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OF

OSTEOTOMY AND OSTEOCLASIS.

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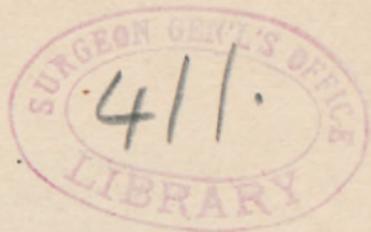


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ULTIMATE RESULTS OF OSTEOTOMY AND OSTEOCLASIS.

BY JOEL E. GOLDTHWAIT, ✓

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THROUGH the kindness of Drs. S. W. Langmaid, E. H. Bradford, A. T. Cabot, H. L. Burrell and H. W. Cushing, now or formerly connected with the Surgical Staff of the Boston Children's Hospital, I am permitted to publish the results of the following cases, in which osteotomy or osteoclasis was done for the correction of rachitic deformity of the legs.

In all there are twenty-eight cases, which are reported at least a year and a half from the time of operation. Fifteen were cases of osteoclasis, twelve of osteotomy, and one, a case in which both operations were performed. This does not include all the similar cases operated upon, but it was impossible to trace the others.

In the majority of the cases, where the curve was in the shaft of the bones, osteoclasis was the favorite operation. (This operation was first introduced into use in this country by Dr. A. T. Cabot, in 1879;¹ the instrument used being a modification of that of Rizzoli.) In the cases of knock-knee, and in a few cases where the curve was in the shaft of the bones, the osteotome was used. The method used for connecting the knock-knees was that known as the "Macewen operation," or supra-condyloid osteotomy; in which the

¹ Boston Medical and Surgical Journal, vol. ci, p. 217.

osteotome is entered from one-half to three-quarters of an inch above the adductor tubercle on the inner side of the femur, is driven through about three-quarters of the thickness of the bone, the part remaining intact then fractured by manual force, and the leg brought into line. For the details of this, and of the other operations, for the correction of genu varum or valgum, any of the standard works of surgery or orthopedics are referred to.

It is to be remembered that no case is reported which was operated upon less than a year and a half ago; while the average length of time which has elapsed is four years, this period having been allowed for any relapse or return of the deformity.

The operations were done as follows: in 1881, two cases; in 1883, four; in 1884, four; in 1885, four; in 1886, eleven; 1887, up to July 1st, three.

All of these cases were seen recently by the writer, either at the hospital or at their homes, and careful observations made. Tracings of the legs were taken and compared with those taken previous to and immediately after operation (so far as they could be obtained) with these results: Of the twenty-eight cases, twenty-seven did not relapse; one case did. Of the twenty-seven cases, the legs were found to be in excellent position, and in none was there deformity enough to be noticeable. There was also no exaggeration of the normal lateral mobility of the knee-joints.

The almost universal expression on the part of the near relatives was that the legs had grown straighter rather than more deformed since the operation.

Perhaps the present condition of these patients may be better appreciated from the diagrams herewith.

Fig. 1 represents a composite of the tracings of the twenty-seven cases, as seen from the front. These tracings are taken as follows: first, the simple tracing

of each case is taken, that is, the child sits upon a piece of paper with the internal malleoli, or knees together, according as it is a case of bow-legs or knock-

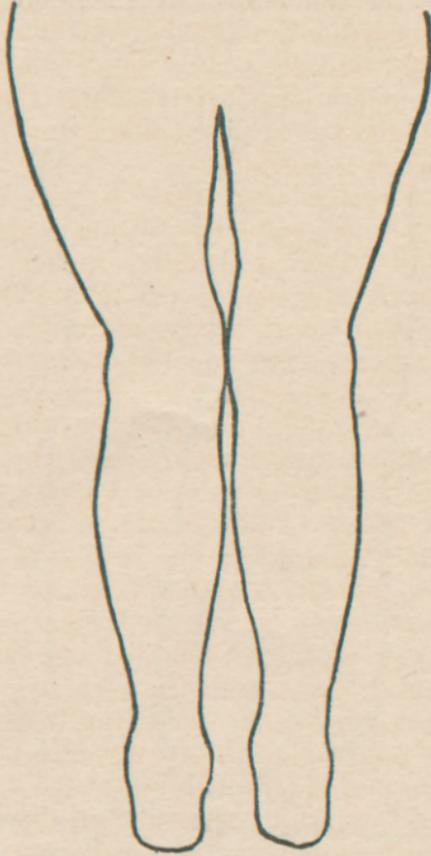


FIG. 1.

