CHAPTER III.

OSTEOTOMY FOR DEFORMITIES AT THE HIP JOINT.

Deformities at the hip joint which may be relieved by an osteotomy may be considered under four heads, namely:

1. After hip-joint disease.
2. After rheumatism.
3. After unreduced dislocation.
4. After fractures united at an angle.

The great majority of deformities of this joint follow coxalgia. There are but few persons who have had suppurative disease of this articulation who recover with motion, and many in whom there have been no signs of abscess, yet the joint remains stiff, with an amount of flexion and adduction which interferes much with locomotion. Or there may be some movement, yet, on account of the contraction of the psoas and iliacus, and the adductors, the limb is flexed and adducted on the pelvis at an angle too great for easy locomotion. The foot can not be planted firmly on the ground even with the greatest latitude of motion at the lower lumbar vertebræ, the gait being awkward and labored. It becomes a question whether by an operation any improvement can be obtained.

An anchylosed hip joint, in which the limb is held in a perfectly straight line with the long axis of the body, is a useful one for walking or standing, but is more of a deformity in any other position of the body than one fixed at a right angle to the pelvis. In the former case the person can not sit down with any degree of comfort, or put on his shoes, whereas in the latter, by the aid of proper orthopedic appliances, not only is the sitting posture comfortable, but locomotion can be performed with considerable facility. It therefore becomes an interesting question at what angle an anchylosed hip should be placed so as to be a compromise, as it were, between the two positions, and give the patient the greatest amount of use; that is, easy walking and comfort in the sitting posture. I think that an angle of 125° with the transverse axis of the pelvis when in an erect position gives this. It permits of comfortable locomotion, ease in sitting, and ability to put on his shoes. This, then, taken as a standard, enables us to discuss the question of correcting any marked deviation on either side of this line. The angle of deviation is obtained by standing the patient erect and bringing up the thigh until the lordosis is obliterated, or, in other words, until the pelvis assumes its normal position.

The deformity after hip-joint disease is due, first, to contraction of the psoas and iliacus muscles, causing flexion and rotation of the limb; second, to the action of the adductors, drawing the thigh toward the median line. This is accompanied or followed by tilting of the pelvis upward on the diseased side in order to bring the limb more in a line with the

long axis of the body, and thus prevent it from crossing over the sound one. It is a compensatory, not pathological, position. In the early stage of this affection the apparent shortening is due to this tilting of the pelvis. Later, in those cases in which changes take place in the head and acetabulum, there is actual shortening of the limb.

The absorption more or less of the head of the femur, and the higher plane occupied by the trochanter, due partly to the above-mentioned change and partly to elongation of the acetabulum in its upper or posterior diameter, increases in no small degree the deformity and the amount of shortening of the limb.

The difficulty in walking is not due so much to the shortening and flexion as to the adduction of the limb, whether the anchylosis be bony or fibrous. The characteristic awkward gait of a patient who has recovered from a coxalgia with anchylosis is due to the tilting upward of the pelvis on the diseased side. In time other muscles become shortened, and add another element to the problem of correction.

The muscles chiefly at fault are the psoas and iliacus, and the adductors; and, even when the deformity is corrected by any operation above the insertion of the former, the question still remains, How can we elongate them? From their origin and insertion being movable, it is impossible to apply any force in order to lengthen them. When extension is applied to the thigh the lumbar vertebræ arch forward (lordosis), and when the lordosis is obliterated the thigh is flexed more or less, being carried forward by the pelvis.

In those cases in which anchylosis does not take place there may be motion in the direction of further flexion, but extension beyond a certain point is impossible; and, although the thigh can be brought down so that the foot can be planted flat on the ground, it is not from further extension, but is accomplished by bending inward of the lumber spine, due to the same shortening of the muscles inserted into the trochanter minor. In this class of cases walking is almost as difficult as in those where the joint is fixed.

