Subcutaneous section of the internal condyle of the femur for the relief of genu-valgum, after the method of Ogston : with a report of two cases : also, remarks upon the operative treatment of this deformity / by Geo. R. Fowler and Lewis S. Pilcher.

SUBCUTANEOUS SECTION

OF THE

INTERNAL CONDYLE OF THE FEMUR

FOR THE RELIEF OF GENU-VALGUM.

AFTER THE METHOD OF OGSTON,

WITH A REPORT OF TWO CASES.

ALSO,

REMARKS UPON THE OPERATIVE TREATMENT OF THIS DEFORMITY.

BY

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SUBCUTANEOUS SECTION OF THE INTERNAL CONDYLE OF THE FEMUR FOR THE RELIEF OF GENU-VALGUM, AFTER THE METHOD OF OGSTON, WITH A REPORT OF TWO CASES.

BY GEO. R. FOWLER, M.D.

Congenital deformities of the knee-joint are very rare. The patella is occasionally found to be dislocated either to the inner or outer side of the leg at birth, but other than this, no departure from the normal shape of the limb at the knee-joint seems to occur congenitally.

Genu-valgum is one of the most common deformities met with. It is seldom acquired during middle life or old age, but generally occurs during the period extending from infancy to adolescence.

The stages of development of this deformity are believed to be as follows:

1st. Disproportionately powerful contraction of the biceps flexor cruris muscle.

2d. Relaxation of the internal lateral and posterior crucial ligaments.

3d. An arrest of growth of the external and increased growth of the internal condyle of the femur.

4th. Oblique outward rotation of the tibia.

When the deformity occurs during infancy, it is generally during the period of most difficult dentition, after the child is a year old, and when abnormal states of general nutrition more commonly obtain.

The cases which occur later in life are met with most frequently in the persons of those who are apprenticed at an early age to some trade requiring constant standing. Of these, the greater number will be found among bakers and cabinet-makers; and indeed, so common is this deformity in Germany among the first-named, that it is there known as "baker's leg." Among bakers it occurs almost invariably in those whose duty it is to "scale" or weigh the dough after it is rolled out in loaves for baking. These persons stand with their right limb thrown slightly forward, the knee flexed, and the foot somewhat in the position of splay foot. The biceps muscle of the right limb is rigidly contracted, in order to assist the workman in maintaining his equilibrium as he receives the dough from the right-hand side of the scales, weighs it, and then rotates his trunk upon his lower extremities to pass it along to the oven. Any one imitating this position and motion will be at once struck by the rigid condition of the outer hamstring of the right limb, or the one thrown forward, as compared with the relaxed inner hamstring of the same limb.

The effect of this disproportionately powerful contraction of the biceps is to put upon the stretch the internal lateral and posterior crucial ligaments. These slowly yield to the constant traction until they become permanently relaxed, and the articulation, instead of having simply an antero-posterior motion, the only one it possesses in a normal condition, gains lateral movement.

This lateral movement tends to a deviation in the normal shape of the limb when the body is in the erect position. The vertical column which the healthy limb represents has its extremities and fixed points respectively at the ankle and acetabulum, and supports the weight of the trunk in the line of its axis. When relaxation of the internal lateral and posterior crucial ligaments occurs the femur maintains its original and perfect position; but the feet are removed to a greater distance from each other, and the weight of the body is received upon a broken line, the axis of the femur meeting that of the tibia at the knee-joint, and forming the apex of a triangle, the base of which is represented by a line drawn from the centre of the acetabulum to a point midway between the two malleoli. As will be readily seen, this deviation from the normal shape of the limb must necessarily result in an increased pressure upon the external condyle of the femur, and an almost entire relief from pressure of the internal condyle. The external condyle, in this abnormal condition, bearing, as it does, half of the entire weight of the trunk, is arrested in its growth, and the internal condyle becomes lengthened. The limb, when flexed,

maintains its normal position and relations; partially extended, the tibia rotates obliquely outwards, and in full extension the lengthened internal condyle fills up the space which would otherwise exist between it and the head of the tibia, and the normal axis of the limb, as a whole, is destroyed.

