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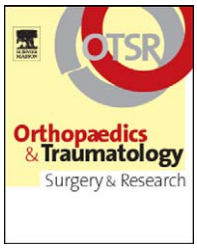

ORIGINAL ARTICLE

Total knee arthroplasty in severe valgus deformity: Interest of combining a lateral approach with a tibial tubercle osteotomy

A.P. Apostolopoulos, D.D. Nikolopoulos*, I. Polyzois, A. Nakos, S. Liarokapis, G. Stefanakis, I.V. Michos

4th Department of Orthopaedic Surgery, Asclepeion Voulas General Hospital, V. Paulou 01 street, 16673 Athens, Greece

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KEYWORDS
Valgus knee;
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Summary
Introduction: Among the patients requiring total knee arthroplasty (TKA), approximately 10—15% presents with a valgus deformity (VD). Severely deformed valgus knees represent a surgical challenge. The purpose of this study is to evaluate the results of TKA in grade II and III valgus knee deformities (Ranawat classification), focusing on axis correction, by using a lateral parapatellar capsulotomy combined with tibial tubercle osteotomy.
Hypothesis: The lateral approach in combination with a tibial tuberosity osteotomy is highly beneficial in the treatment of severe valgus knees in patients undergoing primary TKA, for correction of anatomical axis.
Patients and methods: Between January 1995 and December 2001, 33 patients with severe VD, grade II and III, were treated with TKA by one surgeon. Twenty-six patients (19 male, seven female) with mean age of 72 years (57—79) were dealt with a resurfacing posterior stabilized design; whereas in seven cases, a constrained type implant was used. These seven patients were excluded from the study. Two more patients were lost for follow-up and were also excluded. The axis deviation of the remaining 24 patients ranged from 15 to 35 degrees, (average 23°). A lateral parapatellar arthrotomy, in combination with tibial tubercle osteotomy was used. Patients' clinical evaluation — using the International Knee Society (IKS) score — with simultaneous radiological assessment was performed yearly after the operation; and for a mean follow-up time of 11.5 years (8 to 15 years).
Results: The mean IKS score improved from 44 points (34 to 52) preoperatively, to 91 points (68 to 100) postoperatively, at the last follow-up. In terms of alignment parameter, only two knees had a residual valgus deviation greater than 7° (ideal range : 3—7°). One knee exhibited a 9° valgus, and another one 10°, according to anatomical axis measurments. In one case, there

* Corresponding author.
E-mail address: drdnikol@hotmail.com (D.D. Nikolopoulos).

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was a 5 mm proximal migration of the osteotomised tuberosity fragment, due to breakage of the screw. However, the final outcome was not affected. There were no cases of tibial tubercle's non-union; neither of delayed instability.
Conclusion: The lateral approach is a useful approach in the treatment of severe valgus knee deformity in patients undergoing primary TKA. Anatomical axis restoration is facilitated, as the contracted structures are easily accessed and, in severe cases, the patellar alignment may be achieved by displacing the osteotomised tubercle. However, careful fixation of the tuberosity is mandatory.
Level of evidence: Level IV, prospective study of case series.

Introduction

Ten to 15% of patients requiring total knee arthroplasty (TKA) present with a valgus deformity (VD). This type of deformity may be encountered in rheumatoid arthritis, osteoarthritis, post-traumatic arthritis, metabolic bone disease or an excessively overcorrected proximal tibial osteotomy [1,2].

Three grades of VD have been described by Ranawat et al. [3]. Grade I is characterized by a valgus deviation less than 10°, is correctable and the medial collateral ligament (MCL) is functional and intact. This type accounts for 80% of all valgus knees. In grade II (15% of valgus knees), the axis deviation ranges between 10° and 20°, and MCL is elongated, but functional. Finally, grade III is seen in the rest 5% of the valgus knees, and includes axis deviation more than 20° (Fig. 1). The medial stabilising elements are severely impaired and a constrained implant may be required [3].

The pathological changes of the anatomical units in the valgus knee are distinctive. The contracted structures are usually the iliotibial band, the lateral collateral ligament (LCL), the popliteus tendon, the posterolateral capsule. Rarely, the lateral head of the gastrocnemius and the long head of the biceps femoris are also affected. The stabilising structures of the medial side are attenuated. Unlike the varus knee, most of the osseous defects detected on the valgus knee are met on the lateral femoral condyle, on its distal and posterior surface. The tibial plateau is usually less affected. Among the many factors that influence the long term success of a TKA, restoration and long-lasting maintenance of the limb's anatomical axis is one of the most crucial [4,5].

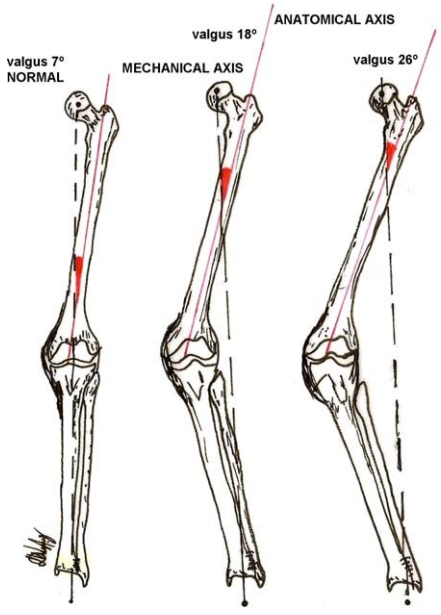

Figure 1 The mechanical and anatomical axis of the knee without deformity and with valgus deformity grade II and III.

The results of TKA in valgus knees with conventional medial parapatellar capsulotomy have been inferior to those of varus knees with significant deformity [6]. A number of authors have reported full restoration of the anatomical axis in 70—78% of valgus knees [6,7]. Incomplete axis restoration has been linked with impaired clinical outcome [6].

Conversely, authors using lateral parapatellar capsulotomy have reported better results in terms of anatomical axis correction and also in terms of clinical performance [8,9]. The rationale of using lateral parapatellar arthrotomy is the preservation of the extensor mechanism's blood supply. The latter may be seriously affected, if lateral release is added to the medial capsulotomy performed in the conventional approach [10]. Moreover, the contracted structures, which require release, are much easier approached laterally. Keblish published, in 1991, the results of TKA in valgus knees with lateral approach and presented the technique of tibial tubercle osteotomy [8]; whereas Whiteside, in 1993 [11], and Bulki et al. in 1999, showed their outcome in valgus deformed knees after lateral approach and tibial tubercle osteotomy [12]. A disadvantage of this approach is the osteotomy of the tibial tuberosity which is necessary for patellar eversion.

This prospective study reports the outcome of TKA in 24 knees with a fixed valgus type II—III deformity by using a midline skin incision with lateral parapatellar capsulotomy, combined with tibial tubercle osteotomy to facilitate medial reflection of the patella and discuss the technical details of the procedure. Due to the fact that there is paucity in the literature regarding this approach for primary TKA in valgus knees, we have the purpose to verify that the lateral approach in combination with a tibial tuberosity osteotomy is highly beneficial in the treatment of severe valgus knees in patients undergoing primary TKA, for correction of anatomical axis.

Patients and methods

We recruited 33 patients, between January 1995 to December 2001, with severe valgus fixed deformities, grade II and III (Ranawat classification) [3], who underwent total knee