In cases where suppuration has been extensive the soft parts about the region of the hip joint are often infiltrated with cicatricial tissue which binds the skin to the bone.

In anchylosis following rheumatic inflammation the condition of the parts is entirely different; the head and neck are intact, the bone is not infiltrated with inflammatory products of low vitality. It may be increased in hardness, but the parts retain their normal relations, the neck is not shortened, the anchylosis is usually bony, the soft parts are normal, and the psoas and iliacus are not as much of an element in causing the deformity. It is due more to position, while in hip-joint disease it is the active contraction of the muscles that causes the deformity. In this disease the limb may be fixed in a straight line with the body, a condition very seldom, if ever, met with after coxalgia.

In rheumatoid arthritis the joint may be surrounded by irregular bony growth, while the bone itself is very compact and hard, like ivory.

Deformities due to unreduced dislocations are not

of frequent occurrence. The dislocation may be traumatic, or pathological.

The latter may occur during the course of hip-joint disease, but I do not think that they are as common as some writers would lead us to suppose. It may occur during the course of some debilitating disease, as typhoid fever.[1] I have seen one taking place upon the dorsum of the ilium during an at tack of acute polyarticular rheumatism, complicated with serious heart trouble. Burns[2] reports a similar case. In cases of dislocation in hip-joint disease the head is often found much altered.

Malpositions of the femur after fracture are sometimes met with, and should be included in this class.

In all of these cases (fracture of the femur excluded, unless they occur very high up) one of the chief obstacles to the correction of the deformity and causing the difficulty in walking is the contraction of the adductors. Flexion alone is not the chief cause of the trouble. It is the adduction of the limb; and, even if the dislocation is reduced, the muscles carry the limb inward, and must be cut in order to afford relief.

There is a well-grounded opinion among practical surgeons that any attempt to correct deformities at the hip joint after suppurative coxalgia, or to regain motion in this articulation, should not be entertained. My own experience has been anything but encouraging. Two cases in which I made the attempt resulted in rekindling a disease in the joints that had shown no symptom for several years, and which, in one, ended in the death of the patient.

[1] Rawdon, "Liverpool Med.-Chir. Jour.," 1882, p. 22. [2] "Centralbl.," 1879, p. 691.

Morton, of Philadelphia, has had a similar unfortunate experience.

The records of many hospital surgeons show similar results. It is true that in a few cases the operation of forcibly straightening has been followed by success. Gay reported such a case at the meeting of the American Medical Association, 1882, in which the neck was fractured and an improved position obtained. Mr. Broadhurst[1] also advocates forcible straightening, and claims remarkable success. But the cases are so carelessly reported that it is impossible to form any opinion of the results. I am decidedly of the opinion that under *no circumstances* should a hip joint that has been the seat of suppurative coxalgia be forcibly straightened. It is a dangerous operation, and is unwarrantable.

The position of the trochanter on the diseased side may be taken as an index of the amount of alteration in the head and neck of the femur. If it is higher than on the sound side, the position of the foot being normal, the change must be due, in the vast majority of cases, to absorption of the head and neck; and the more the upper border of the trochanter major is above Nélaton's line, the more profound must be the alteration in the upper part of the femur. Shortening of the limb, that is, the measurement from the anterior-superior spine of the ilium to the internal malleolus is not as reliable a guide as to the condition of the neck as the position of the trochanter, because the whole limb may be atrophied from disease without any marked change in the neck.

[1] "On Anchylosis," London, 1881.

