the saw. Any small saw may be used, as Butcher's or the metacarpal saw, and a V-shaped portion of bone removed, of such dimensions as will permit the limb to be brought into the straight position.

Considerable care is necessary in removing this portion of bone, in order that it shall be of the exact size required to allow the cut surfaces of bone to come squarely in contact with each other, and at the same time have the limb straight. If too large a section is made, the limb will curve backward, and you will produce another deformity by the operation.

If the adjustment is not sufficiently accurate when the surfaces are brought together, another section of bone must be removed.

In order that the surgeon may remove a portion of bone of the exact size requisite to permit restoration of the limb to the straight position, it is a good plan to lay a piece of pasteboard or paper by the side of the limb, and sketch an outline with a pencil while it remains at the angle at which it is to be operated upon. Then, by cutting a V-shaped section out of this pattern, which will permit of restoring it to the straight position, you can ascertain the exact size of the piece of bone to be removed to enable you to restore the deformed limb to the desired position. When the bone has been removed, three holes are to be drilled through the lower extremity of the femur and upper extremity of the tibia, exactly opposite each other, one upon each side and one in the

middle, for the insertion of silver-wire sutures. When the bones have been brought together and secured by means of the sutures, the whole limb is to be placed in some apparatus, and retained there until ankylosis has taken place. In other words, the case is to be treated like one of compound fracture.

The most complete apparatus that can be employed is Butcher's splint, or Dr. Packard's, of Philadelphia, which has been fully described when speaking of exsection of the knee-joint. (See Figs. 142 and 143.) A very efficient and cheap dressing is a firm plaster-of-Paris splint, applied along the posterior aspect of the limb. Any fixed apparatus, however, may be employed that shall suit the convenience of the surgeon. Dr. Fluhrer, of this city, has recently constructed an instrument for retaining the limb in a fixed position after section of the knee-joint, which is more simple in its application, and at the same time more efficacious, than any other that I have seen applied. Prof. James R. Wood has recently employed it with the most satisfactory result.

ELBOW-JOINT.—If the elbow-joint has become permanently ankylosed at a right angle, an operation for correcting the deformity is not justifiable. If, however, ankylosis has taken place with the limb straight, a section of bone of the elbow-joint may be removed. For, in such cases, we may reasonably expect to obtain mobility at the point of section.

I perform this operation by making a single straight incision over the joint, and, drawing the soft parts aside, expose the bone. I then first remove the tip of the olecranon for the purpose of retaining the attachment of the triceps muscle, and then saw through the humerus, and radius, and ulna. When the sections of bones have been removed, the forearm is to be at once restored to a right angle with the arm, and the entire limb secured in some fixed apparatus until all inflammatory action has subsided, when passive motions should be commenced.

In many cases where the elbow has been ankylosed in the straight position by improperly-dressed fractures, and the dressings retained so long as to lose the mobility of the joint, you may, possibly, succeed in restoring motion to the joint by re-fracturing it, if done within a reasonable period after consolidation, without resorting to any other operation.

The following case illustrates this fact very well:

CASE.—George W. G., aged thirteen years, fell from a tree

in April, 1874, fracturing his arm. The gentleman who saw him at the time placed his arm in the straight position, and secured it in that manner by a board in front of his arm, to which it was secured by a roller, and retained in this position for seven weeks, at the end of which time firm union had occurred, the arm being perfectly straight, but the hand strongly pronated. When the dressings were removed, there was very great disappointment in finding the elbow completely ankylosed. One week from that time, eight weeks from the time of the accident, he was brought to me with the arm firmly ankylosed in the position seen in Fig. 265 (from a photograph).

I put him fully under the influence of chloroform, and, with



FIG. 265.

some force, succeeded in gradually breaking up the adhesions and restoring the arm to an acute angle. The fingers were well padded with cotton, and secured with a firmly-adjusted roller. The bandage was then carried up the forearm and over the elbow, which had been previously padded, and up the arm, a piece of sponge having been placed over the brachial artery for partial compression. One of Ahl's felt-splints was moulded to the arm in this angular position, and retained there. Ice-bags were placed around the elbow for several days, and fortunately no constitutional disturbance followed.