In the treatment of this deformity nothing can be gained by waiting for Nature to right the limb. Spontaneous recovery never takes place, and mechanical treatment is frequently of no avail, unless conjoined with division of the tendon of the biceps. As long as there is lateral movement to the knee-joint something may be gained by attempting to restore the normal axis of the limb by mechanical means, together with tenotomy of the external hamstring. But when no lateral movement can be demonstrated to exist, other operative measures become necessary.

The earlier attempts to correct this deformity by operative procedure other than tenotomy consisted of removal of a wedge-shaped piece of the head of the tibia by what was known as Meyer's operation. This has been most emphatically and justly condemned as based upon incorrect and unsound principles. Knock-knee is not dependent in any way upon curvature or other alteration in the size and shape of the tibia.

After the introduction of Lister's methods of antiseptic surgery, operations involving the opening of joints became more frequently resorted to, and attempts to correct genu-valgum by sawing off and removing the elongated internal condyle were made.

This operation (Annandale's), although based upon a knowledge of the anatomy and pathology of the deformity, did not become very popular with surgeons, for the reason that it almost invariably resulted in a complete and incurable bony anchylosis of the knee-joint, and was finally abandoned.

In 1876 Dr. Ogston, of Aberdeen, Scotland, proposed as a means of relief of this deformity an operation consisting of the subcutaneous division and fracture of the internal condyle of the femur, and a forcible straightening of the limb, thereby restoring the normal proportion in the length of the two condyles without removing any part of the articular surface. Subsequently, in *The Edinburgh Medical Journal* for March, 1877, he reported a case so operated upon in May, 1876, under the antiseptic spray of Lister, in which a perfect cure was accomplished. Mr. George W. Callender, of London, as well as other English surgeons, has since repeated the operation of Ogston—without the antiseptic spray, however—with the same excellent results.

This operation, as performed by myself, is as follows: The limb being strongly flexed and rotated outwards, an Adams tenotomy knife is entered about two inches and a half above the tip of the internal condyle

of the femur, and in the middle line of the inner aspect of the thigh; with its edge directed towards the bone, the knife is pushed onwards until its point can be felt to have reached the groove between the condyles. With the knee strongly flexed and the patella drawn outwards (if it be not already dislocated), it is not difficult, through the tightly-drawn anterior coverings of the joint, to feel the exact location of the knife after it has entered the cavity of the joint. A saw such as Mr. Adams uses in performing subcutaneous osteotomy of the femur is passed along the same route, the flat side of the knife acting as a guide. The latter is then withdrawn. The bone is sawn in the direction of the dotted line, Fig. 1, by short strokes directly backwards, and when it is judged to be nearly divided,

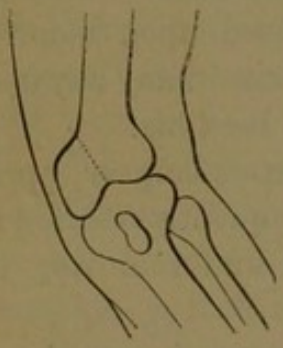

FIG. 1.

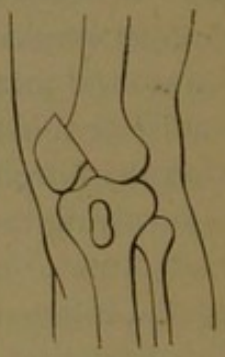

FIG. 2.

the limb is extended and forcibly straightened, the inner condyle being fractured and forced upwards in a position to bring its articulating surface upon a level with that of the external condyle as shown in Fig. 2. This being accomplished, the limb is retained in position by some fixed dressing. About the fourteenth day passive motion is commenced.

The two following cases, occurring in my own practice, were submitted to this operation with the most gratifying results:

Case 1.—Joseph Redman, aged 19; a baker by occupation; born in Germany; one year in this country. About three years ago, and shortly after being apprenticed to his present trade, he noticed the deformity. It steadily increased, and when he came under my observation it was in the

Fig. 3.

