Bilateral Simultaneous Unicompartmental Knee Arthroplasty. Medium-term Outcomes in 86 Arthroplasties with an Average Follow-up of 6.2 Years

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ABSTRACT

Objective: The purpose of this article is to examine the functional outcomes, complications, and medium-term survivorship of medial or lateral bilateral simultaneous unicompartmental knee arthroplasty (bUKA) for the treatment of bilateral knee osteoarthritis. **Materials and Methods:** Retrospective report of patients who underwent a medial or lateral bUKA for treatment of bilateral knee osteoarthritis between April 2004 and April 2020, with a minimum follow-up of 1 year. The KSS 2011 was used for the clinical-functional evaluation of each patient. The duration of surgery, length of hospital stay, and transfusion requirements were determined. The short-term and medium-term complications were analyzed, as well as the revision rate and the prosthesis survivorship. **Results:** We evaluated 86 bUKAs in 43 patients with a mean follow-up of 6.1 years. The clinical and functional KSS improved from 46.1 ± 10.2 to 80.9 ± 15.9 and 22.8 ± 11.9 to 89.8 ± 18.9 respectively. Postoperative maximal flexion improved from 106.3º ± 5.2º to 125.1º ± 4.2º and flexion contracture improved from 7.5º ± 2.2º to 2.3º ± 1.6º. The mean surgical time was 178.6 minutes and the hospital stay was 39.8 hours. Two patients required transfusions. The complication rate was 6.9%. Three knees required revision surgery for aseptic loosening after 12, 8.5 and 7 years. The survivorship rate was 96.5%. **Conclusion:** Simultaneous medial or lateral bUKA provides excellent clinical-functional outcomes with a low rate of complications in patients with bilateral knee osteoarthritis.

Keywords: unicompartmental knee arthroplasty; bilateral UKA (bUKA); bilateral knee osteoarthritis; bilateral knee arthroplasty; simultaneous unicompartmental arthroplasty.
Level of Evidence: IV

Reemplazo unicompartimental bilateral de rodilla en un tiempo quirúrgico. Resultados a mediano plazo de 86 prótesis con un seguimiento promedio de 6.2 años

RESUMEN

Objetivo: Evaluar los resultados funcionales, las complicaciones y la supervivencia a mediano plazo de la prótesis unicompartimental bilateral medial o lateral de rodilla en un tiempo quirúrgico. **Materiales y Métodos:** Estudio retrospectivo de pacientes con prótesis unicompartimental bilateral medial o lateral de rodilla colocada en un tiempo quirúrgico por gonartrosis entre abril de 2004 y abril de 2020, seguimiento mínimo 1 año. Se evaluaron los resultados clínico-funcionales con el KSS 2011. Se determinaron los tiempos quirúrgico total y de internación, y el requerimiento de transfusiones. Se analizaron las complicaciones a corto y mediano plazo, y las tasas de revisión y de supervivencia de la prótesis. **Resultados:** Se evaluaron 86 prótesis unicompartimentales en 43 pacientes (seguimiento promedio 6.1 años). El KSS clínico y funcional aumentó de 46,1 ± 10,2 a 80,9 ± 15,9 y de 22,8 ± 11,9 a 89,8 ± 18,9, respectivamente. La flexión máxima mejoró de 106,3° ± 5,2° a 125,1° ± 4,2° y la contractura en flexión, de 7,5° ± 2,2° a 2,3° ± 1,6°. La cirugía duró 178.6 min y la internación, 39.8 h. Dos pacientes requirieron transfusión**.** La tasa de complicaciones fue del 6,9%, todas menores. Tres rodillas tuvieron un aflojamiento mecánico aséptico y requirieron revisión a prótesis total de rodilla o nueva prótesis unicompartimental tras 12, 8.6 y 7 años. La supervivencia de la prótesis fue del 96,5%. **Conclusión:** La prótesis unicompartimental bilateral medial o lateral en un tiempo quirúrgico para la gonartrosis unicompartimental de rodilla proporciona excelentes resultados clínico-funcionales, con bajas tasas de complicaciones.

Palabras clave: Prótesis unicompartimental; gonartrosis bilateral; reemplazo unicompartimental bilateral; prótesis unicompartimental bilateral simultánea.
Nivel de Evidencia: IV

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INTRODUCTION

Knee osteoarthritis predominantly affects one of the two tibiofemoral compartments in more than a third of patients (35%).[1] In these cases, unicompartmental knee arthroplasty (UKA) relieves symptoms and improves functional values, with outcomes comparable to or better than those of total knee arthroplasty (TKA).[2,3] Recent research suggests that UKA is indicated in approximately 50% of knee arthroplasties.[4] UKA surgery is less invasive than TKA and has several advantages, including less bleeding, a shorter surgical time and hospital stay, faster rehabilitation times, better functional outcomes, and lower infection rates.[2,3,5,6] UKA has a 10-year survival rate of 97%, a 20-year survival rate of 85.9%, and a 25-year survival rate of 80%.[2,7]

Knee osteoarthritis is bilateral in 66-85% of patients, and a quarter of them have symptoms.[1,8,9] After knee arthroplasty, 36-70% will require replacement surgery on the contralateral knee over the next 10 years.[9] The most common pattern of presentation of bilateral knee osteoarthritis is that which involves the internal compartment of both knees.[1] In these cases, medial or lateral bilateral UKA represents an attractive therapeutic alternative. Patients who require bilateral knee arthroplasty have the operation performed in the same surgical procedure and anesthesia time, or it can be done in two separate procedures separated by a time interval.