History.—In 1826, Rhea Barton[1] devised and carried out the following operation for anchylosis of the hip joint at a right angle subsequent to inflammation of that articulation: The patient was a sailor twenty-one years of age. The limb was flexed at a right angle, rotated inward, and adducted. A straight incision was made parallel to the long axis of the limb at the upper portion of the thigh, and a short transverse one at the point of intended section. The bone was divided with a narrow saw just above the trochanter minor. No vessels were ligated. Primary union was not desired. The operation was completed in seven minutes. Passive motion was commenced on the twentieth day, and repeated at intervals of several days. At the time of discharge, two months after the operation, the patient was able to execute "every movement which the limb originally possessed." He had a movable joint for six years, when he became dissipated, the new joint gradually became stiff, and at post-mortem examination the artificial joint was found anchylosed.[2]

Rodger,[3] in 1830, removed a wedge-shaped piece of bone above the trochanter minor from a man forty-seven years of age, for anchylosis of the hip joint, at a right angle, with marked adduction. Clèmot,[4] in 1834, removed a wedge-shaped piece from the femur of a child four years of age for a deformity following hip-joint disease.

[1] "North Am. Med. and Surg. Jour.," 1827, vol. iii, p. 279.
[2] "Am. Jour. Med. Sci.," 1837, vol. xxi, p. 333.
[3] "N. Y. Jour. Med. and Surg.," 1840, p. 240.
[4] "Gaz. Med. de Paris," 1836, p. 347.

Maisonneuve[1] made a section between the trochanters.

Mayer first proposed an osteotomy for old dislocation, and Broadhurst, in 1862, divided the neck of the femur for anchylosis with deformity following hip-joint disease.[2] All of these operations were made through an open wound, and the section made with a saw.

In 1862 Dr. Lewis A. Sayre[3] made a section of the femur just above the trochanter minor and removed a "semicircular piece of bone with its concavity downward" and rounded off the upper portion of the lower fragment so as to be received into this cup-shaped depression, and thus aid in establishing an artificial joint. The first patient operated upon in this manner is reported "cured" with a movable joint at the point of operation. He repeated the same operation later upon another patient, but she died of tuberculosis before a sufficient time had elapsed to establish good and useful motion. In both of these cases there was necrosis of a portion of the bone: in the first, two pieces that "seem to be exfoliated from the lower fragment"; in the second, "two pieces about the size of a pin's head." In the last case, at post-mortem examination the structures of a new joint are reported to have been found. (Fig. 7 shows the line of Sayre's section.)

Walter[4] repeated Sayre's operation for anchylosis of both hip joints. After considerable suppuration,

[1] "Gaz. Med. de Paris," 1847, p. 935.
[2] "Lancet," 1862, vol. i, p. 326.
[3] "N. Y. Med. Jour.," January, 1869, p. 337.
[4] "Arch. Clin. Surg.," August, 1876, p. 60.

the patient is reported as having only limited motion at the new articulation, with a history of a tendency to become stiff.

In 1863 Weinlechner performed a section through the neck with a chisel. Langenbeck, in 1852, corrected deformities in the hip joint by dividing the bone with a narrow saw, passed into the bone through a small perforation made with a drill. Suppuration followed in all the cases operated on. Mr. Adams, in 1869, first divided the neck of the femur through a small wound, and gave to the operation the name of subcutaneous osteotomy. Since that date sections of the femur for deformity have been performed by surgeons both on the continent and in this country.

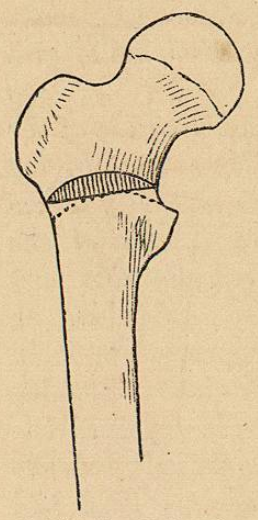

Fig. 7.—Sayre's line of section.

Volkmann[1] removed a wedge-shaped piece of bone from below the trochanter major in order to correct the adduction in bony anchylosis (Fig. 8). Later[2] he substituted an excision of the joint with a chisel and gouge, a linear osteotomy being first performed, and then the head and neck removed in small pieces. He reports six patients operated upon with good results in regard to the re-establishment at the new articulation.