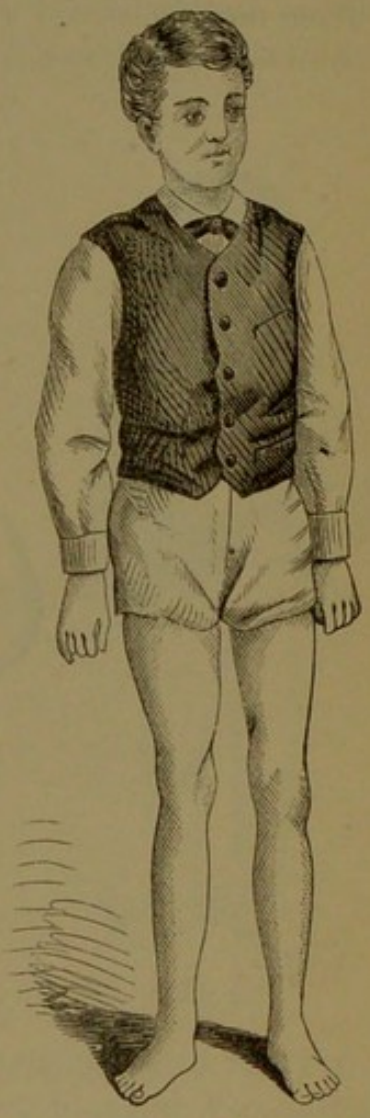

Fig. 4.

condition shown in Fig. 3, from a photograph. On Nov. 26th, 1878, I performed Ogston's operation as above described, under the carbolic spray, in the presence of Drs. Pilcher, Jewett, Hunt, Elmendorf and King. The anæsthetic used was ether. After the operation the wound

was dressed with a single layer of antiseptic marine lint and covered by Mackintosh. The limb was then put up in plaster of Paris, supported by a short thigh splint. No reaction occurred, and the patient remained absolutely free from all pain and discomfort.

On the fourteenth day I removed the dressings for the first time, and found the wound healed perfectly. Passive motion was then commenced, and in less than three weeks after the operation the patient walked about the room. Fig. 4 shows the condition of the limb at this time, and Fig. 5 the amount of flexion he can comfortably make at the end of three months.

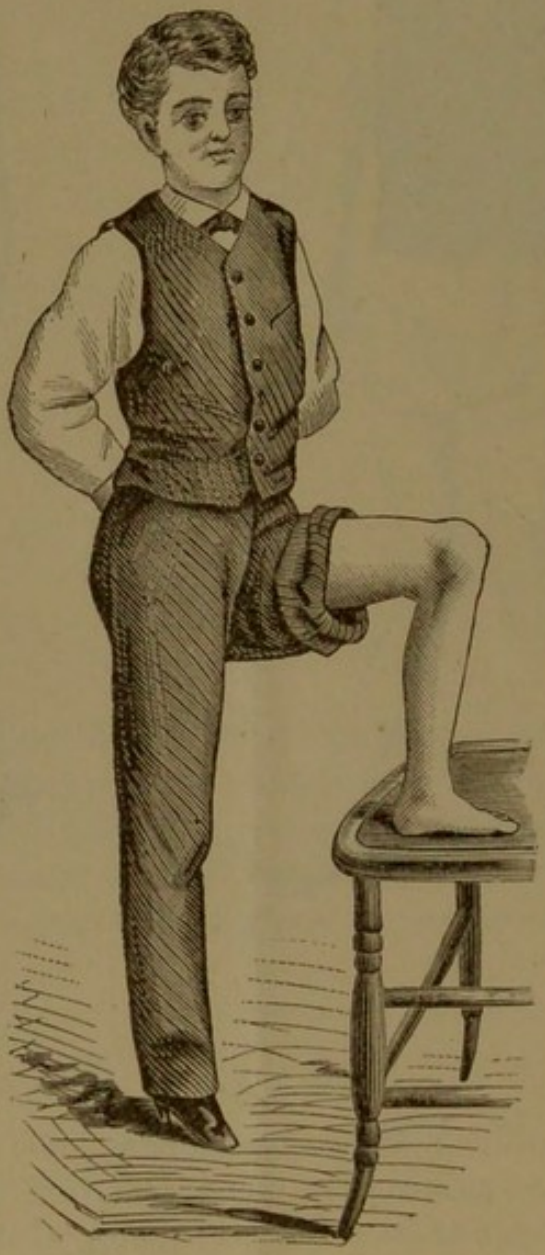

Fig. 5.

