

## KNEE INSTABILITY AND TIBIAL OSTEOTOMY

### *A Clinical Study*

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Twenty-one gonarthrosis patients were preoperatively assessed according to a newly developed orthoradiographic technique ("three-point measurement") and followed up for 2-3 years postoperatively using this technique. The medio-lateral instability of the knee joints was not influenced by the operation. The varus/valgus deviation was under-corrected, on average, but the deviation did not increase significantly with time after the operation. Judging from this pilot study the three-point measurement technique supplies relevant information and it is now being used in a prospective study on high tibial osteotomy in gonarthrosis.

*Key words:* knee instability, measurement; orthoradiographic method; gonarthrosis; tibial osteotomy

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Since osteotomy of the tibia was first reported by Jackson in 1958 as a method of treatment for gonarthrosis, this operation has gained wide acceptance. However, preoperatively the size of the wedge to be removed is estimated in many different ways by the various orthopaedic surgeons (Jackson & Waugh 1961, Devas 1969, Harris & Kostuik 1970, Coventry 1973). To get a more precise picture of the instability of the knee joint we have devised an orthoradiographic examination method and tested it on healthy subjects (Edholm et al. 1977).

This paper describes its use in the preoperative assessment of gonarthrosis patients.

## METHOD

The orthoradiographic technique was used to examine patients with gonarthrosis before and after the operation. As the varus/valgus deviation of healthy subjects was found to be near zero (Edholm et al. 1977), we estimated the size of the wedge to be removed so that the deviation after operation would be zero. Thus the size of the wedge should be the same as the deviation determined by the three-point measurement technique. A high tibial wedge osteotomy fixed with one or two staples was used. No special effort was made to tighten the collateral ligaments.

## MATERIAL

Twenty-five patients were operated on. Three died from causes unrelated to the operation and one moved abroad. The remaining 21 patients (13 women, 8 men), with 23 operated knees, were followed up for 2-3 years (mean 32 months). Their ages ranged from 47-77 years

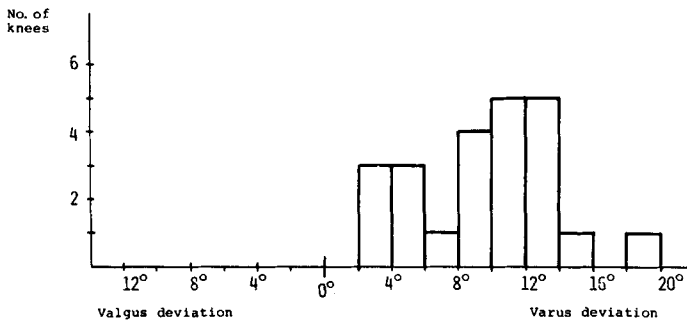


Figure 1. The distribution of the varus/valgus deviation of the 23 knee joints before the operation.

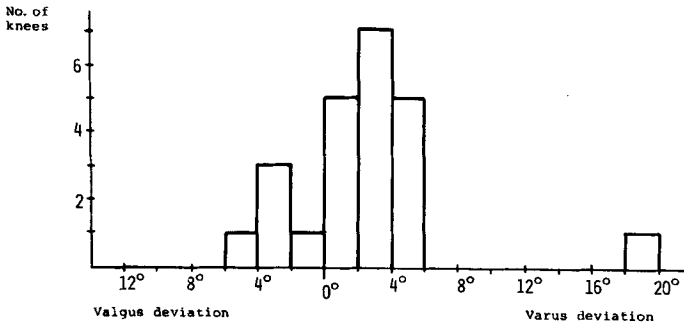


Figure 2. The distribution of the varus/valgus deviation of the 23 knee joints after the operation.

(mean 64 years). All the patients had a medial gonarthrosis and thus a valgus osteotomy was done on all the patients.

**RESULTS**

The varus/valgus deviation was corrected in most cases by the operation but one knee was grossly undercorrected (Figures 1 and 2). The medio-lateral instability was as a rule not influenced by the operation (Figures 3 and 4). Taken as

an average the varus/valgus deviation was undercorrected and increased slightly with time (Figure 5), but was within the uncertainty factor of the orthoradiographic method. One would expect the varus/valgus deviation to increase with time in under- or over-corrected knees (Figures 6 and 7) but this did not occur. The pain on loading the knee joint, pain at rest and pain when starting to walk were reduced to various degrees (Table 1) and the patients were for the most

Table 1. Subjective symptoms before and after the operation.

| Symptom                  | Before operation | None         | After operation |             |             |
|--------------------------|------------------|--------------|-----------------|-------------|-------------|
|                          |                  |              | Less            | Unchanged   | Worse       |
| Pain on loading          | 23<br>(100 %)    | 12<br>(52 %) | 6<br>(26 %)     | 5<br>(22 %) | 0           |
| Pain at rest             | 19<br>(83 %)     | 18<br>(78 %) | 2<br>(9 %)      | 1<br>(4 %)  | 2<br>(9 %)  |
| Pain on starting to walk | 20<br>(87 %)     | 9<br>(39 %)  | 8<br>(35 %)     | 3<br>(13 %) | 3<br>(13 %) |

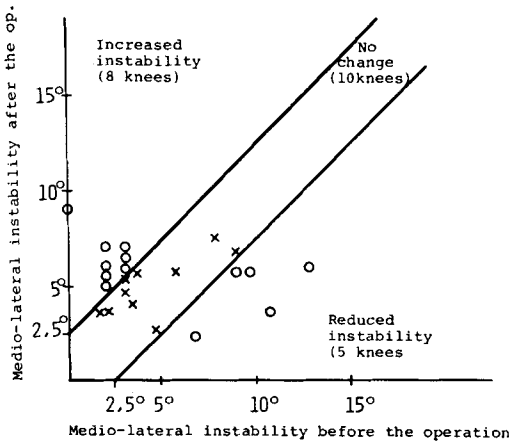


Figure 3. The medio-lateral instability of the 23 knee joints before and a short time after the operation. O = changed and X = unchanged instability.

