

*April 10th.*—Measurements decreased from 17 to  $16\frac{1}{2}$  about the knee; below the knee  $15\frac{1}{2}$  to  $14\frac{1}{2}$ ; above knee not changed. Position straightened to dotted line in Fig. 141; knee-extension splint applied.

*May 16th.*—Readjusted rollers. The plasters, which have been on one month, are in good condition, and the instrument was properly extended; could bear almost his entire weight on limb without pain. Limb perfectly straight; discharge from it very slight; improved in every way.

*June 16th.*—Readjusted plasters for the first time; much improved.

*May 7, 1874.*—Plasters removed for the fourth time, and the joint is perfectly cured. The limb is straight, and can sustain entire weight of body. Has moderate motion. Removed all dressings, and applied roller-bandage; advise frictions and electricity, with passive motions.

*July 1, 1874.*—Patient walked to the office from Williamsburgh; is in perfect health; no pain whatever about the knee-joint; can extend leg perfectly straight, and flex it to nearly a right angle. Flexion may, possibly, be increased in time.

Very many of the cases, however, which you will be called upon to treat, will be those which have been neglected, and in consequence the disease has become far advanced.

You may, then, see a joint in which there is extensive destruction of the soft parts, extensive disease of the bony structures, accompanied by exhausting discharges, and very grave constitutional disturbance.

In such cases, if there is reasonable hope of being able to relieve the patient of this source of constitutional exhaustion and disturbance, by removing the dead bone, and establishing free drainage from the bottom of all sinuous tracts, an operation may be made for that purpose. If deemed justifiable, make a large opening in the soft parts so as to establish perfect drainage and prevent any collections of pus; then drill, gouge, and chisel, until all dead bone is removed; draw setons of oakum or perforated India-rubber tubing through the joint to avoid the possibility of the retention of pus, place the limb upon an extending and counter-extending apparatus, and carefully watch the progress of the case.

If this progress is favorable, both locally and constitutionally,

it will be good evidence that your operative interference has been in the right direction. If, however, the changes are unfavorable, you may next resort to exsection of the joint.

In those cases which have become so far advanced as to admit of no delay, exsection or amputation may be resorted to at once.

There are cases also in which the disease steadily progresses toward an unfavorable termination, even when the very best plan of treatment is adopted and carried out in the most faithful manner. Such cases will probably require exsection or amputation; therefore we will study the subject of exsection at our next lecture.

## LECTURE XVIII.

### DISEASE OF THE JOINTS.—KNEE-JOINT (CONCLUDED).—EXSECTION.

Mode of performing the Operation of Exsection.—Splints and Dressings used after the Operation.—Partial Exsection.—“Bryant on the Least Sacrifice of Parts as a Principle in Operative Surgery.”—Differential Diagnosis.—Bursitis.—Necrosis of the Lower Extremity of the Femur.

GENTLEMEN: You will recollect I stated at my last lecture that there are certain cases of chronic disease of the knee-joint in which the operation of exsection will be demanded, and it is to the consideration of this subject that I shall first direct your attention this morning.

Exsection of the knee-joint should be performed in the following manner:

Make a single U-shaped incision, beginning at the posterior portion of the inner condyle of the femur, passing downward and across a little below the lower border of the patella, and thence back to the posterior portion of the external condyle of the femur. I prefer the incision made in this manner to the H-incision, for the reason that it is equally serviceable, and exposes a much less extensive surface of bone. Turn the flap back and remove the patella whether it is diseased or not. By some it is recommended to peel the patella out from the periosteum, but removing a healthy patella in that manner is impossible.

Having removed the patella, you will next loosen the attachments of the ligaments as little as possible, just sufficient to permit section of the bones with the saw.

The next step in the operation is to remove a segment of bone from the lower portion of the femur and upper portion of the tibia, in such a manner as will permit restoration of the limb to the straight position in which you wish the ankylosis to take place.

To perform this part of the operation properly, requires considerable skill, and you may not succeed at the first trial in making your sections at such angles as will allow you to place the limb in the proper position after the pieces of bone have been removed. To this end, you have simply to recollect that your saw must pass through the femur and tibia, parallel with the articular surface of each bone, and not at right angles to the shafts of the bones. The bones should not be laid bare to an extent greater than is absolutely necessary to fairly expose the portion to be removed.

Section of the bone must be sufficiently extensive to remove all necrosed and carious portions; consequently you will continue removing bone, if your first section is not sufficient, until you arrive at a point where a fresh bleeding surface is obtained, indicating healthy bone.

