Original Articles

Medial and Lateral Gonarthrosis Treated with High Tibial Osteotomy

A Prospective Study

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Summary. A prospective series comprising 52 knees in 48 patients suffering from medial or lateral unicompartmental gonarthrosis and treated by means of high tibial osteotomy shows, by comparing mechanical axis (MA) 0° corrected knees, how important is the overcorrection of the MA into valgus in medial osteoarthritis. The clinical results were significantly correlated to overcorrection, the results 2 years postoperatively being better than those obtained at a follow-up 1 year after the operation. Of the results, 82% were good within a limit of ±3° after 2 years, while only 77% were correspondingly good 1 year postoperatively. In lateral gonarthrosis overcorrection was not as good, but there was a mean overcorrection of +2°, and with respect to this overcorrection, the results were quite acceptable. The results were directly correlated to the opening up of the joint space affected (80%) and diminution or disappearance of subluxation, 1/3 being 0° preoperatively, 1/3 postoperatively in medial gonarthrosis. In lateral gonarthrosis, subluxation was increased, with 1/3 being 0° preoperatively, 1/3 being 0° postoperatively. The extension deficit in varus knees significantly diminished after valgus osteotomy; the change in valgus knees was also evident but not significant. The mean value of extension deficit was below 5° in all cases at the 2 years' follow-up examination. However, 95% of all patients showed good or fair results after a follow-up period of 2 years.

A typical sign of hemiarthrosis of the knee is progressive destruction of the articular cartilage, leading to varus or valgus deformity. The medial compartment of the knee is most frequently affected, particularly in aged women. Among predisposing factors are previous deformity of the medial femoral condyle, fractures in articular surfaces, damage to the meniscus. However, the origin of the disease is mostly undefined.

The characteristic rest pain in gonarthrosis has been attributed to disturbance of the venous drainage exerted by juxtachondral cancellous bone and resulting in intraosseous stasis [31, 32] or to hypertension [2, 3]. Such symptoms disappear when the high medullary pressure is released by osteotomy [4].

Degeneration of the medial compartment of the knee leads to varus deformity and to the development of increasing load pressures acting on the medial articular surface. Thus, an increase of the deformity by 10° implies a threefold increase in loading stresses [34]. In this connection, the lateral knee ligaments are stretched, and a vicious circle is started, giving rise to a rapid progression of the deformity, local pain, and instability. Provided that the deformity can be corrected and the weight-bearing stresses can be transferred to the opposite side of the joint, this vicious circle will be interrupted, so that pain can be relieved [8].

Jackson [22] and Bouillet and van Gaver [7] demonstrated the advantages of osteotomy, and this form of surgery has been widely accepted. Maquet et al. [27] showed the effect of high asymmetric loads on the femorotibial articulation caused by angular deformity.

The broader comprehension of the biomechanics of gonarthrosis has contributed to a better understanding of the inherent deficiency of previous methods of treatment, none of which corrected the me-
Mechanical axis of the knee [5]. Furthermore, an undertreatment at osteotomy has been noted to promote the progression of degenerative changes over the long term [18].

In the past decade, prosthetic arthroplasty has developed rapidly and has been a powerful competitor to osteotomy in the treatment of gonarthrosis. Arthroplasty became the treatment of choice in the most advanced stages of medial gonarthrosis [10, 18, 23], and has also been preferred for moderate stages of lateral arthrosis [18, 33]. However, Hernborg and Nilsson [20] showed how, once established, the relentless progression of gonarthrosis resulted in a poor prognosis even at moderate stages. So the preventive potential of tibial osteotomy became apparent, but this form of operation could be advocated in early cases only, where the correction could be done with great precision [18].

The purpose of this study is to describe the adoption of clinical and radiological parameters after a prospective period of 2 years for examination in patients suffering from medial or lateral gonarthrosis and treated by means of high tibial osteotomy.

Clinical Series

At the Orthopedic Hospital of the Invalid Foundation, Helsinki, Finland, 52 high tibial osteotomies, 45 wedge and seven curved, for femorotibial gonarthrosis were performed during the period 1981–1983. Indications were the same for all 52 operations in 48 patients, 28 men and 20 women, and the same pre- and postoperative routines were applied.

The diagnosis was primary gonarthrosis in 26 cases, gonarthrosis secondary to trauma in 20 cases, tuberculosis in early childhood in one case, and rheumatoid arthritis in one case. The age distribution ranged from 23 to 75 years, with a mean age of 56 years.

The clinical series was divided into three subgroups with respect to the type of treatment: (a) a group treated with operative correction of the mechanical axis (24 knees); (b) a group treated with overcorrection of the axis by 4° (18 knees); (c) a valgus knee group treated by correction of the mechanical axis (ten knees).

The condition of the patients was documented preoperatively and 3, 12, and 24 months postoperatively. The indication for surgery was disability producing medial gonarthrosis in 42 cases and lateral gonarthrosis in ten cases. The usual radiological indication for high tibial osteotomy was stage I–III degenerative changes in the medial or lateral compartment of the knee (Table 1).