

Total Knee Arthroplasty after a Proximal Tibial Osteotomy

B. Flórez, R. Escribano, J. del Río, A. Valentí and J.R. Valentí

Department of Orthopedic and Trauma Surgery. Navarre University Clinic. Spain.

Introduction. The result of total knee replacement (TKR) after proximal tibial osteotomy performed to treat unicompartmental knee osteoarthritis is a highly relevant issue given the widespread use made nowadays of unicompartmental knee prostheses. This is a retrospective comparative study carried out to determine whether the presence of a previous osteotomy negatively influences the result of TKRs.

Materials and methods. Of all the patients subjected to TKR in our hospital, we selected a series of 20 cases that had a prior proximal tibial osteotomy and we compared them with a group of patients with a primary PTR, which we used as control. We performed a series of radiographic (patellar height, alignment of the knee axis and thickness of the tibial section) and clinical (joint mobility, walking capability and complications) measurements, in order to compare both groups and establish differences between them. Mean follow-up was 5 years.

Results. No differences were found in the measurements taken with respect to the varus/valgus index or the functional result achieved. We did observe, however, a slight decrease in patellar height as well as an increase in OR time and in the technical complexity of the procedure. We also detected a relative bone stock deficit in patients who had undergone a previous proximal tibial osteotomy.

Conclusion. High tibial osteotomy remains a reliable treatment for unicompartmental knee osteoarthritis. It is a procedure surgeons have vast experience of and which does not negatively influence a potential TKR implantation at a later date.

Key words: proximal tibial osteotomy, Coventry, total knee replacement.

Corresponding author:

B. Flórez Álvarez.
Departamento de Cirugía Ortopédica y Traumatología.
Clínica Universitaria de Navarra.
C/ Pío XII s/n.
31008 Pamplona.
E-mail: fdeflorez@unav.es

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Prótesis total de rodilla tras osteotomía proximal de tibia

Introducción. El resultado de la prótesis total de rodilla (PTR) tras una osteotomía de tibia proximal para el tratamiento de las artrosis unicompartmentales de rodilla es un tema de gran relevancia en la actualidad, especialmente a raíz de la masificación de las prótesis unicompartmentales de rodilla. Hemos realizado un estudio retrospectivo comparativo para determinar si la presencia de una osteotomía previa influye negativamente en el resultado de las PTR.

Material y método. Del conjunto de pacientes intervenidos en nuestro centro a los que se implantó una PTR, seleccionamos una serie de 20 casos que presentaban una osteotomía de tibia proximal previa y los comparamos con un grupo de 20 pacientes con PTR primaria utilizada como grupo control. Realizamos una serie de mediciones radiográficas (altura de la rótula, alineación del eje de la rodilla, grosor de corte tibial) y clínicas (movilidad articular, capacidad de marcha y complicaciones) para comparar y establecer diferencias entre ambos grupos. El tiempo medio de seguimiento postoperatorio fue de cinco años.

Resultados. No se encontraron diferencias en las mediciones obtenidas respecto a índice varo-valgo ni en el resultado funcional. Sí observamos una discreta disminución en la altura rotuliana, un aumento del tiempo operatorio y en las exigencias técnicas de la cirugía, así como un déficit relativo de stock óseo en los pacientes que habían sido sometidos previamente a osteotomía proximal de tibia.

Conclusión. La osteotomía valguizante de tibia sigue siendo un buen tratamiento para la artrosis unicompartmental de rodilla, en la que hay una amplia experiencia sobre su uso y que no interfiere, según nuestros resultados, en la reconversión a una posterior PTR.

Palabras clave: osteotomía proximal de tibia, Coventry, prótesis total de rodilla.

Proximal tibial osteotomy has long been used to treat unicompartmental knee osteoarthritis. Provided that the indication is correct, this procedure has shown good results in terms of pain relief and has permitted high levels of physical activity in young patients¹. However, a significant number of patients afflicted with unicompartmental gonarthrosis treated with proximal tibial osteotomy will eventually need to be subjected to a total knee arthroplasty (TKA) because of the progression of their osteoarthritis. Therefore proximal tibial osteotomy cannot be considered a final treatment for these patients; it is simply a stopgap solution that will only help them delay the implantation of a TKA².

There is great controversy about whether proximal tibial osteotomy could have some negative effect on the evolution of patients eventually subjected to TKA. Several authors have compared the results of TKA in a group of patients previously subjected to a proximal tibial osteotomy vis-à-vis a control group without a prior proximal tibial osteotomy. These studies have produced contradictory results; some find no differences between both groups³, whereas other researchers report worse results in patients previously subjected to a proximal tibial osteotomy⁴. These poorer results would seem to be related to the greater technical hurdles inherent in implanting the TKA in this group, motivated by the greater difficulty to expose the lateral compartment and a shorter patellar tendon as well as by rotational alterations and the slope of the tibial plateau⁵.

The purpose of this paper is to assess the influence of proximal tibial osteotomy on a subsequent TKA. In what follows, we compare the clinical and radiological evolution of a series of patients subjected to a TKA after a proximal tibial osteotomy with that of a control group, who were subjected to a primary TKA.

MATERIALS AND METHODS

We retrospectively reviewed the clinical records of 20 patients subjected to a TKA after a proximal tibial osteotomy. They were compared to a control group of 20 TKAs, randomly obtained from the primary prostheses database of our department, matched with the group under study in terms of age, gender and implant type.

All osteotomies were of the Coventry closing-wedge type. In all cases the indication for osteotomy was medial unicompartmental gonarthrosis; the indication for the conversion to TKA was the evolution of the gonarthrosis into a generalized osteoarthritis. Mean time from osteotomy to TKA was 5.5 years (range: 1-13).