Case 2.—Annie Behrman, aged 2 years and 10 months, of German parents; a healthy child in other respects. At nine months she began to walk, but it was not until six months afterward that the knock-knee was observed. The parents applied to an instrument maker, who made for her a long brace with a joint at the knee and elastic bands. This was worn for four months, and abandoned, no benefit being derived from the treatment. For several months nothing was done for the child. She was then brought to Mr. Leyh, a skillful maker of surgical mechanical appliances in the Eastern District, who sent her to me for operative treatment. Fig. 6, from a photograph, shows her condition at this time. The "out knee" of the other limb and a lateral curvature of the spine are secondary effects of the genu-valgum.

Fig. 6.

Fig. 7.

On April 5th, 1879, I performed Ogston's operation upon this child under the carbolized spray; present, Drs. Pilcher, Figueira, Elmendorf, King and Rogers. I had caused to be made a small Adams saw especially for this case. I sawed the internal condyle completely through. Upon trial it was found that the deformity, although considerably lessened, could not be completely reduced. I then resorted to subcutaneous division of the tendon of the biceps flexor cruris, after which the limb was easily straightened. The wounds were dressed with antiseptic marine lint and carbolized oil-silk, and the limb encased in a paraffine splint. The child was then laid in Prof. F. H. Hamilton's

double splint for fracture of the thigh occurring in children, and the limb operated upon securely bandaged to the apparatus. The other limb was also secured to the splint of that side.

The reaction resulting from so severe an operation upon so young a child was surprisingly slight. The temperature never arose above 100° Fahr., and after the first night no pain was complained of. On the fourteenth day I removed the dressings and found the wounds entirely healed. The limb was perfectly straight, as shown in Fig. 7, and I at once flexed it to a right angle. For the first few days the limb was sup-

Fig. 8.

ported by placing the child in the double splint after each act of passive motion, and cold water dressings applied. Fig. 8 shows the power of flexing the limb now possessed by the child.

These two cases are believed to be the first operated upon by this method in this country.

REMARKS UPON THE OPERATIVE TREATMENT OF GENU-VALGUM.

BY LEWIS S. PILCHER, M.D.

Reference has been made by Dr. Fowler to the attempts which have been made by various surgeons to overcome the angle produced by the undue elongation of the internal condyle in cases of genu-valgum.

The first operation in which the knee-joint was freely opened and a wedge-shaped slice of the internal condyle removed, was done by Mr. Annandale, now Clinical Professor of Surgery in the University of Edinburgh.

This was reported in the Edinburgh *Medical Journal* for July, 1875. It was done in a very aggravated case, with the result of making a straight limb, but with considerable and permanent stiffness of the joint. Previously to this Mr. A. had divided the shaft of the femur in four cases, but without satisfactory results. In a private letter to myself, dated November 4th, 1878, Mr. A. states that he does not now advocate this operation, but practices the operation suggested by Ogston, using a chisel, however, to divide the condyle, instead of a saw. He has now operated upon twenty cases in all by different methods, and says that he is satisfied that as far as our present knowledge goes, Ogston's operation, with the modification noted, is the best in cases of aggravated genu-valgum.

The first operation of Dr. Ogston was in the case of a male, 18 years of age, in whom the deformity commenced to develop when he was six years of age, after an attack of typhus fever, and had steadily increased up to the time of the operation. His general health was good, but distinct evidences of early rickets were discernible in other bones of his body. When his feet were placed together one knee crossed completely over the other, so that a hand could be passed through between the transposed knees. The knee the most affected was first operated upon; the reaction was almost *nil;* his temperature never rose above 99.8° F.; the joint never became hot or tender, and at the end of the third week the dressings were discontinued and passive motions commenced. The other leg was operated upon in like manner in a little more than three weeks after the first, with an equally favorable result. Within ten weeks from the first operation he was dismissed, walking perfectly.

In September last, at St. Thomas' Hospital, London, I had the opportunity of seeing this operation done by Mr. MacCormac. It was stated that this was the fifth operation of this kind by this gentleman, and that his previous cases had been completely successful. The patient in this case was a delicate-looking boy of 8 or 9 years; both knees were operated upon; complete antiseptic precautions were used, a solution of thymol, 1-1000, being the agent used for the spray; the condyles were sawn as directed by Dr. Ogston; the fracture of the thin bridges of bone left unsawn was attended with an audible crack, and the restoration of the tibiæ to their proper line was immediate; the limbs were fixed in gypsum bandages, and were afterwards slung in an apparatus composed of a long, straight splint on the outside of either limb, connected by a foot-piece below. On the sixth day after the operation I again saw the child, and examined him carefully. I found him perfectly comfortable, tongue clean and moist, appetite good, no elevation of temperature; no unpleasant symptom had been manifested since the operation.

