

CASE IV.—W. S., fourteen years of age, was admitted into St. Mary's Hospital in February, 1881. He is very small for his age, has misshapen chest and



FIG. 36.

other rachitic deformities, together with genu valgum. The ligaments of the knee joint are relaxed.

Fig. 35 is from a photograph taken shortly after admission, and shows the amount of the deformity.

On February 25, 1881, Macewen's supra-condyloid osteotomy was performed upon both limbs, and immediately put in plaster-of-Paris splints. The wounds were found closed on the 27th, and the splints were removed on the 7th of April, at which time consolidation between the fragments was firm. Fig. 36 is from a photograph taken after he left the hospital.

CHAPTER VI.

GENU VARUM.

GENU VARUM has been described by some writers on deformities as the reverse of genu valgum, and that the pathological changes found in the former are similar to those met with in the latter, except that they occupy the opposite side of the limb. This is an error, at least in the vast majority of cases. The deformity in genu varum seldom has that angular appearance so characteristic of knock knee. The whole limb from the trochanter to just above the malleolus forms a long curve, the femur and tibia apparently being equally involved, whose greatest convexity is at the knee joint. There are, however, a few cases that present an angular appearance at the knee joint. I have met one case in which the deformity was due to a lengthening of the external condyle, resembling the condition often found in knock knee. Reeves¹ reports a case of hypertrophy of the external condyle. Genu varum of a marked degree is not as common a deformity as genu valgum, nor are all cases of apparent bowing outward of the limb to be classed as cases of this deformity. Many examples of uncomplicated curvature of the tibia present an appearance of genu

¹ "Trans. Clin. Soc.," London, 1879, p. 32.

varum, but, on correcting the tibial curve, the whole deformity is removed, thus proving that the femur was not involved. Fig. 37 illustrates this. In other examples there may be a slight bending of the femur. Again, a curvature of the thigh may not be observed until the tibial curve has been corrected.

Genu varum may be present in one limb and genu valgum in the other. This deformity may be complicated by other curvatures of the bones of the leg.

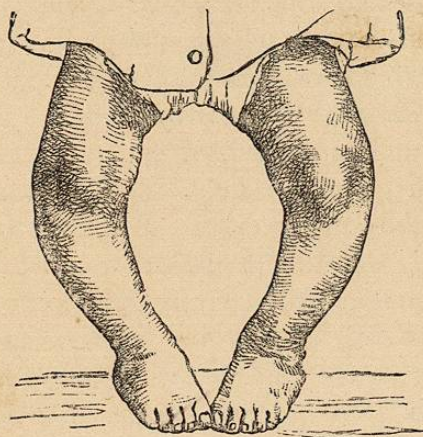


FIG. 37.

The cause of genu varum is rickets, and in the majority of cases the femoral is secondary to the tibial curve.

Patients affected with genu varum to any marked degree walk in an awkward manner, but there is not as much pain from this deformity as from genu valgum.

The elements going to form this deformity being so variable, no strict rule can be laid down as to its

management. The same remarks that were made with regard to the mechanical treatment of knock knee apply with equal force to cases of genu varum. When an operation is called for, it will often be found that a correction of the most marked curve, which is generally the tibial, will remove, or almost remove, the deformity, so that no other section is called for. An osteotomy should be performed at the point of greatest curvature in each bone, and the bone in which the most marked bend exists should *always* be divided first. In marked cases, several osteotomies are necessary to entirely correct.

Theoretically, the section should be made of the tibia from without inward; but, on account of the difficulty of getting at the bone on its outer aspect, and the vessels in close proximity to it in this situation, it is not practical, and its division is made from before backward. The fibula should always be divided first. Section of the femur is best made from the outside.

CHAPTER VII.

OSTEOTOMY FOR ANKYLOSIS OF THE KNEE JOINT.

OSTEOTOMY for ankylosis of the knee joint was first performed by J. Rhea Barton,¹ who made a cuneiform section of the femur at its lower extremity. The late Gurdon Buck, in 1844, modified Barton's operation by including the ends of the femur and tibia together with the patella in the wedge.

Since then other operations have been performed. They can be best considered under—

1. Operations upon the femur.
2. Operations upon the tibia.
3. Operations upon the femur and tibia.
4. Operations upon the joint itself.

1. *Operations upon the Femur.*—Barton's operation, performed in 1835, for bony ankylosis of the knee joint at a right angle, consisted in removing a V-shaped piece of bone, base forward, from just above the condyle of the femur, in the following manner: The bone was reached by an angular-shaped flap, base outward, made just above the condyles, and a V-shaped piece of bone then removed, the apex not extending entirely through the thickness of the shaft. The section was made with a

¹"Am. Jour. Med. Sciences," 1837, vol. xxi, p. 332.

saw, and the remaining portion of the shaft fractured by bending the leg. The line of incision was closed by sutures and adhesive plaster, and the limb placed upon a double inclined plane. After some days the leg was gradually brought up into a straight line with the femur. The object in not immediately correcting the deformity was that the rough ends of the divided bone might become rounded off by inflammatory action. Quite a number of patients have been operated upon by Barton's method, but modified by the immediate instead of the gradual correction of the deformity.

Kilgarriff,¹ in a case of ankylosis at a right angle following extensive injury to the knee, slightly modified Barton's operation by making a complete section of the bone. His reasons for this mode of operating were that the skin over the knee had been entirely replaced by cicatricial tissue, and he desired to remove more bone than a strict Barton's operation would accomplish. Schillbach is reported by Heyfelder (p. 108) to have made a complete resection with a chain-saw of a wedge-shaped segment of the femur. Pancoast² operated upon the shaft by perforating the bone in different directions in the line of desired fracture with a gimlet through a small wound, and then breaking the bone. An abscess formed at the seat of operation, but eventually the patient made a good recovery, the limb being nearly in a straight position. In the following year Brainard, of Chicago, operated upon the condyles, the bone at this point being perforated by an instru-

¹"Dub. Med. Jour.," March, 1880, p. 189.