The next step in the operation is to bring the fresh surfaces of the bone into perfect coaptation, and then retain them in that position with silver-wire sutures.

After the bones have been properly secured, you will fix the limb in some apparatus which will give absolute rest. For this purpose the splint of Dr. John F. Packard, of Philadelphia, is one of the best that can be employed, and which is described by him as follows:

"In order to get a perfectly accurate measurement, I trace an outline of the limb upon a sheet of coarse strong paper placed beneath it. Should the knee be very much flexed, the outline of the thigh may be made first and then that of the leg, marking the limb and paper so that the two proportions may exactly correspond. This pattern should extend on the outer side up to the greater trochanter, on the inner, up to the perinæum, and about four inches beyond the heel. A curved line should be drawn corresponding to that of the buttock for right or left side.

The figure so described may be cut out and made the pattern for the splint, which should be made of inch-board (although thinner stuff will do for smaller limbs). Above, at the buttock end, this board is beveled off so that no edge shall irritate the skin, and a hollow is made near the lower end to receive the heel; the whole is slightly hollowed from side to side so as to make a *very* shallow trough.

"A slit is mortised lengthwise in the middle line, close to the lower end of the splint, to receive the tenon of the foot-piece. This latter should be slightly inclined and long enough to extend up above the toes so as to keep the weight of the bedclothes off the foot. It may be fastened securely at any desired point by means of a wooden pin or wedge. (See Fig. 142.)

A piece corresponding to the knee is now sawed out, the saw lines being made to converge slightly from without inward so that the piece shall be a little wider on the outer side, making it slide out and in more easily. The saw may be carried so as to cut the edges of the knee-piece, as seen in the diagram; or, if a carpenter be employed, a regular groove may be cut in the thigh and leg pieces, with a corresponding ledge on the knee-piece.

Two strong metal brackets of suitable size are screwed on to the thigh-piece above and the leg-piece below so as to connect

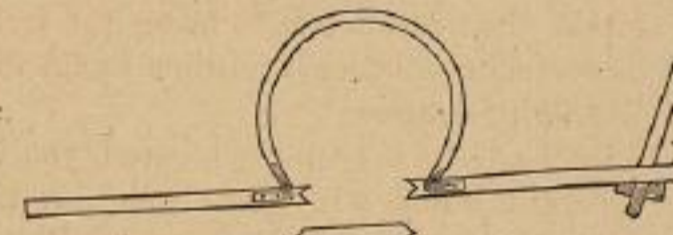


FIG. 142.—FROM ABOVE.



FIG. 143.—FROM THE SIDE (THE SLIDE REMOVED).

them firmly. These brackets should be from six to nine inches high, and should be flared somewhat outward; just at their point of attachment they should curve sharply outward, as seen in Fig.

143, so as to prevent any pressure against the limb in case the latter should swell.

"Side-pieces of soft leather are next tacked on the upper surface near the edge of each portion of the splint; they may be made to fasten by laces, or, if preferred, by straps and buckles.

"The limb being laid on this splint, previously padded, is perfectly secure. Sometimes it is well to add a small strip of paste-board on the upper surface of the thigh and another for the leg.

"To change the dressings it is only necessary to undo the leathers, and to draw out the middle shelf, holding the dressings at the inner side lest they should have become adherent. The knee is thus left exposed, and, when the dressings have been changed, the shelf is slipped in again and fastened as before. I have sometimes had a small catch put on at the outer edge, but do not think it necessary. Before using the splint it is well to have the knee-piece, and the adjoining portions of the thigh and leg pieces, thoroughly oiled so that they may be less apt to absorb any discharges which may flow down over them."

You will doubtless get into trouble in attempting to use such complicated apparatus, unless you are thoroughly familiar with its mode of application; but, if you will keep the principle in mind, namely, absolute rest with the limb in the proper position, it will soon be seen that a great variety of mechanical appliances can be devised to put it into practical operation.

The plaster-of-Paris dressing is one that can be easily applied, and is both cheap and efficient. It consists in the application of strips of flannel, saturated with plaster of Paris, along the posterior surface of the thigh and leg, and along the sole of the foot, and of sufficient width to half encircle the limb. In this way a strong and immovable splint can be easily made. The plaster hardens very quickly, and when hardened the limb can be additionally secured to the splint by means of a roller bandage. The entire secret of success in exsection of the knee-joint is, first to make your incision through the soft parts in such a manner that the outer angle will be as low as the lowest portion of the incision through the bone; and, second, to secure absolute rest for the parts after the operation has been performed. It is important to extend the incision through the soft parts as far back toward the posterior aspect of the limb as the incision through the bone extends, in order to give perfect drainage. All that is necessary,

when these indications are fully met, is to retain the limb in the condition of *absolute rest* until perfect consolidation has taken place.