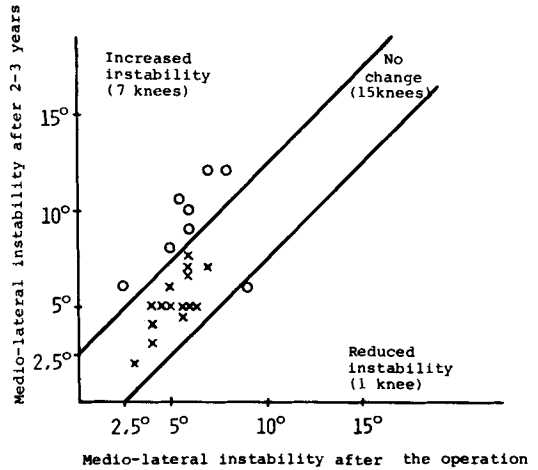


Figure 4. The medio-lateral instability of the 23 knee joints a short time and 2-3 years after the operation. O = changed and X = unchanged instability.

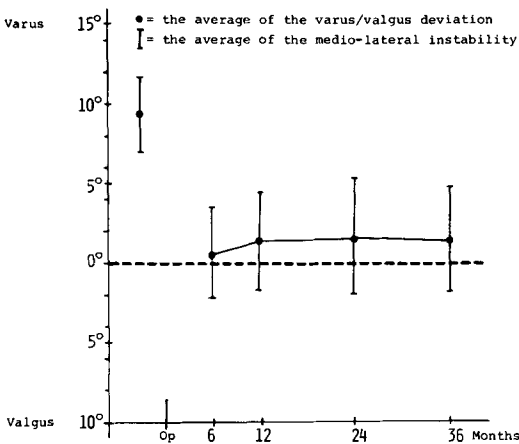


Figure 5. The average of the varus/valgus deviation and the medio-lateral instability of the 23 knee joints as they change with time after the operation.

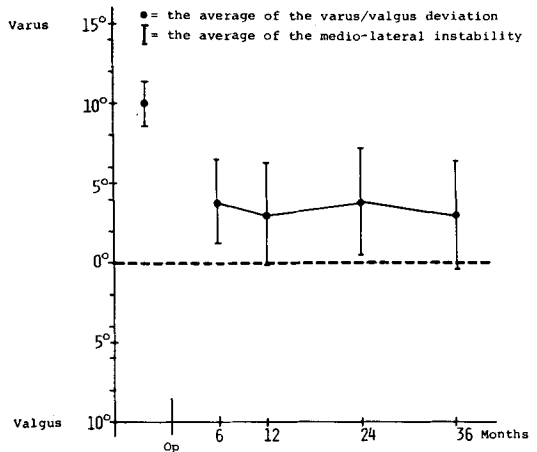


Figure 6. The varus/valgus deviation and the medio-lateral instability as they change with time in 10 undercorrected knees. (Undercorrected = initial postoperative varus deviation > 2°).

Table 2. The patients' overall judgement of the operation.

|                                 |      |        |
|---------------------------------|------|--------|
| No symptoms after the operation | 39 % | } 78 % |
| Much better                     | 22 % |        |
| Better                          | 17 % |        |
| Unchanged                       | 9 %  |        |
| Worse                           | 13 % |        |

part satisfied with the results of the operation (Table 2).

DISCUSSION

With the three-point measurement technique we are able to determine the size of the wedge in a standardized way. It

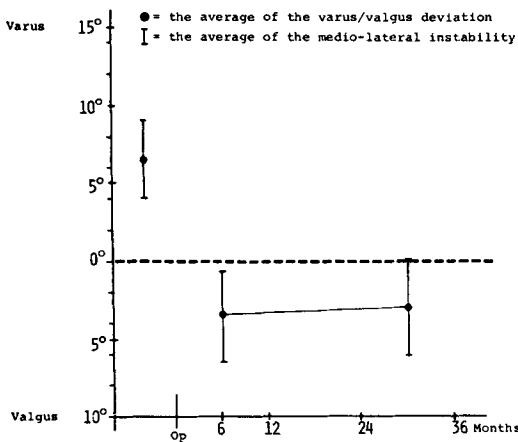


Figure 7. The varus/valgus deviation and the medio-lateral instability as they change with time in five overcorrected knees. (Overcorrected = initial postoperative valgus deviation  $> 2^\circ$ ).

also allows us to check the results of our operations in a reproducible way. The results in terms of subjective improvement of the patients, with about 80 per cent that benefited by the operation, are the same as in most materials on high tibial osteotomy (Jackson & Waugh 1961, Ahlberg et al. 1968, Devas 1969, Harris & Kostuik 1970, Appel & Friberg 1972, Coventry 1973, Hagstedt 1974, Insall et al. 1974, Seal & Chan 1975). We therefore conclude from this pilot study that the three-point measurement technique gives us relevant preoperative information. We are now using this method

in a prospective study to evaluate the results obtained using different operating principles.

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