²"Med. and Surg. Reporter," March 5, 1859, p. 408.

ment devised for this purpose. He was unable at the time to fracture the bone, but some days later, after inflammatory action had been set up, the bone easily gave way. Stephen Smith¹ attempted to perform Brainard's operation, but was unable to fracture the bone, even after inflammatory action had lasted for some time.

Langenbeck, in 1862, practiced subcutaneous osteotomy above the condyles by means of his perforator and small saw, but the operation can not be considered a strict subcutaneous one as such sections are now performed.

Barwell² performed a linear osteotomy with a chisel, two inches above the lower end of the femur, for the correction of angular ankylosis at the knee joint, with excellent results. A few months later Macewen, in April, 1875, operated antiseptically in a knee joint in a similar manner.

2. *Operations upon the Tibia.*—Wahl, of St. Petersburg, in 1877 performed a cuneiform osteotomy upon the tibia just below the tubercle for the relief of a knee ankylosed at a right angle. The operation was followed by suppuration and necrosis. Margary repeated this operation, but with better success. It does not seem to have been a favorite operation, and has had but few advocates.

3. *Operations upon the Femur and Tibia.*—This includes cuneiform excision of the ankylosed joint and linear osteotomy of both bones. Buck,³ in 1844, modified Barton's operation by removing a wedge-

¹ "Am. Med. Times," 1860, vol. i, p. 310.

² "Brit. Med. Jour.," April 28, 1878, p. 807.

³ "Am. Jour. Med. Sciences.," October, 1845, p. 277.

shaped piece, which included the articular ends of the femur and tibia, together with the patella, and immediately rectifying the position of the leg. The apex of the V-shaped section did not reach the posterior portion of the bones, a bridge of bone being left, which was fractured. The object in this was to obviate any danger of injury to the popliteal vessels. The operation is really an excision of an ankylosed joint. It has been adopted in the vast majority of cases of bony ankylosis of the knee joint at an angle, and records of its success are scattered through the medical journals since the day of its first performance.

Enriken¹ deviated from Buck's operation in that he included the whole thickness of the bones in the section on account of the marked contraction of the tissues behind the joint, requiring the removal of more bone than was possible by Buck's section. The same end, however, could have been accomplished by making the cuts as designed by the first operator, and then removing additional pieces until the necessary amount of bone had been removed. Buck's operation is certainly a safer one in that the vessels are protected by a bridge of bone from the saw.

In marked cases of deformity at the knee joint submitted to a linear osteotomy, most operators have advised and practiced two sections: one at the lower end of the femur, by which half of the desired correction was obtained, and later a division of the tibia just below the tubercle, by which the remainder of the deformity was removed. The advantage of this operation is that the shortening of the limb is not increased, while, on the other hand, it leaves the

¹ "The Clinic," March 12, 1876.

joint prominent and misshapen. Time will, however, diminish this deformity to some extent. In correcting after a linear osteotomy there is an entering angle left on the posterior aspect of the bone, its size varying with the amount of correction made. This in time is obliterated by the formation of new bone.

There have been two operations performed upon the joint itself, in order to break up the bony bands between the bones. In 1861 Gross¹ performed a subcutaneous operation by entering the joint itself with a perforator and after dividing or breaking up all adhesions, placed the limb in the desired position, the operation being performed through an incision one half an inch long. He reports six successes out of seven patients operated upon. Stromeyer Little,² in 1868, divided the uniting bands between the femur and tibia, in a case of bony ankylosis of the knee joint, with a carpenter's chisel, one fourth of an inch wide, through a small incision, and then brought the leg into a straight position. The wound closed without suppuration by the sixth day. Dr. H. B. Sands, of this city, has, I believe, performed a similar operation. Of these operations for correcting ankylosis of the knee joint at an angle, that of Buck (cuneiform osteotomy), removing a V-shaped piece from above the joint, and linear osteotomy of the femur and tibia, are mainly practiced. Buck's operation does not properly belong to osteotomies, but rather to excision.

Linear osteotomy for angular deformity at the

¹"System of Surgery," 1882, vol. i, p. 1096.

²"Medico-Chir. Trans.," vol. iv, p. 247.

knee joint is performed as follows: The limb should be rendered bloodless, and a small incision made by the side of the rectus tendon, at a point a finger's breadth above the upper portion of the external condyle, of sufficient length to admit the osteotome. This latter instrument is then passed down upon the knife as a guide, and the femur divided as in other osteotomies until it can be easily fractured. If the deformity is great, it is well to make in addition a section of the tibia just below the tubercle, and divide the amount of correction between the two bones. Barwell makes the section of the tibia two weeks later, while Macewen operates upon both bones upon the same day. The nearer to the joint the section is made, the less will the knee project after the correction is made. In time, however, the deformity is diminished by rounding off and filling up any projection and depression, so that in a year after the operation the appearance of the limb has greatly improved. The shortening of the limb is less than after a cuneiform osteotomy. Macewen reports no shortening in some of his cases.

The only accident after a linear osteotomy that I have seen mentioned is gangrene from compression of the popliteal vessels from the acuteness of the bend after straightening the limb.

I have never performed the operation of simply dividing the bone. I think that a Buck's operation is the safer and better.