In well-chosen patients, the potential benefits of single-stage medial or lateral bilateral UKA include shorter hospitalization, surgical, and recovery times, lower costs, and comparable clinical and functional outcomes to two-stage UKA.[10,11] Despite this, there is concern that single-stage bilateral UKA is associated with higher rates of complications, revisions, morbidity, and mortality than the two-stage procedure.[12]

The purpose of this research was to assess the clinical and imaging outcomes, complications, and medium-term survival of the prosthesis of medial or lateral unicompartmental knee replacements performed bilaterally during the same surgical procedure. The secondary objective was to determine the surgical and hospitalization times, the need for transfusion, and the revision rate. Our hypothesis was that bilateral UKA performed in a single stage is associated with low complication rates and functional outcomes and survival rates comparable to those reported in the international literature.

MATERIALS AND METHODS

Retrospective observational study to evaluate the functional outcomes, complications and medium-term survival of simultaneous bilateral medial or lateral UKA in patients with bilateral unicompartmental knee osteoarthritis. Cases operated on consecutively by the same surgeon and with the same technique between April 2004 and April 2020, with a minimum follow-up of one year, were analyzed.

The inclusion criteria were: patients with bilateral medial or lateral unicompartmental knee osteoarthritis treated with simultaneous bilateral UKA, age >18 years and follow-up >12 months. The exclusion criteria were: patients with bilateral unicompartmental knee osteoarthritis treated with sequential UKA in two stages, patients with knee osteoarthritis treated with TKA, loss to follow-up.

Clinical evaluation

Preoperative data was gathered retrospectively from the medical records of patients who met the inclusion criteria. Clinical assessment was made before surgery and at the last control using the *Knee Society Score* 2011 (KSS). Joint stability was verified using the varus-valgus stress test, the Lachman test, the pivot-shift test, and the anteroposterior drawer test, and joint range of motion was determined with a goniometer. During surgery, patellofemoral chondropathy, according to the modified Outerbridge classification, and the integrity of the anterior and posterior cruciate ligaments were evaluated.

Surgical time (from the start of anesthesia to the end of surgery), hospital stay, and the need for transfusions were determined. A red blood cell transfusion was indicated if the patient had a hemoglobin value <7 mg/dL or symptomatic anemia (paleness, palpitations, or tachypnea). During the postoperative controls, the presence of both acute (before three months) and late complications was determined. Revision was defined as any new surgical intervention in the operated knee that included the removal or replacement of any of the prosthesis components, as well as reoperation with these preserved.

Radiographic evaluation

Before surgery, anteroposterior and lateral radiographs of both knees were taken, with bipodal standing, axial of the patella at 30º flexion (Merchant), anteroposterior in 45º semiflexion (Schuss), and varus and forced valgus radiographs to assess collateral ligament sufficiency, misalignment correction, and contralateral compartment impingement. In the postoperative period, anteroposterior, lateral, and axial radiographs of the patella were taken (Figure 1).

The pre- and postoperative tibiofemoral axis was measured with a goniometer. The degree of osteoarthritis in the affected compartment was quantified according to the Ahlback classification for genu varus, and the Kellgren-Lawrence classification for genu valgus. The evaluations were carried out by one of the authors who was not involved in the surgery.

