Alignment of the tibial component of the unicompartmental knee arthroplasty, assessed in the axial view by CT scan: does it influence the outcome?

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ABSTRACT

Background: The ideal position of the unicompartmental knee arthroplasty (UKA) in the axial plane remains undefined in the medical literature. The aim of this study was to observe how tibial components are placed in the axial plane and identify whether this could influence the postoperative clinical outcome.

Methods: A retrospective transversal study of 101 UKA was performed in 88 patients by a single surgeon. Postoperative CT scans were performed at a mean follow-up period of 71 months (36 to 150), and clinical and functional outcomes were assessed by the WOMAC and the KSS scores. Patients were divided several times in two groups depending on a different WOMAC or KSS value each time, and differences in axial angulation were analyzed in every comparison. Distribution of data and influence on outcomes were also analyzed.

Results: The tibial component was positioned with a mean angulation of 11.9° (−1 to 32) of external rotation (ER). A lower angle of ER was observed in all comparisons in the groups with better outcomes. Differences between groups were statistically significant when a good result was defined as a WOMAC score lower than 10.

Conclusions: Variability in axial positioning (33°) is higher than in other planes due to the free-hand technique. A trend towards better outcomes is observed when the tibial component is placed in a lower angle of ER. Rotational alignment in UKA should be investigated in subsequent studies with larger sample sizes.

Level of evidence: Level III, retrospective comparative study

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1. Introduction

Unicompartmental knee arthroplasty (UKA) is considered by many surgeons the procedure of choice for the treatment of unicompartmental osteoarthritis (OA). The kinematics of the knee after UKA is similar to that of the arthritic knee [1], as the integrity of the anterior cruciate ligament, and lateral and patellofemoral compartments are preserved. Over the years the indication for UKA has been controversial due to early unsuccessful experiences in the 1970s [2]. Subsequent studies have demonstrated lower long-term failure rates [3] and more satisfactory outcomes in comparison with total knee arthroplasty (TKA) [4]. On the other hand, survival rates have been demonstrated to be lower for UKA [5].

This controversy has led to decreased popularity for this device, which is indicated under very strict criteria. Therefore, most of the radiological studies of knee prosthesis are based on TKA, and there is limited literature evaluating the influence of the alignment in UKA. Most of these studies analyze the positioning of the tibial component in the sagittal [6–8] and coronal [9–12] views by simple radiographs. To our knowledge, there is only one study on the alignment of the tibial component in the axial plane, measured by CT scan [13]. Nevertheless, comparison with long-term clinical data was not carried out in this study.

The aim of our study was to observe how tibial components of UKA are positioned in the axial view and show the variability between patients. We also aimed to analyze if rotation of the tibial component is an important factor in the clinical outcome. The biomechanical consequences of such variation in positioning have not been studied yet, and could be the cause for ongoing pain or early failure of a UKA.

1.1. Patients and methods

Between April 1999 and December 2009, 210 consecutive medial UKA were performed on 186 patients and recorded on to a database. Surgery was carried out by a single senior surgeon (JFA), always using the same surgical technique. The indications used for UKA were a medial OA grade 2 or 3 for Ahlbäck classification [14]. Cartier’s angle < 6° for the tibia in the coronal view [3], femorotibial angle < 10° of varus or valgus, and mild limitation of range of motion.

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Twenty-six patients were excluded based on exclusion parameters, including patients with lateral or femoropatellar OA before the index surgery (12 cases), anterior cruciate ligament injury or plastia (3), other ligamentous instabilities, history of infection (1), revision TKA performed before the beginning of the study (9) and patients over the age of 80 (1). All patients had a follow-up longer than 3 years, unless revision arthroplasty was performed before. Patients included in the study were contacted by telephone and invited to return for a follow-up visit. Fifty-eight patients were not located or did not want to participate in the study. The result was 102 patients attending to the clinical visit. The study was explained to the patients, and a written consent was taken. Fourteen patients refused to perform CT scans, so the end result was 88 patients (101 knees). All 101 cases were included in this retrospective transversal study, as sample size could not be estimated due to the lack of references about the population variance of axial alignment in UKA. The first 11 cases received the Genesis unicompartmental knee replacement (Smith & Nephew, Inc, Memphis, TN) and the next 90, the Accuris Uni Knee System (Smith & Nephew, Inc, Memphis, TN). From the 109 knees that could not be included in the study, 20 received the Genesis and 89 the Accuris.