knee, and with a pencil held perpendicular to the paper, the outlines of the legs are traced. These tracings are then reduced to a common size, and are reproduced till all of the tracings are drawn upon one piece of paper, one over the other. From this what repre-

sents the average of all of these is drawn; and is termed the composite tracing.

Fig. 2 represents a composite tracing of the results in five of the above cases, in which the deformity had

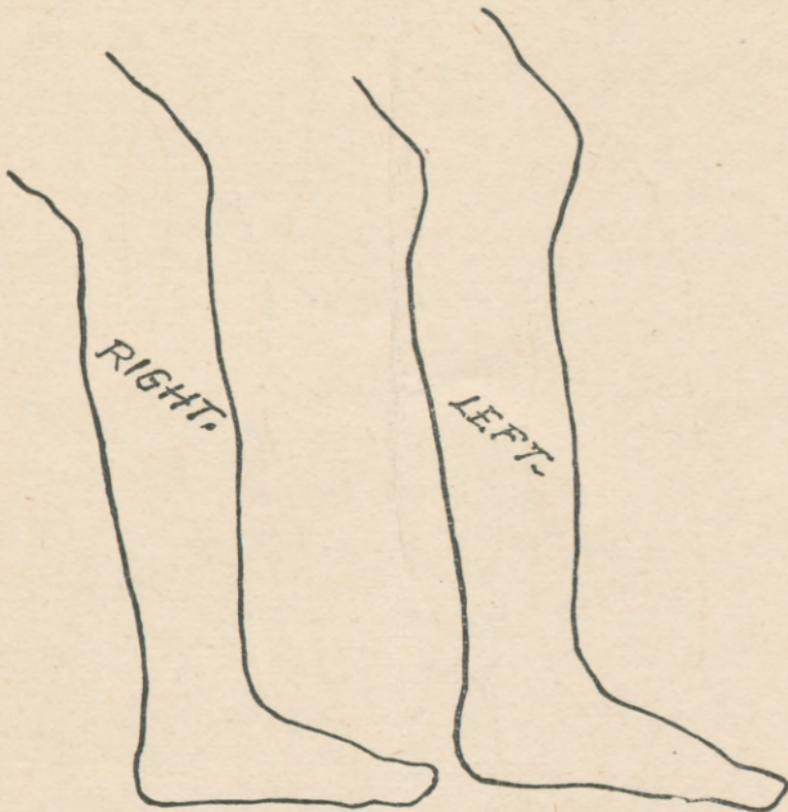


FIG. 2.

been an anterior bowing of the bones of the lower leg. These tracings are taken with the legs lying upon the side.

It will be interesting as well as instructive, by way of comparison, if we have an idea of the condition of

these cases previous to operation. (It was impossible to obtain tracings of all of these cases before they were straightened, but those which could be found are utilized in making up the following diagrams.)