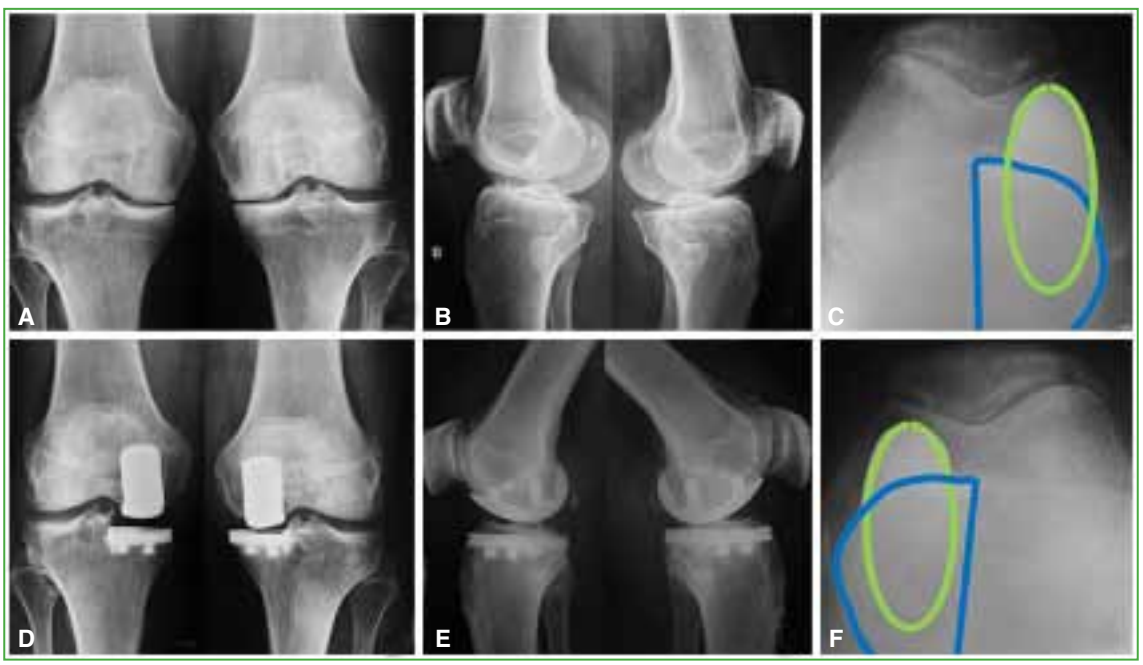

Figure 1. Patient with bilateral internal unicompartmental prosthesis and 6.3 years of follow-up.
A and B. Anteroposterior and lateral preoperative radiographs of both knees. Bilateral osteoarthritic genu varus is observed. **C-F.** Postoperative anteroposterior and lateral radiographs of both knees, and axial radiograph of the patella. The correct alignment of the components can be visualized in all projections.

Indications

Bilateral UKA was proposed if the patient had symptomatic bilateral tibiofemoral unicompartmental knee osteoarthritis, either internal or external; correctable deformity on varus or valgus stress radiographs; preservation of joint space in the contralateral tibiofemoral compartment; valgus or varus deviation of up to 20º, preoperative flexion ≥90º, preoperative extension deficit ≤15º, clinical ligament sufficiency in the coronal and sagittal planes, and body mass index ≤40. The extended indications were: symptomatic or asymptomatic patellofemoral osteoarthritic changes, osteophytes or incipient tibiofemoral osteoarthritis without clinical repercussions in the contralateral compartment, degenerative lesion of the anterior cruciate ligament without clinical instability secondary to osteoarthritic progression, were not considered contraindications, as well as age at the time of surgery.

Contraindications were: knee osteoarthritis with bicompartmental tibiofemoral involvement, impingement of the contralateral compartment on knee radiographs with varus or valgus stress, fixed or severe imbalance >20º, preoperative flexion <90º, preoperative flexion >15º, anteroposterior or mediolateral clinical instability, body mass index >40 and active systemic arthropathies (such as rheumatoid arthritis).

The selection of patients for the simultaneous bilateral procedure was based on:

- an ASA (*American Society of Anesthesiology*) score ≤3 (1 = healthy patient, 2 = moderate systemic disease, 3 = severe systemic disease, 4 = severe systemic disease that constantly threatens life, 5 = person dying person not expected to survive without operation, 6 = person with brain death).

- the level of activity of the patient. People with an active, non-sedentary lifestyle.

- The proactive psychological disposition and conviction of the benefits of performing the procedure simultaneously, which is assessed during questioning and the doctor-patient relationship.

Surgical protocol

All surgeries were carried out by the same surgeon and surgical team, according to the same protocol. Each surgery was performed at the same surgical stage, with the drapes of each one placed independently. The surgeries were carried out in medium-complexity operating rooms, without laminar flow and under spinal anesthesia. The irrigation system or pulsatile lavage gun was systematically used as an intra-surgical antiseptic protocol. Because of the administration of tranexamic acid, no hemostatic tourniquets have been placed in the last seven years.

From patient installation to the rigorous surgical technique, the surgical protocol was always similar or standardized. For genu varus, a midline skin incision was made, followed by an internal parapatellar arthrotomy or mid-vastus approach, and for genu valgus, a lateral transretinacular approach. After the tibial resection in knee flexion, the femoral resection was performed with the knee in extension, ensuring strict parallelism between the tibial and femoral cuts. The polyethylene with a thickness that ensured a safety laxity of 2 mm at 20° flexion was chosen (Figure 2). In all cases, a fixed-bearing UKA was used. Image intensifier was not used.

On the patellofemoral joint, the following surgical procedures were performed on demand: resection of osteophytes, cartilage shaving, microfractures, and lateral patellar facetectomy. Finally, the lateral retinaculum was partially or completely released to reduce lateral patellofemoral hypertension and achieve proper patellar tracking.

A tight capsular and superficial tissue closure was performed in the cases of medial UKA and a partial subsynovial closure for lateral UKA, which facilitates active mobilization of the knee with no limits other than pain in the immediate postoperative period. An aspirator was placed in all patients, which was removed 12 and 24 hours after surgery, before discharge. Dabigatran 150 mg per day was administered for 30 days as antithrombotic prophylaxis.

Rehabilitation protocol

Patients were trained and instructed to perform and achieve effective isometric quadriceps contractions prior to surgery in order to facilitate a quick recovery. The early rehabilitation protocol included quadriceps, hamstrings, gastrocnemius, and soleus strengthening exercises, and ambulation with full weight-bearing allowed from the first day after surgery. Physical therapy began after 3-4 weeks and return to normal activities occurred at 6-8 weeks.

Statistical Analysis

An observational cross-sectional study was carried out. The results are expressed in frequency tables or graphs depending on the nature of the variables. For quantitative variables, measures of central tendency (mean and median) and measures of dispersion (standard deviation and interquartile range) were calculated. The 95% confidence intervals were calculated for the estimates of the means of the variables of interest.

For statistical inference, the nonparametric Wilcoxon signed-rank test was used to compare the pre- and postoperative KSS distributions and also the pre- and postoperative distributions of the variables of interest. The means of two independent populations were compared using the Mann-Whitney-Wilcoxon non-parametric statistical test. To study whether the correlation between two quantitative variables was statistically significant, Spearman's correlation test was used. All hypothesis tests are performed considering a significance level of 5%.

