forming a bow, with the tendo Achillis stretching along its base like a bow-string. More often the lower two-thirds are implicated, and sometimes the lower third is alone affected. In most of these cases, the tibia is elongated from before backwards, and flattened latterly; the fibula generally participating in this part of the deformity. In these cases, the deformity, when slight, may be corrected by a simple osteotomy; that is to say, the division of the bone from before backward, at the most prominent part of the convexity, by an osteotome. But, when they are more pronounced, a series of osteotomies, or the removal of a wedge, is necessary to rectify them. Of the two methods, I am inclined (when a single simple osteotomy is not sufficient) to remove a wedge, as being on the whole the most simple and satisfactory. Now, many have asked an easy method of ascertaining the size of the wedge to be removed, without going into mathematical calculations. One of the easiest methods of ascertaining the size of the wedge to be removed is by turning the limb on its side, and taking a tracing of the anterior edge of the tibia. Next, measuring the breadth of the tibia, from before backward at the most prominent part of the convexity, and drawing a second line parallel to the former, corresponding to the thickness measured, then cut this shape out. After this has been done, fold the paper, at the most prominent part of the convexity, wedge-fashion, with its base anteriorly, until the pattern has become straight. The base of the wedge will then represent the size of the wedge to be removed. Having ascertained this, it is convenient to have it marked by measuring it with a pair of callipers, keeping their blades fixed at the distance measured, so that they may be applied to the bone when necessary. An incision sufficient to admit the instrument is all that is necessary, as the skin will slide upwards and downwards to suit. A chisel (not an osteotome) is used. It ought to have a keen cutting edge, with little bevel. It is convenient first to remove a wedge smaller than is required; and then to remove from either side one or two shavings up to the desired extent. In this way, opportunity is given for making the incision on each side perfectly smooth. In cutting out the wedge, the periosteum on either side can be preserved, and, if so, it gives a surety that the border of the chisel has not injured any of the soft structures. After removing the wedge, and seeing that no fragments of bone remain in the opening, the fibula may be attended to. In many cases, a simple fracture may be made; but in some, especially when it is flattened and perhaps elastic, this is not so easy; and it is better to make a subcutaneous osteotomy with the osteotome; after which the limb will become straight by bringing the two anterior tibial cut surfaces into apposition. Some have spoken of dividing the tendo Achillis in such cases; and it is possible that it facilitates the rectification of the osseous deformity, when it is present to a marked extent. In the majority of cases, I have not divided the tendo Achillis, and have found that, after the first two or three days, there is no trouble with it, the foot being fixed to the foot-piece of the splint.

ON GENU VALGUM: WITH SOME REMARKS ON OPERATIONS FOR ITS REMOVAL.*

By B. E. BRODHURST, F.R.C.S.,
Surgeon to the Royal Orthopædic Hospital, etc.

GENU VALGUM is an affection of so frequent occurrence that it has lately attracted a good deal of attention, and various modes of treatment have been suggested. Some rely on mechanical support for its removal; while, again, we have various operations, namely, such as have been described and practised by Dr. Ogston, Dr. Macewen, Mr. Barwell, Mr. Reeves, and others; among which I will especially mention one which I have several times performed, and to which I have on another occasion directed attention.

But, before alluding more directly to this operation, I will answer the question: What is genu valgum? Genu valgum is produced by the yielding of the internal lateral ligament of the knee-joint, and it is usually preceded by flat foot. When first observed, it may be removed simply by taking the weight of the body off the feet, and later slight lateral pressure will produce the same effect. After a short time, however, the whole lower epiphysis of the femur becomes oblique, and at length the shaft of the bone becomes more or less seriously involved, as well as the tibia itself. The motions of flexion and extension become somewhat restrained, the leg and thigh-bones being somewhat locked, in consequence of and in proportion to the obliquity of the femur. In an early stage, the recumbent position, with perhaps some slight lateral support, is sufficient to overcome deformity; but, when deformity is considerable

and has lasted several years, it is perhaps yet a question how this obliquity is most readily, and with the least material damage to the parts concerned, to be removed.

That there is such an affection as a prolongation downwards of the inner condyle I do not deny; but I contend that it is of great rarity; and, if the malady be not confined to the inner condyle, but extend along the entire breadth of the epiphysis, and implicate the shaft of the femur as well as the tibia, to operate on the inner condyle alone is calculated to complicate rather than to remove the deformity.

There are cases in which Mr. Barwell's operation—namely, to divide the femur in part, and then to straighten the bone, and subsequently and at some interval of time, to divide the tibia and the fibula, and thus to bring the limb into a straight line—may be the best to be done; but the cases are rare where the advantages to be derived would be considered sufficient compensation for such an operation. The instances are not frequent in which this operation is needed. But there are a large number of cases where osteotomy is not necessary, and where mechanical appliances are useless—cases where a certain amount of separation of the articular ends of the bones becomes necessary before the limb can be straightened. This may be gained by the division of the biceps tendon and the external lateral ligament, and, when it is tense, of the ilio-tibial band. When deformity is not very severe, the limb may be immediately placed in a straight position, and, being confined in a splint, may be so retained.