Mean age at TKA was 63 years (range: 53-71). Gender distribution was: 63% males and 37% females and the implant types were: 18 PCL-sparing and 2 LCP-sacrificing implants in each group. In all cases, the prosthesis was implanted through a medial parapatellar approach and the

implants used were either PCA or Duracon II, depending on the implantation date, both manufactured by Howmedica. Mean follow-up after TKA was 5 years (range: 3-13 years).

In addition to the usual epidemiological data, different preoperative variables were studied in both groups prior to TKA. These were: indication and type of osteotomy; varus-valgus alignment, patellar height as measured by the Insall Salvati index; distance from the lateral joint line to the fibular head; and indication for the conversion to TKA. A series of postoperative variables like thickness of the tibial section, patellar replacement, alignment, ROM, presence of pain and complications were also assessed so as to establish the differences between both groups.

CNES were assessed both pre- and postoperatively according to the clinical-radiological criteria of the Knee Society⁶, which include the *knee score* and the *function score*. The *knee score* evaluates pain, alignment and ROM. A well aligned knee, with no pain and an ROM of 125° would obtain a score of 100. The *function score* evaluates the capacity to ambulate and climb stairs, with deductions from the top score determined by any limitations present or aid needed (crutches, walking stick).

The statistical analysis of the data was performed by means of a paired Student's «t» test (SPSS for Windows).

RESULTS

There were no differences between both groups as regards age, gender or type of prosthesis used at surgery.

Preoperative variables

Mean pre TKA alignment in the group subjected to a prior tibial osteotomy was 2.3° valgus, whereas in the control group preop alignment was 1.58° varus ($p = 0.064$).

The mean distance between the articular surface of the lateral tibial plateau and the fibular head was 9 mm in the group subjected to a prior tibial osteotomy and 17 mm in the control group. This difference was statistically significant ($p = 0.041$).

Mean patellar height, according to the Insall-Salvati index, was 0.87 for the group under study, as compared with 1.1 in the group without a prior tibial osteotomy. This difference was statistically significant ($p = 0,029$).

Postoperative variables

The mean tibial cut thickness was 0.7 cm in the group subjected to a prior tibial osteotomy, while in the control group it was 1.08 cm ($p = 0.032$). Mean post-op alignment was 5.40° valgus in the group subjected to a prior tibial osteotomy and 5.58° valgus in the control group, but the difference was not statistically significant. Nor were the differ-

ences in the knee and function scores between the two groups at the end of follow-up: in the group subjected to a prior tibial osteotomy the mean scores were 84 and 77 respectively, whereas in the control group mean scores were 82 and 78. Such differences were not statistically significant ($p = 0.12$).

Complications found in the tibial osteotomy group were a suture dehiscence and a case of reflex sympathetic dystrophy; complications in the control group were a case of aseptic loosening, treated by means of a prosthetic replacement, and a reflex sympathetic dystrophy.

DISCUSSION

The evolution of TKA in young active patients is still associated to different problems, including patellofemoral alterations, prosthetic loosening and PE wear. Proximal tibial osteotomy is an excellent alternative that offers many advantages such as the preservation of the patient's bone stock, proprioception and physiological pain mechanisms, which permits higher activity levels without the risk of damaging a potential implant⁷.

In the last few years, several authors have reviewed the results of TKA further to tibial osteotomy. The literature contains contradictory results since some papers report results comparable to those of a primary TKA while others reflect poorer results in patients that received a prior tibial osteotomy. In a review of 35 knees, Staeheli et al⁸, reported good result in 89% of their cases, which confirms the idea that «no bridges are burnt» if a proximal tibial osteotomy is carried out previously. In turn, Windsor et al⁹, in a review of 45 knees, report only 80% good results and concludes that the evolution of TKAs is poorer in patients that have been subjected to a prior proximal tibial osteotomy.

In order to minimize the effect exerted by variables such as age, gender, type of prosthesis or the use of cement, several paired studies have been conducted, whose results are also contradictory. Mont et al¹⁰ compared the results of TKAs in patients subjected to a prior tibial osteotomy with a group of 75 patients undergoing a primary TKA. After a 6.5-year follow-up, good results were found in just 64% of the knees, as compared to 89% in the group that had not been osteotomized.

In 2000, Meding et al¹¹ published a paper in which the contralateral knee was used as control in a series of patients subjected to bilateral TKA, who had previously been subjected to a proximal tibial osteotomy in only one of their knees. This paper showed no significant differences between both groups as regards clinical evolution, ROM, post-op varus-valgus alignment and number of complications. But significant differences were found regarding patellar height, distance from the lateral joint line to the fibular head

and the thickness of the osteotomy during the preparation of the tibial condyle. Similar results are reported by studies such as those by Amendola et al¹² and by Toksvig-Larsen et al¹³, performed with paired samples.

The results of this study are in line with those of other papers on this topic in that they show that the patella in the group of patients with a prior osteotomy in at a lower level than in patients subjected to a primary TKA¹⁴. We also found differences regarding the thickness of the tibial cut and the distance from the lateral joint line to the fibular head. Although higher instability rates and limitations in ROM have been reported in cases of TKA further to osteotomy¹⁵, in our paper we found no differences in the patients' post-op evolution that bear out this theory.

Therefore, in our experience carrying out a TKA in a patient with a prior proximal tibial osteotomy causes certain intraoperative difficulties derived from the retraction of the extensor mechanism and the alterations in the tibial plateau morphology, although these increased technical demands do not result in a higher rate of poor results in the medium term.

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