The three points at which section has been made

[1] "Centralbl. für Chirurg.," 1874. No. 1, p. 1.
[2] "Centralbl. für Chirurg., 1880, No. 5.

on the femur are through the neck, between the trochanters, and below the trochanter minor.

Maisonneuve, in 1847, divided the neck of the femur through an open wound,[1] and Weinlechner in 1863. But to Mr. Adams is due the credit of devising an operation through a very small wound and reducing the risks of suppuration to a minimum. The instruments used were a long tenotomy-knife and a very small saw (Fig. 1), three eighths of an inch wide, with a cutting edge one inch and a half in length, at the end of a slender shank three inches long. The details of the operation are as follows: The tenotomy-knife is entered a little above the top of the great trochanter and carried straight down to the neck of the thigh-bone. The muscles are divided and the capsular ligament freely opened. Withdrawing the knife, the small saw is carried along the track made straight down to the bone, which is then divided from before backward, and at right angles to the long axis of the neck.

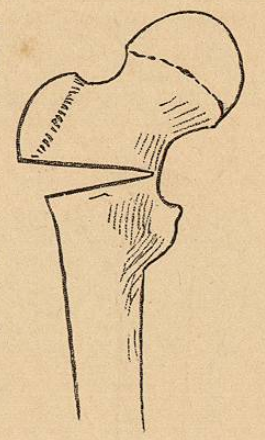

Fig. 8.—Volkmann's line of section.

After the division is completed (Fig. 9), those muscles that prevent the limb being brought into the desired position are divided and the limb put up in a straight position. He simply covers the wound with a compress held in position by a piece of adhesive plaster.

[1] "Gaz. de Hôp.," 1849, p. 64.

Golding-Bird substituted a chisel for the saw.[1]

Stokes[2] divided the neck with an osteotome in Adams's line.

Operations between the trochanters have been performed by Barton and Maisonneuve and Sayre through an open wound, division of the bone being made with a saw. Later, sections have been made through a small wound with the osteotome. But few cases have been reported. The operation is performed like any simple osteotomy. Cuneiform section between the trochanters has been more frequently performed. They seem to be adapted to those cases of marked adduction.

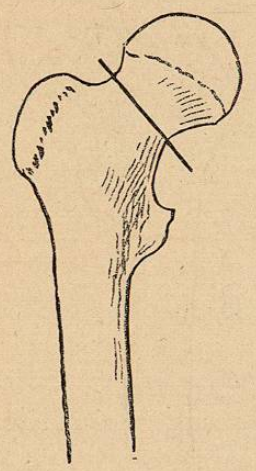

Fig. 9.—Adams's line of section.

Mr. Barwell[3] divided the femur just above the trochanter minor with a chain-saw, and a strict antiseptic method, arguing that a section below the trochanter minor would produce too much shortening, equal in amount to the distance from the head to the point below the trochanter—from two to three inches. The wound healed by first intention; a firm union was established in thirty-three days.

Mr. Gant[4] made a section with an osteotome of

[1] "Guy's Hospital Report," 1877, p. 278.
[2] "Brit. Med. Jour.," April 8, 1882, p. 505.
[3] "Brit. Med. Jour.," May 29, 1880, p. 812.
[4] "Lancet," December, 1872, p. 881.

the shaft of the femur below the trochanter minor for deformity at the hip joint (Fig. 10). He advocated it for anatomical reasons: that the resistance of the psoas and iliacus was set free, and on the pathological grounds in that the section was made through healthy bone, or rather at a greater distance from the point of disease after coxalgia, and thus the operation was not as liable to rekindle the joint trouble.

Lately, Dr. Stephen Smith[1] performed the following operation for anchylosis of the hip-joint at a right angle: With a Shrady's saw he made two partial sections of the femur just below the trochanter minor—one from its posterior and one from its anterior aspect — half an inch apart, and then fracturing the intervening portion of bone, thus making a half tenon and mortise, the object being to prevent any tendency to displacement of lower fragment so as to endanger non-union. After placing the bone in position, the two fragments would assume the relations exhibited in Fig. 11.