On June 15th, 1877, I operated on a youth, fifteen years of age, where the inner malleoli were eighteen inches apart and the patellæ were dislocated outwards. He left London in a fortnight with perfectly straight limbs, and in the course of six weeks he walked easily with supports. He continued to wear these supports for four months, and at the expiration of this time I advised that they should be discontinued. He has not since needed them. I saw the patient in June last, and found him straight, and without undue lateral motion of the knee, and able to take much exercise.

After considerable experience of this operation, I have never known any ill effects to arise from it, and have always had reason to be satisfied with the results.

ON OSTEOTOMY OF BOTH THIGH AND LEG FOR GENU VALGUM.*

By [RICHARD] BARWELL, F.R.C.S. Eng.,
Surgeon to Charing Cross Hospital.

IT is not my intention to detain the members of this Section with details concerning the different forms of operation for knock-knee, nor to criticise the methods proposed and adopted by other surgeons; my object is simply to give my reasons for operating by dividing the bones right across, and in most instances the bones both of the thigh and leg.

Firstly, however, it should be said that I believe it impossible to cure a well marked case of knock-knee by instruments, unless the bones be very unusually soft; and that, even were it possible, the long continuance and irksomeness of the treatment render it an undesirable method. It is worse than useless to attempt cure of a deformity which originates in obliquity of the bones by division of ligaments; a limb thus treated could only be put into a straight position by forcing and keeping the outer part of the joint-surfaces asunder. It need hardly be said that no articulation could, when thus distraught, perform its function.† Perhaps, too, a few words as to the advisability or the reverse of operations at an early age should be added. I would gladly avoid all such undertakings previous to the seventh year, but occasionally they are almost forced upon me; yet I absolutely refuse to operate if the bones bend or seem elastic to manual pressure. When, on the contrary, the bones are absolutely unyielding, I have frequently performed osteotomy with permanently good result. (Tracing shewn.) It must, too, be remembered, that if the deformity be unequal, if one limb be more distorted than the other, or if there be genu valgum on the one side, varum on the other, an oblique position (laterally) of the pelvis is produced, which must result in scoliosis; and a rickety lateral curvature of the spine is rarely, if ever, curable; hence, early osteotomy, if the bones be hard, is frequently desirable; and when the first, the softening, stage of rachitis has ceased, the bones become exceedingly hard, almost stony.

The direction which the surgeon chooses for division of the bones will depend upon the notion formed by him of the deformity. Seventeen years ago, I had several opportunities of studying the real cause of

* Read in the Section of Surgery at the Annual Meeting of the British Medical Association in Cork, August 1879.

† This view was forcibly proved, I believe, to all present at a meeting of the Clinical Society in June, when a case thus treated was shown.

genu valgum; and in 1863, I—distinguishing two forms of the malady, as is certainly correct—wrote thus of one: “The femur receives two bends; the upper half curves, so that the convexity looks outward and forward, the lower half in the contrary direction, its convexity looking inward and backward. The tibia follows curves which are the exact inverse of those in the femur.” Of the other kind of knock-knee, I said: “The actual locality of the morbid change resides in the lower epiphysis of the femur and upper one of the tibia. Thus, the angular bend is not a single one situated at the articulation, but the knee-joint itself and the bones a little over and under it are in normal relationship; the bend is a double one situated above and below the epiphysis.” By epiphysis I mean the line of junction.* In 1878, I again wrote: “I conceive the malady not as a mere lengthening of the inner condyle, but as an obliquity of the whole lower epiphysis of the femur.”

Now, an outward curve of the lower end of the femur, even an oblique position of the lower epiphysis on the shaft, can, unless exceedingly small, be verified by careful and properly directed palpation. To detect the former, the lower portion of the thigh should be grasped between the palms, which are then to glide down the limb; the finger- and thumb-tips of one hand may also be used. To distinguish the latter is even more easy; the finger-tips of each hand should make, at about the lower fifth of the limb, firm pressure on the inner and outer aspect of the femur, and then should, with continued pressure, travel downward until checked by the upper prominence of the condyles on each side. If this mode of examination be tried on a normal limb, the fingers on the inner side are thus checked on a somewhat higher level than those on the outer, or at the very least on an even level. But if genu valgum be present, the hand of the inner side will lie, when stopped by the upper boss of the inner condyle, at a considerably lower level; showing that the lower end of the diaphysis and the junction-line are oblique, while the mass of the epiphysis is equally thick on both sides.

In examining the tibia, one finds the portion of bone for about an inch below the knee-joint perfectly normal; just at that distance below the articulation one feels, in well marked cases of knock-knee, an angle from which the shin-bone slopes outward. Now, this angle marks the point where the shaft of the tibia sits askew on the epiphysis.

