Acta orthop. scand. *49*, 85–88, 1978

THE SAAB JIG: AN AID IN HIGH TIBIAL OSTEOTOMY

RUNE MYRNERTS

Department of Orthopaedic Surgery, Linköping University, The Medical School, Linköping, Sweden

To increase the precision of high tibial osteotomy a surgical tool has been developed. The instrument is described. The precision obtainable using the instrument is found to be significantly ($P < 0.001$) higher than that obtained when operating without the instrument.

Key words: gonarthrosis; high tibial osteotomy; surgical tool

Accepted 1.x.77

High tibial osteotomy is commonly used in the treatment of moderately severe gonarthrosis with varus or valgus deviation. The size of the wedge to be removed to correct the deviation is determined in various ways in different clinics (Devas 1969, Coventry 1973, Maquet 1976, Edholm et al. 1976 and 1977, Myrnerts & Wennberg 1977). Freedom from pain is five times more likely in well-corrected patients than in patients who have been either over- or undercorrected (Hagstedt 1974). A necessary condition for a good correction is that the wedge removed is exactly of the size determined preoperatively. To increase the possibility of removing exactly the predetermined size of wedge at high tibial osteotomy, a surgical tool has been developed at the Department of Orthopaedic Surgery, Linköping, Sweden, in co-operation with SAAB-Scania. The instrument has been called the SAAB jig. Its construction and function can be seen in Figures 1–7. The precision of the instrument has been examined in connection with a clinical study of gonarthrosis.

METHOD

The size of the wedge that was actually removed at operation was determined by measuring the angle between the long axis of the tibia and a tangent to the articulating surfaces of the tibial condyles on frontal x-rays of the knee, taken before and immediately after the operation. The actual size of the wedge removed was compared with that intended. The intended wedge size was determined by three-point-measurement (Edholm et al. 1976 and 1977, Myrnerts & Wennberg 1977). The difference between the intended wedge size and the size of the wedge actually removed has been used as a measure of the precision of the surgical method.

MATERIAL

The difference between intended wedge size and actual wedge size was determined in 56 patients operated on using the SAAB jig (group A) and in 40 patients operated on without the jig (group B). In the latter operations, prefabricated models of the wedge or the method in which 1 mm on the cortical surface corresponds to 1° of wedge were used as an aid in determining the wedge size to be removed.

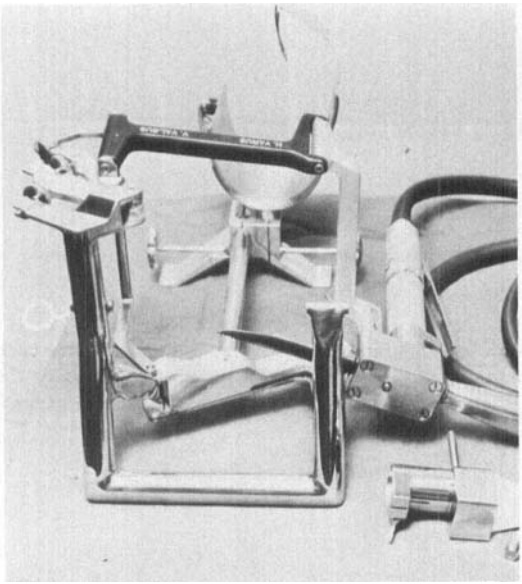

Figure 1. The jig consists of a metal frame for three-point suspension of the lower leg. An articulated arm, that directs a saw in a well-defined plane, is mounted on this frame.

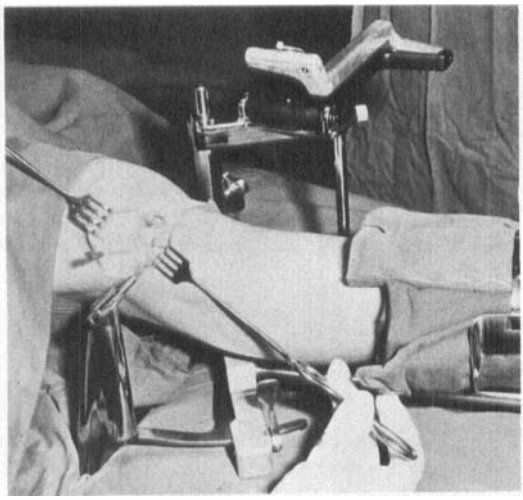

Figure 2. The leg is suspended by two metal points that are drilled into the bone laterally and medially at the knee and by a circular holder that can be tightened around the ankle.