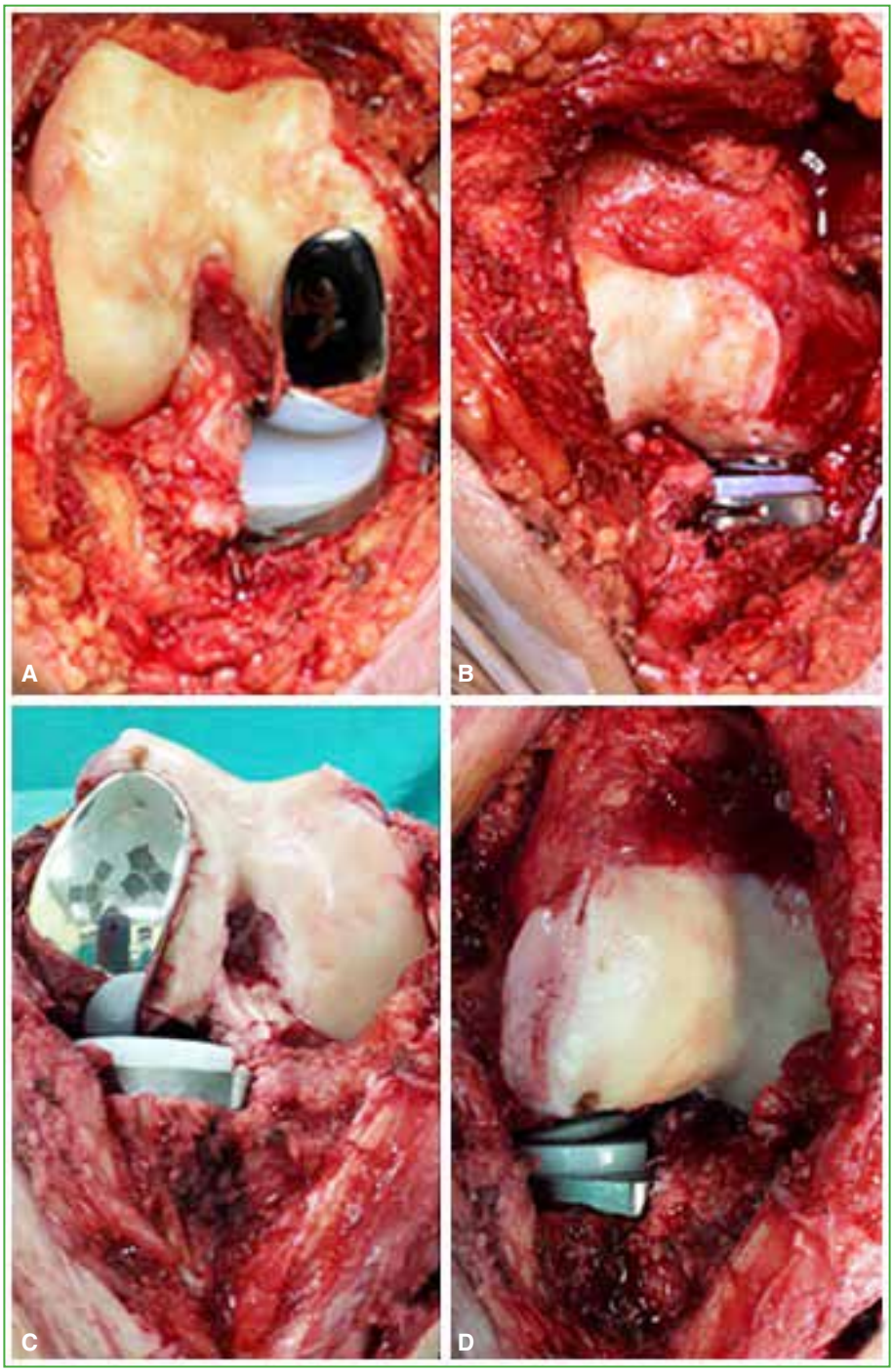

Figure 2. A and B. Intraoperative images of the medial unicompartmental prosthesis with the knee in flexion and extension. The alignment of the tibial and femoral component in flexion and extension can be observed. **C and D.** Intraoperative images of the lateral unicompartmental prosthesis with the knee in flexion and extension. The divergent orientation of the femoral and tibial components is observed with the knee in flexion, due to the femorotibial screwing mechanism (**C**) and the correct alignment in extension (**D**).

RESULTS

284 UKAs were performed between April 2004 and April 2020. Six patients were excluded: four due to loss of follow-up and two due to follow-up <1 year. The sample was made up of 86 UKAs in 43 patients who met the inclusion criteria. 72.1% (n = 31) were women (mean age 66.3 years [range 50-83]), body mass index was 29.3 (range 18.6-39.6), and mean follow-up was 6.1 years (range 1.1-17). In 40 patients (93%), a bilateral medial UKA was performed, two (4.7%) had a bilateral lateral UKA, and one (2.3%) had a medial UKA in one knee and a lateral UKA in the other. Thus, 81 UKA were medial (94.2%) and five UKA were lateral (5.8%). 23.3% of the patients had undergone a previous arthroscopy (n = 10), four of them in both knees (Table 1).