At the end of ten days the splint was removed, and the sponge-compress taken off. Gentle friction was applied to the limb, which was very much ecchymosed, and very slight passive mo-

tion given to the joint under the influence of an anæsthetic, after which the arm was re-dressed as before, with the exception of the sponge-compress over the brachial artery.

Two days after, the same manipulations were repeated, with a little more freedom of movement.

Each succeeding day these manipulations were continued, increasing the movement a trifle each time, for about two weeks. An anæsthetic was required each time motion was given to the joint.

From this time onward the dressings were removed daily, and manipulations made without the anæsthetic, and, at the end of a month, an instrument was adjusted to his arm with a hinge at the elbow, and, by means of a ratchet and key, I could obtain flexion to an acute angle and perfect extension. The boy was instructed how to use the instrument, and was told to apply the key several times a day for the purpose of making complete flexion and extension, but never carry the movements to the point of producing pain which would last more than twenty-four hours.

Once or twice during the treatment, slight febrile excitement was produced, accompanied with great tenderness and heat over the joint, and the motions had to be omitted for two or three days, ice and cold water having in the mean time been applied.



FIG. 266.

With the exception of this febrile phenomenon, nothing occurred in the case worthy of mention, and, at the end of four months, he was capable of making perfect extension (as seen in

Fig. 266), and complete flexion, to an acute angle (as seen in Fig. 267), both motions being the result of the voluntary contractions



FIG. 267.

of his own muscles without mechanical aid. (Figs. 266 and 267 are from photographs by O'Neil.)

LECTURE XXIX.

VARIOUS DEFORMITIES NOT DESCRIBED IN PREVIOUS LECTURES.

Deformity accompanying Facial Paralysis.—Torticollis.—Disease of the Wrist-Joint.—Causes.—Treatment.—Method of making Extension and Counter-Extension at the Wrist-Joint.—Case.—Wrist-Drop.—Causes of the Paralysis that gives Rise to the Deformity.—Why it gives Rise to this Peculiar Deformity.—Symptoms.—Treatment.

GENTLEMEN: I invite your attention this morning first to the deformity which accompanies facial paralysis.

The deformity which accompanies paralysis of the facial nerve is due to more or less complete loss of muscular power in those

muscles to which the nerve is distributed. The causes of paralysis of this nerve have been so fully explained in text-books, and the peculiarities of the deformity are so well understood, that but little time need be spent in their consideration. The most common cause of this paralysis, perhaps, is direct exposure to cold, such as comes from a current of cold air striking directly upon the side of the face. The deformity consists in a drawing of the mouth toward the unaffected side; the patient is unable to whistle or laugh properly; the angle of the mouth upon the affected side is lower than normal, and the eye upon the same side can be only incompletely closed.

The deformity not infrequently becomes permanent.

In many cases, however, so far as the cheek is concerned, it can be relieved in a very simple manner.

The principle is to approximate the origin and insertion of all the muscles affected.

This can be done by bending a hook upon the end of a piece of silver wire, and hooking it into the angle of the mouth, and then fastening the other extremity by bending it around the ear, as suggested by Dr. Detmold. The ear will yield somewhat, which may be sufficient to afford all the relaxation desired; but, if it is insufficient, a piece of elastic can be used, with a piece of wire attached at each extremity. When the muscles are supported in this manner, galvanism can be applied with benefit, for the muscles are then able to contract without carrying any weight.

This is a rule that should never be violated, when applying galvanism or electricity to paralyzed muscles.

TORTICOLLIS, OR WRY-NECK.—This deformity is of quite common occurrence. It may be congenital or acquired. When acquired, it may depend either upon abnormal muscular contraction or upon muscular paralysis. The muscle chiefly involved is the sterno-cleido mastoid. When either one of these muscles contracts independently of the other, the head is drawn toward the shoulder of the same side, and rotated so as to carry the face toward the opposite side.

Again, when one of these muscles becomes paralyzed, and the other is permitted to contract without anything to counterbalance it, wry-neck is the usual result.

In this respect, therefore, it is similar to the deformity of