The desire to avoid, if possible, opening into the knee-joint, has stimulated other surgeons to attempt to devise other methods for the relief of knock-knee, since the publication by Dr. Ogston of his method.

In July, 1877, Mr. Chiene, Surgeon to the Royal Infirmary of Edinburgh, presented to the Medico-Chirurgical Society of Edinburgh a boy upon whom he had done the following operation for the relief of knock-knee: The tubercle into which the bony tendon of the adductor magnus is inserted having been exposed by a vertical incision upon the inside of the thigh, the periosteum, divided by a crucial incision, was raised, and a wedge-shaped piece of bone cut with chisel and mallet out of the substance of the internal condyle, above the tubercle, care being taken to avoid the epiphyseal line. By properly directed pressure the leg was

then brought into its normal axis, where it was confined by splints until full consolidation was accomplished. The operation was performed with full antiseptic precautions; the knee-joint was not opened into; in both legs the wounds healed in a fortnight, and as a result the legs were practically straight.

This case was reported in the Edinburgh *Medical Journal* of September, 1877. At nearly the same time a similar operation, and with equally good result, was done by Dr. McEwen, of Glasgow; this was reported in the *Lancet* of March 30th, 1878.

The operations of Mr. Chiene and Dr. McEwen were devised independently of each other.

In September, 1878, I had an opportunity of examining, at the Royal Infirmary, Edinburgh, two of the cases in which Mr. Chiene had done his operation. The first was a boy ten years of age, in whose case the deformity, affecting chiefly the right knee, had been comparatively slight, though still sufficient to seriously incommode him, and was increasing in its gravity. The operation was performed June 22d, 1878. The patient was discharged from the hospital July 19th following. September 21st, the date when I saw him, the limb was straight and strong, and the motion of the joint was perfect.

The second case was that of a girl, aged 14 years, in whom the deformity began to develop from the time she began to walk, and had gradually increased up to the time of operation. There were marked evidences of a general rachitic taint. The deformity was extreme, affecting both knees. July 20th, 1878, Mr. Chiene operated upon the right limb, the one the least deformed.

After the removal of an unusually large amount of bone, with great difficulty and only by using great force was the leg brought into a straighter position. The limb was then confined between lateral splints, secured by *elastic* bandages, and extension of 8 lbs. applied. Under this treatment a further improvement was secured. At the end of five weeks the lateral splints and the extension were discontinued, and the limb put up in plaster of Paris. September 21st, 1878, when I examined it, the limb was still being supported by the plaster. A great improvement had been effected in its line, although it was not yet perfectly straight. The left leg, the most crooked, was yet to be operated upon.

Mr. Reeves, of the London Hospital, in a clinical lecture on knock-knee and its treatment, published in the *British Medical Journal* for September 21st, 1878, advocates yet another mode of operating, which he calls "Subcutaneous Extra-articular Osteotomy." The following is his description of it:

"A scalpel, previously dipped in carbolized oil, is obliquely introduced just above

the most prominent part of the internal tuberosity, and the soft parts and periosteum are divided; by the side of the knife, a chisel, also dipped in carbolized oil, is inserted, and, with a few strokes of the mallet, the condyle is penetrated at its greatest depth, *but only as far as the cartilage covering it.* The chisel, with the greatest depth of the condyle and soft parts—due allowance being made for the thickness of the cartilage—previously marked on it, is first directed towards the inner side of the inter-condylar groove, then partially withdrawn, its direction altered forwards and backwards until the condyle has been *loosened*—not separated. The feeling of resistance to the chisel should not at any time be overcome. This loosening can be ascertained by gently using the chisel as a lever, and placing the fingers on the condyle, which will be found to yield before them. I do not attempt to loosen the entire condyle; it is not necessary, as the limb can be straightened without it, and, by leaving a small portion of it to grow, the probability of a genu-extrorsum, which may be induced by the increased growth of the external condyle, now relieved from excessive pressure, is much diminished. If the operation be accurately executed, there is no risk of entering the joint, of injuring the popliteal artery, or of damaging the epiphyseal cartilage; but if the joint were entered with the chisel it would be of much less consequence than if opened by the other method, as the wound would be a clean incised one and more strictly subcutaneous. It is well to trace out the outline of the condyle before operating, as it is a good guide; but it is not absolutely necessary."