Table 1. Demographic characteristics of the sample

Total patients **Total number of bilateral unicompartmental prostheses**	**43** **86**
Age (years)	66.3 (range 50-83)
Body mass index	29.3 (range 18.6-39.6)
Follow-up (years)	6.1 (range 1.1-17)
Sex Female Male	 31 (72.1%) 12 (27.9%)
Unicompartmental prosthesis Bilateral medial Bilateral lateral Medial and Lateral	 40 (93%) 2 (4.7%) 1 (2.3%)

The implants used were: 76 ZUK (Zimmer®, Warsaw, IN, USA), six Allegretto (Sulzer, Winterthur, Switzerland) and four MG (Zimmer®, Warsaw, IN, USA) prostheses.

A statistically significant increase was observed in the KSS values with respect to the preoperative scores. The clinical KSS increased from 46.1 ± 10.2 to 80.9 ± 15.9 in the postoperative period, and the functional KSS, from 22.8 ± 11.9 to 89.8 ± 18.9 ($p < 0.05$). The KSS of satisfaction improved from 9.1 ± 3.2 to 38.2 ± 7.4, and that of expectations from 10.7 ± 2.3 to 14.5 ± 2.8 ($p < 0.05$). An increase in the range of motion was observed, which went from a maximum preoperative flexion of 106.3° ± 5.2° to 125.1° ± 4.2° postoperatively, while the flexion contracture was 7. 5° ± 2.2° to 2.3° ± 1.6°, respectively ($p < 0.05$) (Figure 3).

The radiographs revealed genu varus osteoarthritis in 81 knees, 9.9% (n = 8) corresponded to grade 3 of the Ahlback classification; 43.2% (n = 35) to grade 4 and 46.9% (n = 38) to grade 5. Of the latter, 22 (57.9%) had subluxation in the coronal plane reducible on radiographs with forced valgus. In all cases of genu valgus osteoarthritis, grade 4 degeneration was found according to the Kellgren-Lawrence classification. The preoperative tibiofemoral axis was 9° ± 2.3° of varus for genu varus osteoarthritis (range 4-15) and 14.6° ± 4.2° of valgus for genu valgus osteoarthritis (range 10-20). The postoperative tibiofemoral axis was corrected to 3.6° ± 1.4° varus (range 1-9) and 7.4° ± 2.8° valgus (range 4-10), respectively ($p < 0.05$) (Table 2 and Figure 4).

The total surgical time was 178.6 min (range 150-195). During surgery, it was discovered that 18.6% of the knees (n = 16) had grade 2 patellofemoral chondropathy, 53.5% (n = 46) had grade 3, and 27.9% (n = 24) had grade 4. Three of the latter required lateral patellar facetectomy, all with lateral UKA. The mean hospitalization time was 39.8 h (range 27-48). Two patients (4.7%) required a transfusion of red blood cells, both had undergone surgery 17 years before when tranexamic acid was not administered.

There was no statistically significant relationship between age, BMI, degree of patellofemoral chondropathy, and degree of preoperative misalignment and postoperative KSS values ($p>0.05$). There was no difference in surgical time between patients who received a tourniquet and those who did not, with 44 receiving a tourniquet and a surgical time of 177.3 ± 17.5 compared to 42 without a tourniquet and a surgical time of 180 ± 15 ($p = 0.25$).

Figure 3. A 60-year-old patient treated for right genu valgus and left genu varus osteoarthritis with a bilateral unicompartmental prosthesis. **A and B.** Anteroposterior and lateral radiographs of both knees in the postoperative period. The correct alignment of the prosthetic components is observed. **C.** Recovery of the primitive axis and full range of motion after 7.6 years of follow-up.

Table 2. Comparative pre- and postoperative outcomes.

	Preoperative	Postoperative	P
Clinical KSS	46.1 ± 10.2	80.9 ± 15.9	<0.005
Functional KSS	22.8 ± 11.9	89.8 ± 18.9	<0.005
KSS satisfaction	9.1 ± 3.2	38.2 ± 7.4	<0.005
KSS expectations	10.7 ± 2.3	14.5 ± 2.8	<0.005
Maximum flexion	106.3° ± 5.2°	125.1° ± 4.2°	<0.005
Flexion contracture	7.5° ± 2.2°	2.3° ± 1.6°	<0.005
Tibiofemoral axis Varus Valgus	 9° ± 2.3° 14.6° ± 4.2°	 3.6° ± 1.4° 7.4° ± 2.8°	 <0.005 <0.005

KSS = *Knee Society Score*.

