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ORIGINAL ARTICLE

Does the medial–lateral stability of total knee replacements have an effect on short-term clinical outcomes? One-year results of a multicentre study with computer assisted surgery☆

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KEYWORDS
Total knee replacement;
Navigation;
Computer assisted surgery;
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Clinical results

Abstract
Objective: To evaluate the influence of the medial–lateral stability of the joint on the short-term clinical outcomes after performing navigation in total knee replacement.
Material and methods: A multicentre prospective study was conducted on 111 consecutive total knee replacements performed with computer assisted surgery. The study included the evaluation of KSS, WOMAC, and SF-12 preoperatively, and at 3 and 12 months of follow-up, and correlation with stability data obtained during surgery, in extension and at 20° and 90° of flexion.
Results: No differences were found in WOMAC, KSS and SF-12 relative to coronal stability during surgery.
Conclusions: Variations in coronal stability were shown to have no influence on the short-term clinical results of navigated total knee replacement.
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PALABRAS CLAVE
Artroplastia total de rodilla;
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Estabilidad;
Resultados clínicos

¿Influye la estabilidad mediolateral de las artroplastias totales de rodilla en la evolución clínica a corto plazo? Estudio multicéntrico a un año con cirugía asistida por ordenador

Resumen
Objetivo: Evaluar la influencia de la estabilidad mediolateral de las artroplastias totales de rodilla implantadas con navegación quirúrgica en sus resultados clínicos a corto plazo.
Material y métodos: Estudio prospectivo multicéntrico de 111 pacientes intervenidos con artroplastia total de rodilla mediante cirugía asistida por ordenador. Los resultados clínicos y funcionales se evaluaron a los 3 y seis meses mediante las escalas KSS, WOMAC y SF-12 y se correlacionaron con la información que mostraba el sistema de navegación intraoperatoriamente en cuanto a la estabilidad mediolateral en extensión, a los 20° y a los 90° de flexión.
Resultados: No se encontró relación entre los resultados clínicos y funcionales y la estabilidad mediolateral medida intraoperatoriamente.
Conclusiones: Las variaciones en la estabilidad mediolateral de las artroplastias de rodilla no han mostrado una influencia significativa en los resultados clínicos a corto plazo.
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Introduction

Achieving good clinical and functional long-term results in total knee arthroplasty (TKA) depends on several factors, among which we must mention a correct alignment of the implant[1] and adequate balance of soft tissues. In order to obtain a balanced prosthesis it is necessary to achieve optimal varus-valgus alignment and symmetric spaces in flexion and extension.

Computer-assisted surgery (CAS) in TKA has provided a precision instrument enabling more homogenous results for the alignment in the coronal plane than those obtained using conventional instrumentation.[2–4] Nevertheless, there is some controversy regarding its ability to provide a better alignment in the sagittal plane.[3,4] CAS also enables the use of sequential release techniques to obtain a correct ligament balance and equalize spaces in flexion and extension.[5] Although in theory this could result in a longer lifetime of the implant and better clinical outcomes, the relatively short evolution of CAS has not allowed this hypothesis to be confirmed.

The aim of this study was to determine the relationship between medial–lateral stability of TKA, quantified using navigation data, with clinical outcomes.

Materials and methods

We conducted a prospective multicenter study comprising 111 patients who underwent TKA. Inclusion criteria were patients with knee osteoarthritis candidates for TKA without surgical contraindications. All patients signed an informed consent form. The process which determined the surgery was primary osteoarthritis in 107 cases, secondary post-traumatic arthrosis in 3 cases and rheumatoid arthritis in 1 case. Gender distribution was 34 males (30.63%) and 77 females (69.37%), aged between 44 and 85 years (mean: 69.5 years) and a mean body mass index of 32.15. The operated knee was the left in 45 cases (40.54%) and the right in 66 cases (59.46%), with involvement. According to the Ahlbäck classification,[6] 46 cases of partial interline impingement, 59 cases of full impingement, 3 cases of sinking of the minor tibial plateau of 5 mm, and 3 cases of sinking between 5 and 10 mm were found. According to the alignment detected by navigation, 73.9% of the knees presented a varus deformity (angle of 180° between the mechanical axis of the femur and tibia major), 14.4% valgus deformity (angle less than 180°) and 10.6% had a normal axis, considering this as an angle of 180°.

All patients underwent a total knee arthroplasty with Apex® (OMNI Lifescience, East Taunton, Massachusetts, USA), in 30 cases through a standard medial parapatellar approach with patellar eversion and in the rest through a minimally invasive, midvastus approach. In 66 cases (59.5%) we used a femoral implant with preservation of uncemented posterior cruciate ligament (CR) and in 45 (40.5%) we used a cemented posterior stabilized component (PS). In 55 cases we used CR polyethylene inserts, in 45 we used PS polyethylene inserts and in 11 cases the insert used was of the ultracongruent type. Tibial trays were cemented in all patients. The Total Knee Surgetics® system version 7.9 (PRAXIM SA, La Tronche, France) was used to perform all the surgical procedures. This is a closed navigation system, without previous images, which uses a kinematic analysis of the hip, knee and ankle and anatomical mapping of the knee to build a working model. After placing the infrared sensors on the anterior cortex of the femur and tibia and resecting osteophytes, we performed a tibial section at 90° on the mechanical axis of the tibia in the coronal plane, with 5° of posterior slope in the sagittal plane, and applying the technique of dependent cuts by sequential releases with a distractor, the femoral cuts were calculated to obtain symmetric spaces in extension and flexion of 90° with equal soft tissue tension. Once the final components were in place and the joint was closed by suture, we recorded the postoperative kinematics of the limb and quantified the flexion-extension arc and medial–lateral stability by evaluating changes in the femorotibial angle after applying varus-valgus stress maneuvers to induce joint gaping with reduction of the extensor apparatus (Fig. 1). The limit value

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