I had an opportunity of seeing Mr. Reeves himself do this operation at the London Hospital, in September last, upon a girl of 13 or 14 years, a case of genu-varum, dependent primarily upon marked outward rachitic curvature of the femur, but aggravated by secondary changes in the condyles, in consequence of the altered lines of pressure. Both knees were operated upon. Decided improvement in the line of the limbs was effected; but it required the exertion of great force, and not until after a distinct crack indicated that some structure had given way was any improvement manifested.

It is of interest to consider whether the varying conditions which may be present in different cases of genu-valgum may not afford indications of value in determining the choice of a procedure for their rectification.

In early childhood the bones are more pliable; the articular extremities are more largely cartilaginous; in a larger proportion of cases a rachitic taint is determining the deformity, presupposing an abnormal bony softness and pliability; simple ligamentous weakness is more likely to be present; extensive overgrowth of the internal condyle is less likely to have taken place; the lesser degrees of the deformity are more frequently met with.

In older children and youths a bone more dense and firm is to be managed; a longer continuance of the deformity, with permanent changes of structure and form, and its more aggravated degrees, are more frequently met with.

However, severe degrees of the deformity do occur in quite young children, and also the slighter degrees are sometimes developed in advanced adolescence.

In young children, therefore—except when the more severe forms of the deformity have already become established—complete relief would be expected by the use of orthopedic appliances, and the pursuance of a tonic treatment, both local and general, combined in some cases with tenotomy.

When the use of orthopedic appliances has been found insufficient, or when the degree of the deformity, when first presented for treatment, is so aggravated that the uselessness of such apparatus is apparent, then upon the *angle* and the *age* will probably depend the determination of the operation to be adopted. The child being young and the angle not extreme, the operation proposed by Mr. Chiene recommends itself as well adapted to accomplish a cure; a small wedge of bone removed, a pliable bridge of bone left which bends without breaking, the joint uninjured, a good result would be expected.

In older subjects, and in all cases of great angle, the want of pliability of the bone, or the large size of the wedge of bone necessary to be removed, renders the application of Mr. Chiene's method less satisfactory. Fracture of the connecting bridge of bone is probable; which, indeed, Mr. Chiene informed me had occurred in some of his cases. The second case, operated upon by Mr. Chiene, which I have related—that of the girl of 14 years—illustrates the unsatisfactory results of the operation in aggravated cases, involving a severe operation, tedious repair and long-continued weakness of the limb. Only to so complete a master of antiseptic surgery as is Mr. Chiene would have been obtained as good a result as was finally secured.

As to the operation of Mr. Reeves, I am unable to understand how the mass of the internal condyle can be pushed upwards, while the articular surface with its encrusting cartilage is preserved intact, without the removal of any of the bony substance which is heaped up at its base. In the operations which Mr. R. has performed it seems to me that either of two things must have happened, the articular lamella has been fractured and the whole condyle forced up—a condition like to that produced in Ogston's operation—or the lower epiphysis of the femur has been torn off upon the outside, and separated from the shaft sufficiently to admit of the rectification of the limb.

In the class of cases under consideration, viz.: those in youths and adults, and in all cases of great angle with overgrowth of the internal condyle, the operation of Ogston remains as an efficient and safe means of cure, the best at our command. The many cases in which it has already been done have demonstrated that the use of the saw entails no additional dangers which are obviated by a substitution for it of a chisel, and the original procedure of Dr. Ogston still appears to me as

superior to any modifications of it that have been suggested. As to its applicability to cases occurring in young children, Mr. Callender, on page 189, Volume XIV, St. Bartholomew's Hospital Reports, gives it as his opinion that the practical difficulty of severing the comparatively soft structure of the condyles without endangering the subjacent vessels is so great, that it should be a bar to its performance in such cases. I accordingly watched with great interest the operation of Dr. Fowler in the case of the little child, Annie Behrmann, not yet three years of age, but failed to discover any practical difficulties which care and judgment on the part of the operator were not competent to meet.