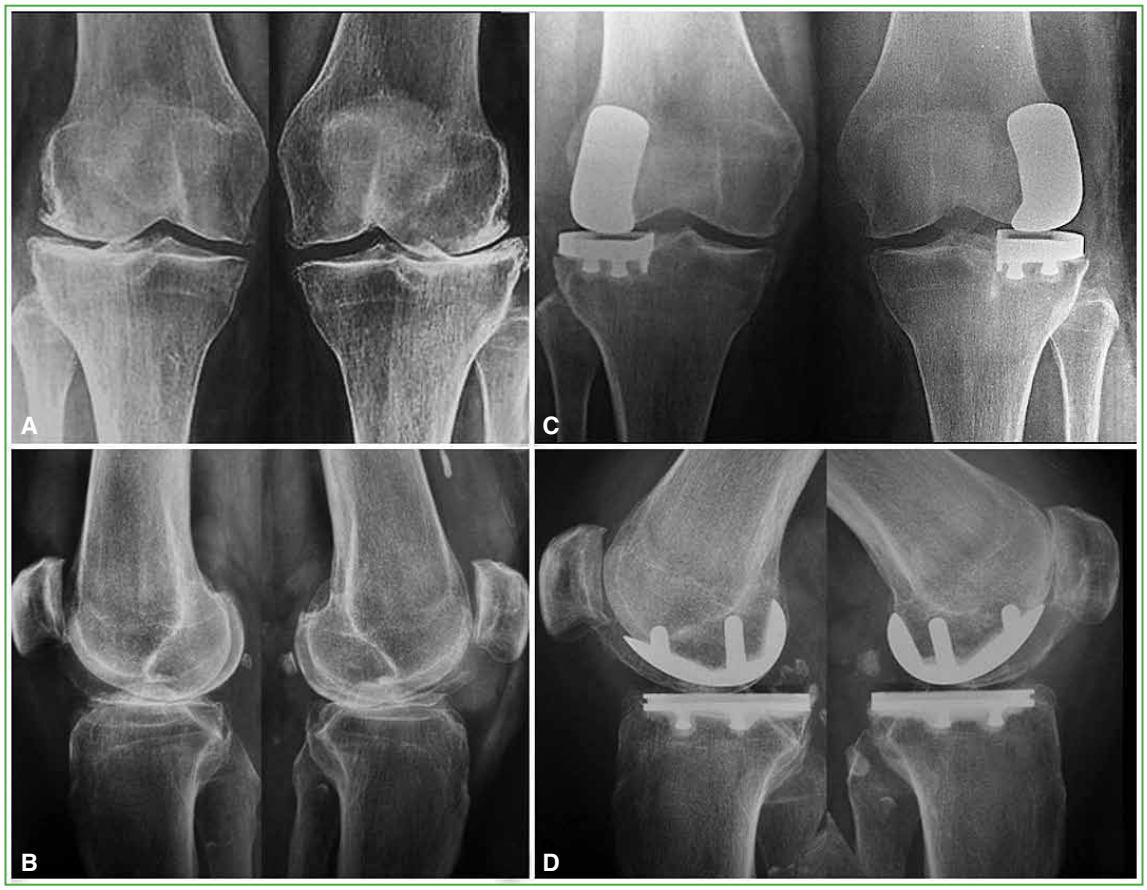

Figure 4. Preoperative (**A and B**) and postoperative (**C and D**) anteroposterior and lateral radiographs of both knees. Patient with bilateral lateral unicompartmental prosthesis and 7.2 years of follow-up.

The complication rate was 6.9% (n = 6), all of which were minor: one mobilization under bilateral anesthesia in the same patient six weeks after the initial surgery, with complete recovery of the range of motion; 2 wound dermatitis, 1 dehiscence and 1 superficial necrosis, all with good evolution by outpatient treatment. Three knees in three patients (3.5%) evolved to aseptic mechanical loosening, one of them traumatic, for which we proceeded to revision and conversion to TKA in two cases, and revision of the unicompartmental tibial component to a new *all poly* tibial plateau UKA in the remainder, after 12, 8.6 and 7 years, respectively. The survival of the prosthesis was 96.5% at 6.1 years (1.1-17) (Figures 5 and 6).

DISCUSSION

Bilateral medial or lateral UKA at the same surgical stage is recommended for appropriately selected patients. The findings of this retrospective study indicate that a simultaneous bilateral medial or lateral UKA as a treatment for bilateral unicompartmental knee osteoarthritis is a safe procedure with low complication rates and long-term favorable outcomes.

There is a wealth of literature highlighting the advantages of simultaneous bilateral UKA over two-stage UKA.[10,11,13-17] Marullo et al. observed a statistically significant improvement in gait pattern after simultaneous bilateral UKA, in contrast to cases with bilateral knee osteoarthritis treated with unilateral UKA, where the gait pattern did not change from the preoperative period.[18] In this series, there was a statistically significant increase in clinical and functional parameters in the postoperative period, determined by the KSS and range of motion. Similarly, studies comparing bilateral UKA in one and two stages found that patients operated on in a single surgical stage had similar, if not superior, clinical and functional outcomes, with shorter recovery times.[10,14-17]

Figure 5. Revision of unicompartmental prosthesis to total knee prosthesis with posterior stabilized primary prosthesis and tibial stem after 12 years, due to mechanical prosthetic loosening of the tibial component. **A.** Anteroposterior and lateral radiographs of the right knee in the preoperative period. Polyethylene wear and loosening of the tibial component. **B.** Anteroposterior and lateral radiographs of the right knee in the postoperative period. Revision with primary total knee arthroplasty associated with a tibial stem.

