

SHORTENING OPERATIONS IN THE LOWER LIMB

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When one wishes to equalise the lengths of the right and left legs, one has in theory to choose between two possibilities; one can either lengthen the shorter leg or shorten the longer. Both methods have been known and tested for many years.

Operations to lengthen the shorter leg appear a priori to be more attractive, since in these cases it is most often a case of lengthening a shortened leg, but they are technically difficult, and now and again are complicated by pareses due to overstretching of the vessels and nerves, and further it may be difficult to fix the osteotomy in perfect alignment.

Therefore we have chosen in the Orthopedic Clinic in Stockholm, in cases which required operation, to shorten the sound limb, in spite of the risk that, if infection or non-union should occur, the patient is in a worse condition than before, with two bad legs instead of one.

Our material is very small—only 9 cases—and also it is difficult to judge since some of the patients had at the same time operations on the other leg. A bigger series has, we know, recently been published from Norway by *Nissen-Lie*, but we would like to take up the question here because we hope to induce a discussion on the principles involved and to hear our colleagues' experiences with operations for shortening

the lower limb. 3 of our 9 cases were children under 15 years, the rest were adults, the oldest being 51 years old. All the operations were done on the femur by resection of part of the diaphysis: in one case in the upper third, and in the remainder in the middle third. The shortening varied between 3.5 cm. and 7 cm. In one case the osteotomy was z-shaped and fixed with wire; in the remainder a transverse resection and fixation with a Küntscher nail was done, except for one case where, instead, a tibial graft was inserted into the medullary cavity.

The consolidation time varied very considerably. In the 3 children the bone consolidated within 3 months; while among the adults there was 1 case where no sound callus could be seen in the radiographs before 10 months, and in 2 21-year-old patients there was still only thin periosteal callus on one side after over 5 months. It is notable that the consolidation time was so long with the Küntscher fixation, which had been used in these cases, in spite of good contact and fixation of the osteotomies. In all cases the function of the thigh muscles was good afterwards, but 2 cases had for a long time stiffness of the knee.

In growing patients there is also the possibility of influencing the length of the bone by operating on the growth zones to check the growth in a certain area. Technically the operation is easy, but it requires very critical indications and good knowledge of the bone's growth. This subject has been studied by a number of workers in recent years, and Gill and Abbott have drawn up a scheme from which one may calculate, from the individual's actual age, the length of his body and of his femur and tibia, and a number of other factors, the annual growth of his thigh and leg bones and the probable final length of his body. One reckons that growth is completed at 18 years, and it is possible, by stopping growth at one or more epiphyses at a suitable time to obtain a final equal bone length when the patient stops growing.

Treatment is simplest in cases where there is shortening due to damage to only one epiphysis. The difference between the lengths can be prevented from increasing by destroying

the corresponding epiphysis on the other side, and can later be eliminated by a shortening osteotomy.

Decision is more difficult in cases in which, due to a disease, e.g. poliomyelitis, growth is slowed but not stopped in all the epiphyses of a limb. First one must observe the patient for some time, and by radiographic measurements of the limb determine the percentage difference between the growth on the two sides. The figures are then referred to Gill and Abbott's scheme and information obtained on the time at which either the thigh or leg should be operated on. It is enough to operate on the lower femoral and upper tibial and fibular epiphyses since here most of the growth takes place.

The operation which seems to be the most attractive of those recommended in the literature is the one in which one removes a square piece of bone with one angle above and one below the epiphysial line, rotates it 90°, and wedges it again firmly in the same place so that a bridge of bone is obtained and grows across the epiphyseal line. If this is done on both the medial and lateral sides further growth at the epiphysis is prevented.

We have done this operation on 2 cases, but so recently that the results cannot yet be judged since at least 2 years of observation are necessary.

SUMMARY

The author refers to 9 cases of shortening operations on the lower limb: all were done on the diaphysis of the femur. 7 were fixed by Küntscher nail: in 3 children the bone consolidated within 3 months, but in the 4 adults consolidation time was notably long, 1 having no sound callus on the radiographs before 10 months and 2 only a thin periosteal callus at 5 months. In 2 cases the bone-growth was checked by turning a square piece of the epiphyseal bone through 90°.

RESUME

L'auteur rend compte de 9 cas d'opération pratiquée pour raccourcir l'extrémité inférieure : elles ont toutes été faites sur le diaphyse du fémur. 7 ont été fixées au moyen des clous Küntscher : chez 3 enfants la consolidation était réalisée au bout de 3 mois, mais chez 4 adultes la consolidation demanda un temps beaucoup plus long. Chez l'un, la radiographie ne montrait pas encore de cal après 10 mois, mais chez 2 un mince cal périostal apparaissait au bout de 5 mois. Dans 2 cas la croissance osseuse a été arrêtée en pratiquant une fente de 90 ° sur l'épiphyse de l'os.

ZUSAMMENFASSUNG

Verfasser berichtet über 9 Fälle von operativen Verkürzungen der unteren Extremität: alle wurden an der Diaphyse des Femur vorgenommen. 7 wurden durch Küntscher-Nagelung fixiert: bei 3 Kindern konsolidierte der Knochen innerhalb von 3 Monaten, aber bei den 4 Erwachsenen war die Konsolidationszeit bemerkenswert lang, 1 hatte keinen festen callus im Röntgenbild vor 10 Monaten, und 2 hatten nach 5 Monaten nur einen dünnen periostalen Callus. In 2 Fällen wurde das Knochenwachstum durch Drehung eines Keils aus Epiphysenknochen um 90° gehemmt.