Exsection at the knee-joint is attended with considerable danger, and in many instances you may justly hesitate before resorting to the operation.

If the disease of the joint is not sufficiently extensive to warrant complete exsection, you may remove all the dead bone, by drilling and gouging; pass setons of oakum or perforated rubber tubing through the joint for the purpose of securing complete drainage, and conduct the treatment upon the general plan recommended when speaking of the management of the ankle-joint.

Exsection can be performed much more quickly than the operation just indicated; but, when the disease does not involve the entire joint, when the risk is considerable, or when the surrounding conditions are unfavorable, exsection should be avoided. In such cases I rely chiefly upon the operation for partial removal of the joint and the result in many cases is very satisfactory, as you have already seen at our clinics.<sup>1</sup>

This plan of treatment, which I have practised for more than twenty years, I am happy to say is now being adopted in England. Mr. Bryant, the distinguished surgeon of Guy's Hospital, in his recent papers published in the London *Lancet*, "On the Least Sacrifice of Parts as a Principle in Operative Surgery," has this remarkable statement:

"I trust that this series of cases is enough to demonstrate with sufficient clearness the value of the practice I am now inculcating, and to show that in a large number of cases of disease of the joints a cure may be secured by a simple incision into the affected joint and the removal of necrosed bone. The series includes examples of disease of the shoulder and elbow, hip, knee, ankle, and great-toe joints, and I do not think I should be far wrong if I were to express my belief that in many of the cases, if not in all, many surgeons—more particularly those who are advocates for excision—would have excised the joints, and some few would have amputated. I am not here, however, to condemn their practice, for their results might have been good; but, whatever they might have been, they would have been secured by severe operative measures, and consequently by dangerous risks, whereas in the treatment I am now advocating the surgical proceedings are simple and are attended with a minimum of danger. The success of the practice I have recorded was also great."

<sup>1</sup> See case Thomas B. C., Lecture XVII.

During the remainder of the hour we will study some of the diseases that may be mistaken for chronic disease of the knee-joint.

*Bursitis.*—The bursæ about this joint sometimes become the seat of inflammation, which goes on to suppuration and the formation of large abscesses.

When such a case presents itself, if of long standing, there will probably be numerous openings above and below the joint, and many of them will connect with each other through long, tortuous sinuses, that lead off into pockets here and there filled with pus. These sinuses and pockets are always lined with a thick membrane, which keeps up a constant secretion. The long-continued and exhausting discharge gives rise to more or less constitutional disturbance, and the swollen and infiltrated condition of all the tissues about the joint imparts to it an appearance and feel very much like that seen in true disease of the joint itself.

When, however, these sinuses are explored with my vertebrated flexible probe (see Fig. 144), or the elastic flexible probe of Mr. Charles Steele, F. R. C. S., of Meridan Place, Clifton, Bristol, England (see Fig. 145), you will find that they have been



FIG. 144.



FIG. 145.

made by pus burrowing in the cellular tissue beneath the skin and among the muscles, and are all extra-capsular. The characteristic appearance of the external openings when dead bone is present is not seen in these cases. This probe of Mr. Steele's, although apparently such an insignificant instrument, is yet one of the greatest value, and I think an improvement upon my own.

The most certain method of recognizing the difficulty, however, is to make a thorough examination by crowding the bones together, by extension, and by pressure over the insertion of the coronary ligaments, for in this way you will be able to determine

whether the joint is involved or not. When this is done it will be found that scarcely any symptoms are present indicative of true disease within the joint.

It is very difficult in certain cases to determine whether the fluctuation that may be present is within the bursa over the joint, or is due to the presence of fluid in the joint itself. If the bursa alone is involved, the patella will be crowded firmly against the condyles of the femur; whereas, if the effusion is within the joint, the patella will be lifted from the condyles, and can be pressed against them in many instances so as to produce an audible click.

The TREATMENT for cases of bursitis of long standing is to open all the sinuses freely, remove the lining membrane, and fill the cavities with oakum saturated with Peruvian balsam. In this manner you will be able to establish the healing process at the bottom of the cavities lined with pyogenic membrane, and the case will probably give you no further trouble.