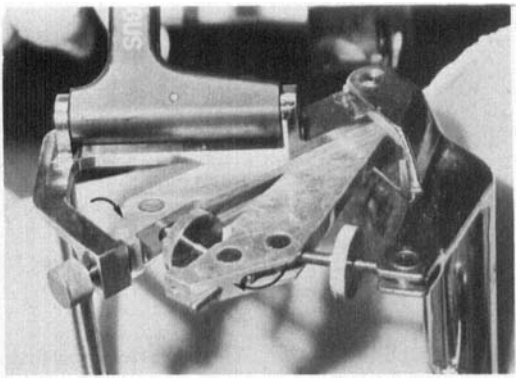

Figure 3. With this mechanism the size and position of the wedge can be determined. With the articulated saw arm in positions 1 and 2 respectively (see arrows), a wedge is removed the size of which can be read on the scale of the mechanism.

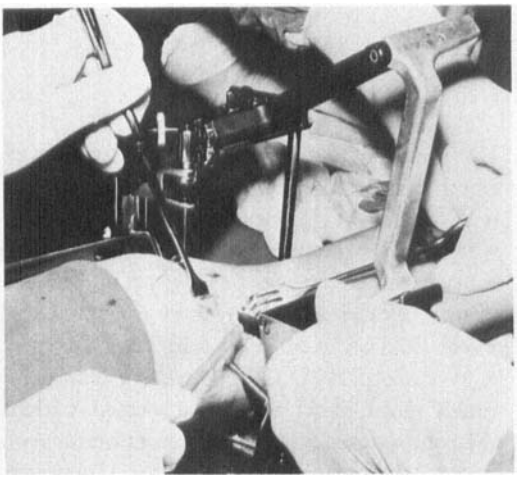

Figure 4. The osteotomy is carried out.

RESULTS

The results of a comparison between the two surgical methods are shown in Table 1. It has been possible to reduce the percentage of poor corrections (difference > /6/°) from 22.5 to 5.4. A statistical comparison of the mean of the differences between the intended and the actual wedge size in the two groups showed a significant improvement in favour of the SAAB jig ($P < 0.001$). The SAAB jig is easy to use. No injuries to vessels or nerves have been observed.

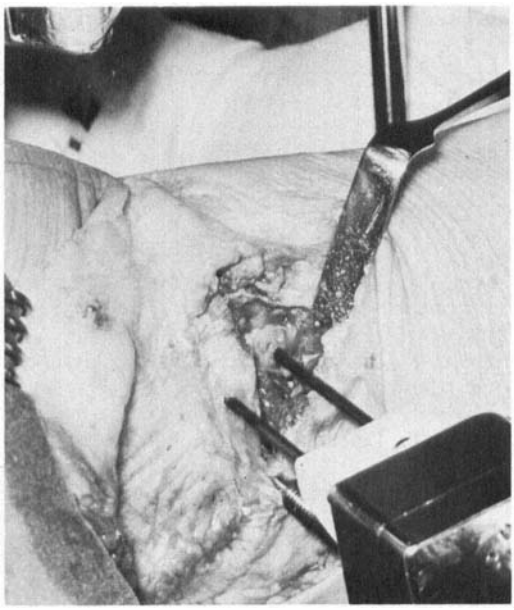

Figure 5. After the wedge has been removed and the surfaces of the osteotomy have been approximated the saw is changed for a special drill and two holes are bored parallel to the line of the osteotomy.

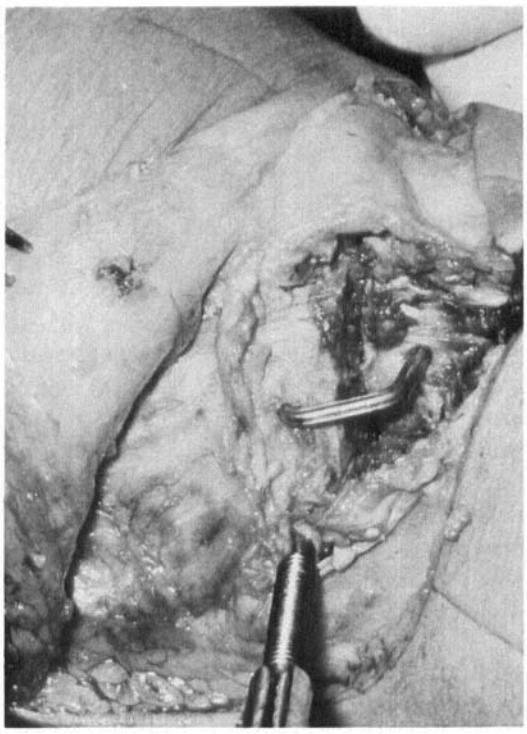

Figure 6. The osteotomy is stabilized with one or two staples.