The views which I have, as above stated, from time to time enunciated have of late received singular confirmation in a paper by Dr. Mikulicz of Vienna, founded upon careful mensuration of a large number of specimens.† This paper is accompanied by lithographs. My figure, diminished from diagram 11, represents two of these; I have taken the liberty of placing the tibia under the femur instead of keeping them

asunder. The following is very briefly, but in the investigator's own words, the gist of his paper. “When the femur is concerned in genu

valgum, the deformity lies above the condyles, which cannot be materially involved. The bend must be above the epiphysal line.” “The epiphysis is not materially affected and the deviation lies only in the lower part of the shaft. We perceive, then, that in genu valgum the deviation of the femur is thus caused, that the unaltered epiphysis lies obliquely on the diaphysis.” “In regard to the tibia, it is demonstrable that the obliquity affected only the upper part of the diaphysis, and was produced partly by a bend high up in the shaft, partly by uneven growth of the diaphysal junction.” “Genu valgum adolescentium is therefore a distortion situated in the extremities of the shafts, upper and lower respectively, both of the tibia and femur, caused in part by uneven growth of the epiphysal junction, partly by a deviation of the whole end of the shafts. The epiphyses themselves do not materially participate.”

In Plate 11 is given a good representation of the condition; and a tracing (shown) from a case operated on by me last year, shows how these osseous deviations mark themselves on the soft parts. It should be stated that good outlines may be obtained by letting the patient lie with the limbs upon the paper and running a pencil along them, the feet being sketched in afterwards. Now, if one consider cases of knock-knee with reference to the bony anatomy of this figure, one cannot but see that an attempt to straighten such limbs by sawing off or chopping away the inner condyle could only succeed by causing as great an obliquity of the knee-joint as will compensate for the deviation of the bones both below and above the articulation. If the deformity be treated by removal only of a wedge from the femur, the lower end of the thigh-bone must, owing to the tibial obliquity, be made to curve as much inwards as it now does outwards. It is only just to Dr. Macewen to state that he of late has advocated in some cases division of the tibia as well as removal of a wedge from the femur.

My method consists in dividing, in part with a chisel, in part by fracture, the femur and tibia above and below the epiphysal lines respectively, and at each place rectifying its own proportion of the deformity; the operations follow one another in from a fortnight to three weeks. By this means, a wedge-shaped gap is left on the outer aspect of the bones. I hold that nature can fill up this gap more accurately than the surgeon who attempts the cure by removing a wedge on the inner side; and I have never found the slightest tendency in the uniting substance to yield in after months or years. Mr. Barker says—I do not quote his words but his meaning—that this method of mine has not found much favour with, nor been commonly adopted by, the profession; and Mr. Barker, whose courteousness I fully recognise, is quite right. But I hope he and the gentlemen now listening to me will not consider it egotistic to say that I confidently await the time when surgeons will, on this point, come to accept my views, or at least to follow my method; indeed, Dr. Macewen's division of the tibia is already a step in that direction.

My confidence in the matter is based upon the exposition above very shortly given of the anatomy of genu valgum; also on the fact, that other deviations are often combined with the knock-knee. For instance, the femora are often bent backward; the cases look as though there were imperfect power of straightening the knee-joint. These curves can only be corrected by entire division of the femur; and as this bone has been bent while in the soft phase of rickets by action of the flexors, a certain amount of tenotomy may be required. Another condition exists in which the diaphysis sits obliquely on the epiphysis, not only in the lateral but also in the anterior direction; and in these cases, the bones are usually twisted, so that from the middle of the thigh downward, the limb is more and more rotated outward. This complicated disarrangement gives the appearance of knock-knee, calf-knee, and splay-leg (see right leg of Plate IV). When I operated fourteen months ago, the child, aged 7, had recovered from the soft stage of rickets, but was flabby and abominous from want of exercise. She is still clumsy in form about the pelvis, nor is the spine quite straight. Such result as shown in Plate IVA (figure with straight limbs) could only have been obtained by complete division of the bones, enabling me to untwist them, to straighten out the anterior bend, and rectify the knock-knee. Since being able to run about and play with other children, she has much improved in general condition.

GUILD OF ST. LUKE.—We are requested to state that the annual commemoration of this Guild for medical practitioners and students will be held at St. Paul's Cathedral, on Tuesday next, October 21st, at 7.30 P.M., when the popular preacher, the Rev. W. J. Knox Little of Manchester, is to deliver the sermon. Seats under the dome are reserved for the profession and their friends, and tickets can be obtained from the officers of the Guild on application. We understand the choir will number five hundred voices, and the organ be assisted by a small orchestra.

* *Cure of Club-Foot*, p. 117 and 140.

† *Archiv für Klinische Chirurgie*, vol. xxxii, 3rd Heft.