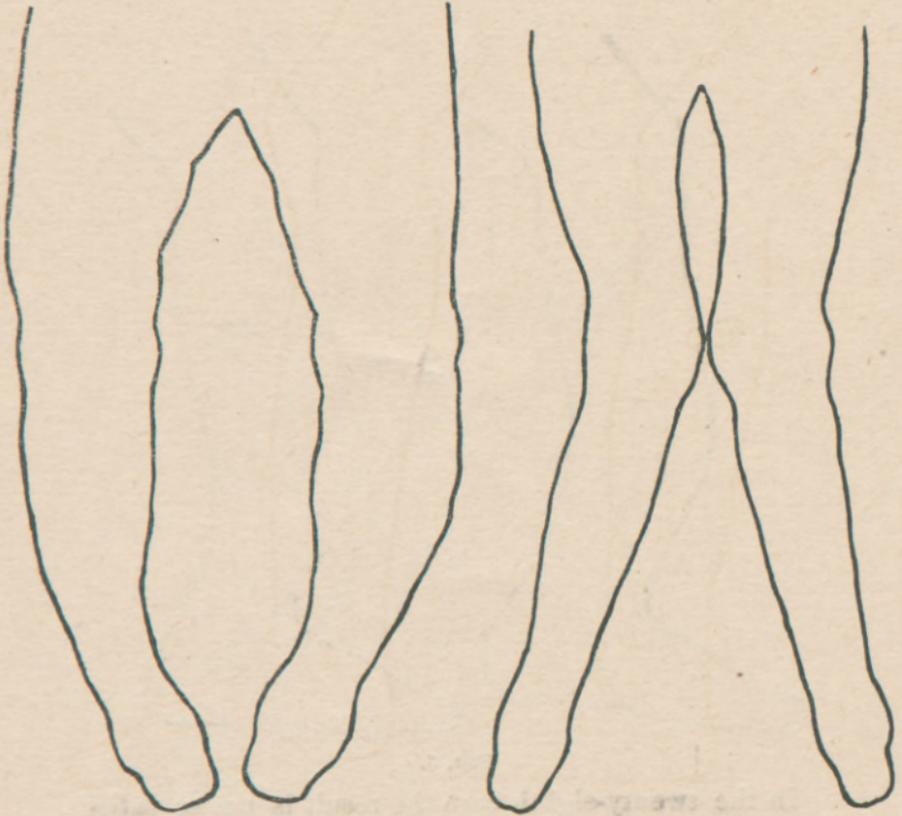


FIG. 3.

FIG. 4.

Fig. 3 represents the composite of the tracings in ten cases of bow-legs before operation. Of course, among these cases, as well as among the cases of knock-knee, were some in which the curve was very

extreme, while in others the deformity was so slight as to render an operation questionable.

Fig. 4 is a composite of five cases of knock-knee.

Fig. 5 is a composite of three cases of anterior bowing of the tibiae, as viewed from the side.

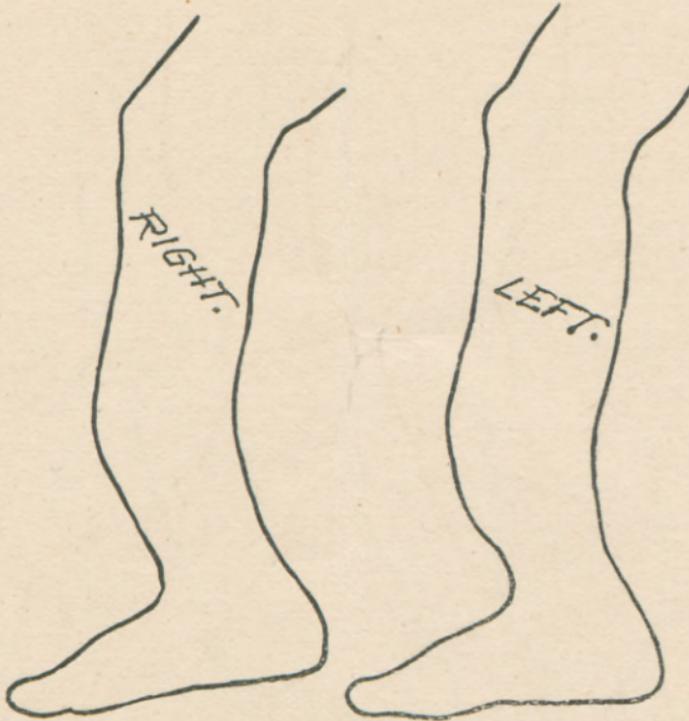


FIG. 5.

In the twenty-eighth case the result is not so satisfactory; and in order that it may be fully understood, it will be necessary to go more into detail.