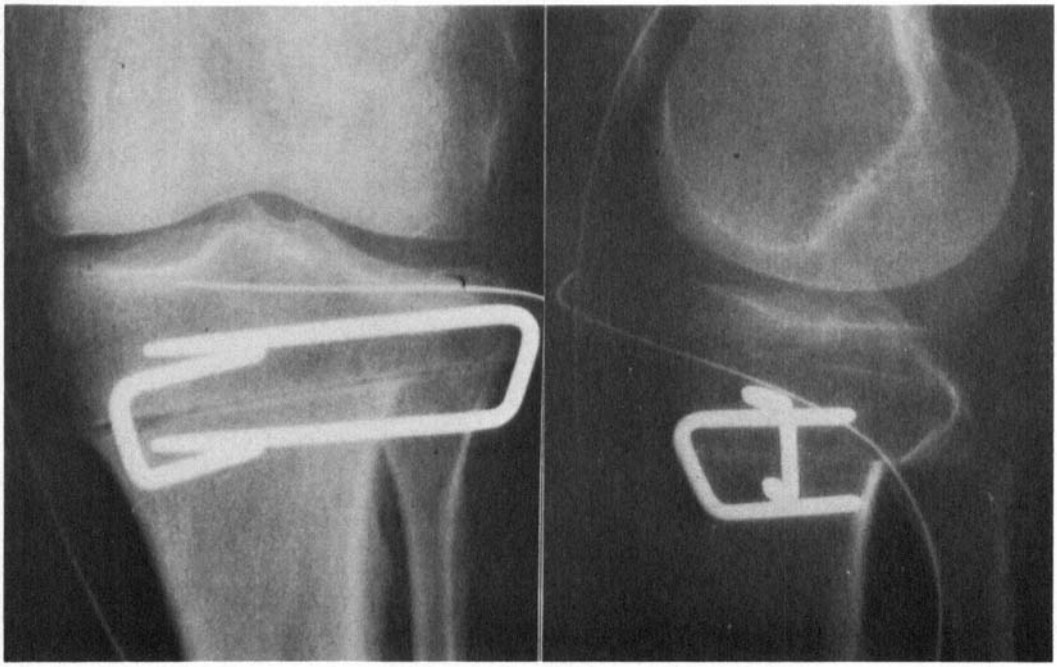

Figure 7. Postoperative x-rays.

Table 1. The difference between intended wedge size and actual wedge size measured immediately postoperatively

Group/Diff.	/0°–2°/	/2°–4°/	/4°–6°/	>/6°/
A	55.3%	26.8%	12.5%	5.4%
B	30.0%	22.5%	25.0%	22.5%

DISCUSSION

It is still not known with any certainty what is the optimal degree of correction in high tibial osteotomy. In addition, the correction can either increase or decrease while the osteotomy is healing. Nevertheless, it seems that one prerequisite for a good correction is that the size of the wedge removed at operation is as close as possible to the predetermined size and we have found the SAAB jig to be of decided value in achieving this.

REFERENCES

Coventry, M. (1973) Osteotomy about the knee for degenerative and rheumatoid arthritis. *J. Bone Jt Surg.* **55**-A, 23–48.

Devas, M. (1969) High tibial osteotomy for arthritis of the knee. *J. Bone Jt Surg.* **51**-B, 95–99.

Edholm, P., Lindahl, O., Lindholm, B., Myrnerts, R., Olsson, K.-E. & Wennberg, E. (1976) Knee instability. *Acta orthop. scand.* **47**, 658–663.

Edholm, P., Lindahl, O., Lindholm, B., Myrnerts, R., Olsson, K.-E. & Wennberg, E. (1977) Knee instability and tibial osteotomy. *Acta orthop. scand.* **48**, 95–98.

Hagstedt, B. (1974) High tibial osteotomy for gonarthrosis. ISBN 91-7222-069-4, Lund.

Maquet, P. (1976) Biomechanics of the knee. ISBN 3-540-07882-7, ISBN 0-387-07883-7.

Myrnerts, R. & Wennberg, E. (1977) "Three-point measurement" – A new orthoradiographic examination technique in gonarthrosis. *International Orthopaedics (SICOT)* **1**, 43–47.

Correspondence to: Rune Myrnerts, M.D., Department of Orthopaedic Surgery, Linköping University, The Medical School, S-581 85 Linköping, Sweden