*Necrosis of the Lower Extremity of the Femur.*—Necrosis of the femur at its lower extremity is quite commonly mistaken for chronic disease of the knee-joint. (See Case, page 409.)

In occasional cases it is very difficult to make a correct diagnosis. The most common seat of the necrosis is along the course of the branches of the linea aspera, including the popliteal space of the femur. These bifurcations have edges more or less rough and cutting, which will break through the periosteum when it is firmly pressed against them. For instance, a person may fall from some height, and in the descent his leg may become caught in such a manner as to make severe pressure just over the periosteum covering these ridges, perhaps sufficient to wound the periosteum without making any external wound. Such an injury may give rise to periostitis and subsequent necrosis of the bone. When such results follow an injury of this character, it takes a long time for the difficulty to make itself manifest upon the thigh, on account of the depth of the disease beneath the surface. But the damage done, and necrosis following, pus is retained and burrows among the tissues, and the disease is so near the knee-joint that it is very liable to be mistaken for true joint-disease.

All that is necessary to do in these cases, to arrive at a correct diagnosis, is to make a thorough examination of the joint in the manner already described. If your examination is thorough, and

disease of the joint is present, you will be able to detect it. You will also observe that there is no abduction or twisting of the leg outward, as shown to result when the joint has been long involved; but, on the contrary, the leg will be found flexed in a straight line with the femur, and has no outward rotation. The external openings of sinuses communicating with dead bone have such a characteristic appearance, described by the late Dr. Alexander Stevens as resembling the anus of the hen, as to be absolutely unmistakable. When this is present, therefore, you will at once use a flexible probe (*see* Figs. 144 and 145), which will follow the lead of any opening under the fascia or elsewhere, and finally conduct you to the dead bone, and then your diagnosis is positive.

In some cases, however, which have fallen under my observation, there were no openings until I had made one for the purpose of exploration. Such an incision can be made through the vastus externus muscle, when the bone is very readily reached without incurring any risk from hæmorrhage.

The incision will probably give free discharge to pus; and then, with your finger or probe, the exploration can be continued until the diagnosis is completed. In some cases, perhaps, the parts can be saved by making a free incision through the periosteum before death of the bone takes place. When diseased bone is found, proper measures can be resorted to for its removal. If you are not able to remove all the dead bone at the time of the first operation, draw a seton of oakum or an India-rubber tube through the wound, and leave Nature to remove the remaining portion.

An important point with regard to operations for the removal of dead bone in this region, as well as elsewhere, is to preserve the periosteum as much as possible.

The permanent deformity which commonly follows chronic disease of the knee-joint is ankylosis with distortion. The subject of ankylosis will be fully considered hereafter.

## LECTURE XIX.

## DISEASES OF THE JOINTS.—MORBUS COXARIUS.

Anatomy of the Hip-Joint.—Pathology of Hip-Disease.—Etiology.—Symptoms of First Stage.

GENTLEMEN: We shall next consider that malady which occupies the chief place among affections of the joints, namely, Morbus Coxarius, or hip-disease. But, before entering upon the consideration of the symptoms and morbid changes of structure in this disease, it will be necessary for me to give a brief description of the most important anatomical structures entering into the composition of the hip-joint, in order that you may fully comprehend the principles which I shall endeavor to establish as the proper basis for correct treatment.

ANATOMY OF THE HIP-JOINT.—The osseous structure of the hip-joint is made up of the *os innominatum* and head of the *os femoris*, the latter being received into a deep cavity of the former, the *acetabulum*, by a kind of articulation called *enarthrodial*, or ball-and-socket joint.

The head of the femur and the acetabulum are cancellous in structure; quite vascular, and subject to inflammation.

The acetabulum is lined with cartilage at all parts, except at a circular pit (*fundus acetabuli*), which occupies the lower part of the cavity near the notch, and is cushioned with fat. The head of the femur, which fits into and articulates with the acetabulum, is nearly two-thirds of the segment of a sphere, and is entirely covered with cartilage, except at the deep pit, which is for the insertion of the *ligamentum teres*, at its upper and inner face looking toward the cavity of the pelvis.

The proper ligaments of the hip-joint are the *capsular*, the *ileo-femoral*, the *ligamentum teres*, the *cotyloid*, and the *transverse*.

The *Capsular Ligament* (*A*, Fig. 146) is the largest and strongest capsule in the body. It is attached above to the outer border of the acetabulum and outer face of the cotyloid ligament; and below, to the anterior inter-trochanteric line, and neck of the femur, which latter it completely surrounds. It is thicker and