Referring to the hospital records, we find, that in March of 1886, F. B., colored, aged four and one-half years, came to the hospital, presenting the following condition: "rhachitic changes in all of the long bones

in the body, clavicles very angular, well-marked rosary at junction of ribs with cartilages, anterior bowing of humeri, anterior bowing of femora, double genu

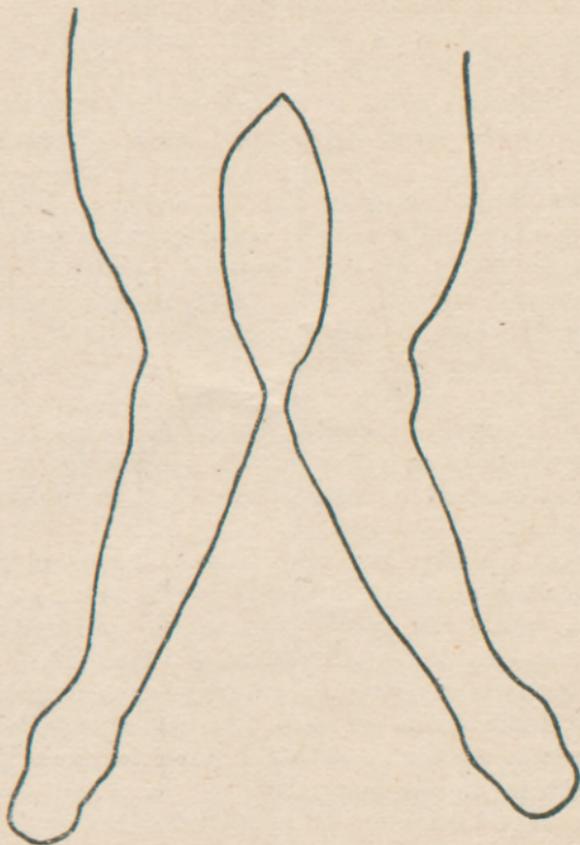


FIG. 6.

valgum, antero-posterior curve in lower third of tibiae, very extreme upon the right side. Both feet in the position of valgus, and general epiphyseal enlargement."

The child was operated upon, and in two sittings the

Macewen operation was done on both knees, while both lower legs were osteotomized at the point of greatest curve. A double spica, plaster-of-Paris bandage was applied at the hips, and was continued down to the toes, by means of circular bandages.

After a little over two months, the child was discharged from the hospital; and as a tracing of the legs at that time is not to be had, reference must again be made to the hospital records for a statement of the child's condition: "Left leg in perfect position, except a slight lateral bowing of the femur. Right leg straight, except that a slight antero-posterior curve persists at the lower third of the tibia. Union at the latter place not very firm; at points of other operation more solid, though with a slight sensation of yielding especially in the left tibia." The legs were done up in light plaster-of-Paris and silicate bandages, and the child discharged. These bandages were removed several weeks later, and as at that time no further treatment was deemed necessary, the child was allowed to walk about.

As seen a short time ago, there was present a well-marked double knock-knee, with lateral curving of both femora, while the lower legs were fairly straight. Fig. 6 represents a tracing taken at that time.

The process of relapse, according to the mother, was a very gradual one up to a number of months ago, since when, to her knowledge, there has been no further increase in the deformity.

The largest number of bones fractured at any one sitting was six. This, in a child five and one-half years of age, in whom both femora were osteotomized by the Macewen method, while the bones of each lower leg were fractured by means of the osteoclast. The child made a good recovery, and was discharged well, wearing no apparatus, in about two months from the time of operation.

It may be well in passing, to mention the after-treatment which these children received. The legs were done up in plaster-of-Paris at the time of operation and this was allowed to remain on for from one month to six weeks, when it was taken off, and the child discharged. In only one or two cases was any apparatus worn after leaving the hospital.

Another thing which was very noticeable in these cases, as seen recently, was the frequency with which flat-foot was met. In fourteen cases this condition was present in both feet, while in two others one foot alone was affected. In six cases the children walked, "toeing-in" quite noticeably with both feet, while in six other cases it was a unilateral affection.