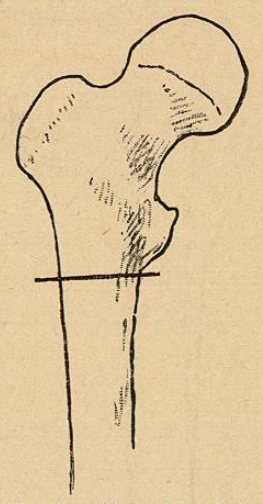

Fig. 10.—Gant's line of section.

The patient recovered after evacuation of a large abscess, extending from the point of operation nearly down to the knee.

Adams's operation can only be performed when the neck of the bone is present. It is therefore only

[1] "Med. Record," Jnne 2, 1883, p. 589.

applicable to cases of anchylosis following rheumatism, and possibly those cases of recovery from hip joint disease in which there has been but slight destruction of these parts with bony anchylosis. But it is a serious question whether cases of deformity after suppurative coxalgia should *ever be* submitted to the operation. In the vast majority of cases the section would be through bone infiltrated with inflammatory products of low vitality. The incision, to gain access to the neck, would frequently have to be made through tissue that had been riddled with abscesses, and with the skin often bound down to the bone, and even after a section it would be very difficult to bring the limb down. Adams's operation is not applicable to cases where the psoas and the iliacus are greatly shortened, and this occurs more often after hip-joint disease than after anchylosis following any other condition.

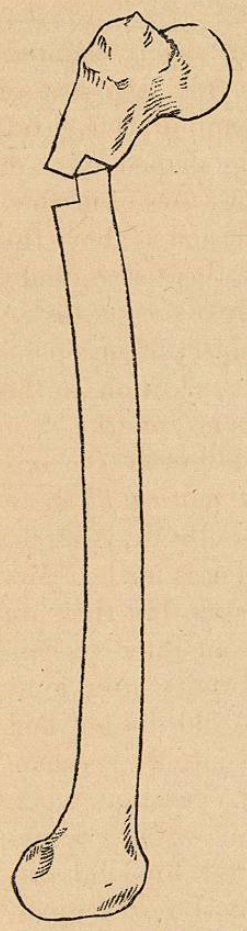

Fig. 11. — Smith's line of section.

Cases of unreduced traumatic dislocation offer a much better chance. In regard to the class of cases that are suited to the operation, Mr. Adams justly states "that those cases are best adapted to this operation in which there is but slight destruction of

the head and neck, and in which there is bony anchylosis, and that cases of anchylosis after rheumatic inflammation are the most favorable; those after suppurative coxalgia the least so."

In regard to operations between the trochanters the section is made farther away from the seat of disease in cases of deformity after suppurative coxalgia, and it also permits of a wedge-shaped piece of bone to be removed, if so desired, in cases of marked adduction. Yet, as the point of division is above the insertion of the psoas and iliacus, there is a doubt whether the deformity is as easily overcome as in section below that point. If the object of an operation is to obtain useful motion in addition to the correction of the deformity, there is no question but that the nearer the division is made to the true axis of motion the better. But useful motion after an osteotomy, be it linear, cuneiform, or elliptic, is rarely obtained, no matter where the section is made. Motion has been obtained in some cases, but they are exceptional. I do not think that an inter-trochanteric operation is the best for deformity after joint disease. It is too near the point of old disease, and it *does not* free the muscles inserted into the trochanter minor. It is, however, a good operation when the bone is healthy; the operation below the trochanter minor is the one to perform after hip-joint disease. Mr. Gant[1] thus very concisely states the question when section should be performed below and when above the trochanter minor.

1. "When in consequence of continued disease of the hip joint the head of the femur has disappeared,

[1] "Brit. Med. Jour.," October 18, 1879, p. 606.