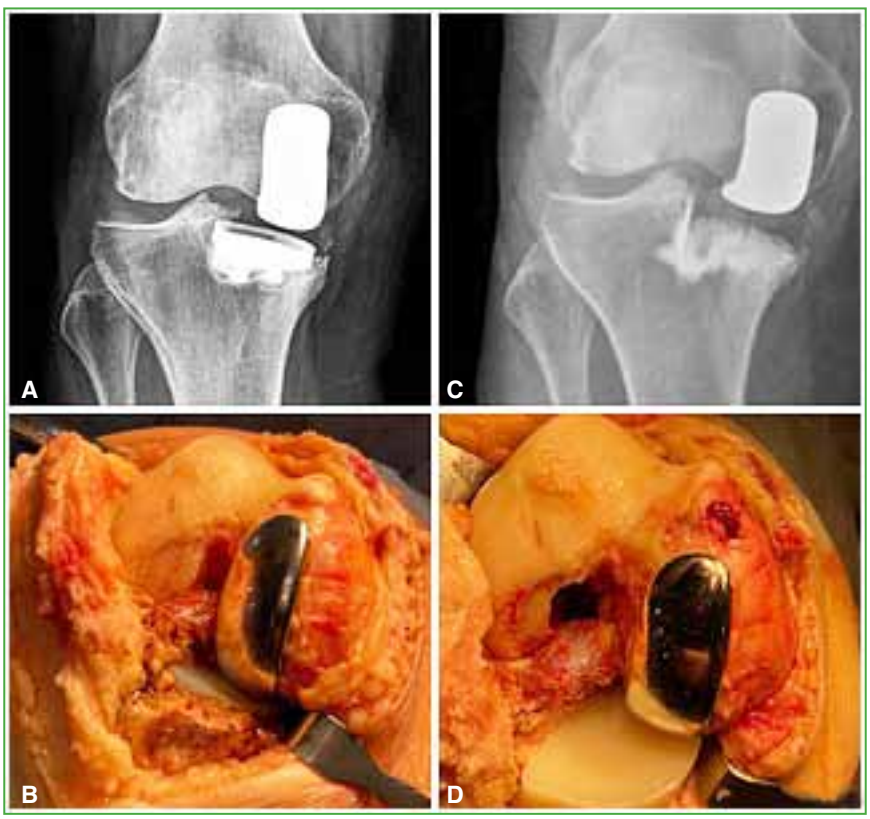

Figure 6. Revision of the UKA tibial component to a new UKA tibial plateau due to mechanical prosthetic loosening of the tibial component after 7 years. **A.** Anteroposterior radiograph of the right knee. Loosening and subsidence of the tibial component. **B.** Intraoperative image. The loosening of the metallic tibial plateau and the indemnity of the remaining joint structures were confirmed. **C.** Anteroposterior right knee radiograph after revision to an internal unicompartmental prosthesis with an *all-poly* tibial component. **D.** Intraoperative image of the revision of the unicompartmental tibial component.

Undercorrection of the axis is the gold standard to avoid deterioration of the contralateral compartment due to overload during the static and dynamic phase of gait, with the aim of restoring the primitive axis of the limb.[2,19] In our series, the postoperative tibiofemoral axis was 3.6° ± 1.4° varus (range 1-9) and 7.4° ± 2.8° valgus (range 4-10), respectively. This prevents the progression of osteoarthritic deterioration in the contralateral compartment, which is uncommon but one of the leading causes of prosthesis revision.[2,19]

Patients who undergo bilateral UKA in the same surgery benefit from significantly shorter anesthesia and hospitalization times than those who undergo two operations.[10,11,13-17] An average anesthesia time of 178 min was recorded, slightly higher than that published for bilateral procedures in one surgery (between 61.3 and 147 min).[8,10-12,14,15,17,20] However, it should be noted that most of the patients in the series had advanced degrees of osteoarthritis (90.1% of genu varus corresponded to the Ahlback classification 4 or 5, 100% of genu valgus, to the Kellgren-Lawrence classification 4 and 81.4%, to the Outerbridge classification 3 or 4) justifying the longer duration of the intervention. Surgery for bilateral UKA has the advantage that two different surgical teams can perform both procedures simultaneously, as reported by Siedlecki et al.[15] In all cases, the hospitalization time was <48 hours, which is lower than most published reports and even comparable to the Sekka and Berend outpatient procedures, in which patients were discharged with bilateral UKA implanted at a single stage 1.1 and 1.7 days after the operation, respectively.[3,8,10-12,14,15,20,21]

One of the limitations when indicating single-stage bilateral UKA is the possible increase in the volume of bleeding and the need for transfusions. Many publications report bleeding rates after bilateral UKA that are comparable to those of two-stage procedures without the need for transfusions.[10,11,14,17,20-22] On the other hand, in the study by Rogmagnoli et al., the transfusion rate was 11% in patients with bilateral procedures and 4% in those with unilateral UKA.[8] However, they did not use a tourniquet or tranexamic acid.[8] Biazzo et al.[13] published similar results. In this series, only two patients required red blood cell transfusion (4.7%), all of whom had undergone surgery before the use of tranexamic acid.