The first thing which will attract the attention of those familiar with the literature upon the subject will be the age at which the operations were performed, the youngest child operated upon being just two years old, while the oldest was ten years of age. The intermediate cases ranged as follows: From two to three years, three cases; from three to four years, nine; from four to five years, six; from five to six years, two; from six to seven years, four; from seven to eight years, one; from eight to nine years, two; ten years, one. Thus, about eighty-five per cent. of the cases were operated upon under seven years of age, or the average age at which the operation was performed is four years; and it must be remembered that twenty-seven out of twenty-eight cases did not relapse.

In connection with this, it may be of interest to note the ages of thirty other cases operated upon similarly to those mentioned above, but which, because of change of residence, or other apparent reasons, could not be found, so that the ultimate results we are unable to compare: From two to three years, eight cases; from

three to four years, ten ; from four to five years, four ; from five to six years, two ; from six to seven years, one ; from seven to eight years, one ; from nine to ten years, one ; from ten to eleven years, one ; from eleven to twelve years, one ; thirteen years, one. Again eighty-five per cent. operated upon under seven years of age, or an average age of operation of four and three-quarters years.

Referring to the authorities for an opinion as to the operable age in these cases, one finds :

E. Noble Smith² in considering operative interference for the correction of the rachitic deformities of the lower legs, says : "To perform osteotomy upon cases that can be cured by more simple means, is contrary to sound surgical principles, and the frequent performance during the last few years of this operation upon children between four and twelve years of age has called forth strong condemnatory expressions from many surgeons of high repute. . . . Up to about twelve years of age, and even beyond this period, simple curvatures and genu valgum may be nearly always cured by pressure alone."

Ogston³ says : "Most cases of knock-knee, under puberty, are curable without a cutting operation."

Adams :⁴ "Osteotomy should not be performed upon very young children ; for them, splints, bandages and constitutional treatment should suffice."

Barker :⁵ "Will not operate earlier than the sixth year."

Macewen :⁶ "Will not operate on any patient under nine years of age, at least ; and he would prefer them to be fifteen years of age or more."

² The Surgery of Deformities, p. 268.

³ Owen. Surgical Diseases of Children, p. 83.

⁴ Ibid, p. 83.

⁵ Ibid, p. 84.

⁶ Ibid, p. 84.

Barwell:⁷ "Will not operate before the seventh year."

A. W. Mayo Robson⁸ reports fifty-three cases, in which three were operated upon at the age of three years, while the average age was eleven and one-half years.

Chotzen⁹ reports the ultimate results of twenty-two cases in which the age of operation varied from fifteen to nineteen years. The ultimate results in these cases were universally good.

At the International Congress in 1884, held at Copenhagen, Macewen¹⁰ reported 1,118 cases, drawn from the practice of thirty-seven surgeons, including American, English and Continental, in which the ages of operation varied from three to thirty-nine years. In this same paper, in speaking of the ultimate results, he says he has known two cases to relapse, where there were anterior curves to the tibia in young children, and one case after his method of supra-condyloid osteotomy.

It will be seen from this that osteotomy and osteoclastis is performed at the Boston Children's Hospital at a much younger age than is considered allowable by many of the standard authorities; and yet after a considerable period of time only one case out of twenty-eight has relapsed, and that a case in which acute rhachitic processes were present after operation.

To summarize, in conclusion: twenty-eight cases are reported, fifteen cases of osteoclastis, twelve of osteotomy and one case in which both operations were performed. The average time which has elapsed since operation is four years. Of the twenty-eight cases,

⁷ Owen. *Surgical Diseases of Children*, p. 84.

⁸ *British Medical Journal*, January 19, 1889, p. 125.

⁹ *Breslauer ärztl Zeitschr.*, No. 23.

¹⁰ *Cong. Internat. des Sciences Médicales, Sect. de Chirurgie*, p. 73.

twenty-seven are found in excellent position while one, a case of advanced rhachitis, has relapsed. The average age of operation was four years, while the youngest child was operated at the age of two years, and the oldest was ten years of age. Double talipes valgus was found in fourteen cases, and single in two cases, and a tendency to toe-in was also a frequent occurrence.

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