Despite concerns about an increase in complications following bilateral UKA at the same surgical stage, a complication rate of 6.9% was observed in this series, all minor and with good evolution, values similar to those published in the international literature.[3,8,10,11,13-15,17,20-23] Likewise, according to multiple publications, the incidence of postoperative complications is similar between procedures in one and two surgical stages.[10,11,13-17] The only study that reported higher complication rates for the bilateral UKA group at one stage was that of Chan et al., with a major complication rate of 4.1% (n = 13 in 318 bilateral UKA), of which 76.9% (n = 10) were thromboembolic events and one death due to pulmonary thromboembolism.[12] However, it is important to highlight that the procedures were carried out by 10 different surgeons and that postoperative thromboembolic prophylaxis was not administered, so these complications could be prevented and do not represent an increase in the real risk of the procedure (Table 3).[12]

Two patients required revision to TKA and one required revision of the UKA tibial component for a new *all-poly* tibial plateau UKA due to aseptic loosening, after 12, 8.6, and 7 years, respectively. According to the literature and our experience, most conversions to TKA can be performed relatively easily, with only one-third of cases requiring the use of revision stems and implants.[24] If the remaining joint structures are intact, there is evidence of good outcomes after revision to a new UKA.[19,25] Similarly, Romagnoli et al. published the largest cohort to date with 220 bilateral UKAs, reporting revision rates of 3.5% for single-stage bilateral UKA, with no difference from the unilateral UKA group.[8] Survival of the prosthesis was 96.5% after 6.1 years of follow-up.

The proper selection of patients is essential in this type of procedure. The ASA score is one of the most important parameters to consider; in most studies, it is a key selection criterion, usually with values ≤3.[11,13,15,17,21] In their study, Siedleki et al. reported 18% of patients >80 years of age with similar complication rates as younger patients.[15] On the other hand, Akhtar et al. performed the bilateral procedure considering only the ASA score (≤3), regardless of the body mass index, with complication rates of 3.9%, similar to those of the two-stage procedures.[21]

Despite the fact that it was not assessed in this study, it has been reported in the international literature that single-stage bilateral UKA is associated with lower hospital costs due to shorter hospitalization, surgery, and rehabilitation times, with functional outcomes and complications comparable to those of two-stage procedures.[11,14,15] Feng et al. noted that the hospital cost decreased by 12.1% in bilateral procedures in one stage.[14]

Table 3. Comparative results with the published international literature.

	Bilateral UKAs	KSS-OKS	Surgery time (min)	Hospitalization time (days)	Transfusion	Complications
Chan et al.[12] (2009)	318 Oxford	-	114	5	-	13 major (4.1%), 10 (3.1%) thromboembolic. No prophylaxis
Berend et al.[10] (2011)	70 Oxford	Functional KSS 88	109	1.7	0	4 minor (5.7%)
Chen et al.[11] (2013)	248	KSS clinical 88 and functional 80 OKS 17	130	5	1 (0.8%)	5 (2%), 3 thromboembolic
Akhtar et al.[21] (2014)	76 Oxford	modified OKS 34	83	3.5	0	1 major (1.3%) and 2 minor (2.6%)
Romagnoli et al.[8] (2014)	440	-	61.3	4	24 (10.9%)	9 major (2%)
Ma et al.[17] (2015)	72 Oxford	OKS 18.3	113.5	-	0	1 (1.4%) major, 2 minor (2.8%)
Ahn et al.[3] (2017)	104	Clinical KKS 89.2 and functional 84.2	-	8.4	9 (17.3%)	1 minor (0.9%)
Siedlecki et al.[15] (2018)	88	-	75.1	6.7	1 (2.3%)	4 major (4.5%) and 2 minor (2.3%)
Clavé et al.[22] (2018)	100 Oxford	Modified OKS 44.5 KSS 192.6	-	-	3 (6%)	5 (5%) 60% thromboembolic
Yildiz et al.[23] (2018)	88 Oxford	OKS 39.6	-	2	-	3 (3.4%)
Feng et al.[14] (2019)	78 Oxford	Clinical KSS 88.9 and functional 80.9	120.2	4.2	1 (2.6%)	4 minor (5.1%)
Biazzo et al.[13] (2019)	102	-	93.2		4 (7.8%)	1 major (1%) and 3 minor (2.9%)
Sakka et al.[20] (2020)	238 Oxford	-	147.1	1.1 (6.7% ambulatory)	0	2 readmissions (0.8%) at 90 days
Gaggiotti (2021)	86	Clinical KSS 80.9 and functional 89.8	178.6	1.6	2 (4.7%)	6 minor (6.9%)

KSS = *Knee Society Score*; OKS = Oxford Knee Score.

In their comparative study of paired patients, Ahn et al. discovered that single-stage bilateral UKA caused fewer postoperative complications, blood loss, transfusions, and had better functional outcomes at six months than unilateral TKA.[3] Sakka et al. carried out a comparative study between single-stage bilateral UKA and unilateral UKA, and found that the incidence of complications was similar between both procedures.[20] In this way, not only the results of single-stage bilateral UKA are comparable to those of sequential bilateral UKA, but they are also comparable with respect to those obtained after unilateral UKA.[8,20,22,23]

This study presents the limitations inherent to the non-comparative observational and retrospective methodology. Low complication rates may be due to patient selection bias when performing the procedure (ASA ≤3). However, we did not find similar national publications, so we believe that our analysis can contribute to the literature of our field. Among the strengths, it is important to note that the study population was homogeneous. In addition, all patients were operated on by the same surgical team, with the same type of implant, and an identical rehabilitation protocol was indicated. Studies with a larger sample, longer follow-up, and a control group are needed.

CONCLUSIONS

Simultaneous bilateral UKA in a single surgical stage as a treatment for medial or lateral unicompartmental knee osteoarthritis is a conservative procedure that is associated with excellent clinical-functional outcomes with low rates of transfusions, complications, and revisions. Proper evaluation and selection of the patient, a rigorous surgical technique, and trained personnel are essential to achieve reproducible results.

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