Intra-operatively, a mid-vastus approach was performed, the patella was laterally subluxated, osteophytes were removed and the intercondylar notch was enlarged in every case. The sagittal cut of the tibia was performed using a free-hand technique, in the most lateral rim of the medial plateau, with a slight external rotation with respect to the anteroposterior (AP) tibial axis. The transverse tibial cut was

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**Fig. 1.** Rotational angle of the tibial component in the axial view of a CT scan, measured by the Yoshioka protocol. a: tangent to the posterior rims of the tibial plateau; b: anteroposterior axis of the tibia; c: the most lateral edge of the tibial component; α: rotational angle of the tibial component.

**Fig. 2.** Distribution of cases according to the alignment in the axial plane (histogram and boxplot).
determined by an extramedullary guide and executed with 1 or 2° of varus in the coronal plane and 3° of posterior slope. Seventy-eight cases received an all-polyethylene tibial plateau, and the other 23 were metal-back, all of them with a concave surface. Alignment of the femoral component was determined by the position of the trial tibial component with the knee in extension. Condylar resurfacing was stopped at the level of subchondral bone. The tibial implant was cemented first and, once the cement had sealed the tibial component, the femoral implant was cemented with a second cement mix. An intraarticular drain and an epidural catheter were placed for 48 hours. Walking with sticks was initiated after two days. Patients were discharged after four days.

CT scans were performed on all patients by the same senior radiologist. The lower limb was placed in complete extension and with neutral rotation of the hip. Images were taken from the upper margin of the patella to the anterior tibial tuberosity, each cut was separated by one mm. Rotational angle of the tibial component was measured following the protocol described by Yoshioka [15]. A tangent to the posterior rims of the tibial plateau was delimited first, and the perpendicular to this line was the anatomical reference to determine the rotation. The angle between the perpendicular line and the most lateral edge of the tibial component was considered the rotational angle of the tibial component (Fig. 1). External rotation was considered as positive and internal rotation as negative. All images were measured by the same orthopedic surgeon (II).

All patients completed the WOMAC osteoarthritis index for their knees, including information about the previous two days. They were also examined to calculate the KSS score, and a visual analogue scale

![Fig. 3. a.) Significance of differences in mean axial angulation between groups, when the limit to divide groups is set on a different WOMAC score value in each comparison. b.) Mean angulation in the axial view in both groups, depending on the WOMAC score value where the limit between groups is set.](image)

![Fig. 4. a.) Significance of differences in mean axial angulation between groups, when the limit to divide groups is set on a different KSS score value in each comparison. b.) Mean angulation in the axial view in both groups depending on the KSS score value where the limit between groups is set.](image)
(VAS) was made for pain (range 0 to 10: 0 for no pain, 10 for severe pain). Multiple comparisons were performed and, in each comparison, patients were divided in two groups depending on the score obtained in WOMAC: group A (better outcome) and group B (worse outcome). A different value in WOMAC score was set as the limit between both groups in each comparison, starting with values higher or lower than five and increasing the score where the limit was set at five points for the consecutive comparison. Thus, we observed if there was any significant difference in any comparison. The same method was repeated for KSS and VAS. Rotational alignment was analyzed in patients requiring surgery after the index procedure. Every revision technique was also compared separately. Personal satisfaction rating was recorded in a range between 0 and 10.

1.2. Statistical analysis

Data are expressed as mean and range. Statistical analysis was performed using SPSS version 18. Distribution of data was assessed using the Kolmogorov–Smirnov test, showing that data were not consistent with a normal distribution. Therefore, differences in quantitative variables were tested with a non-parametric test, the Mann–Whitney test. Multiple linear regression was used for multivariate analysis to determine the relationship between the outcome variable (WOMAC, KSS and VAS) and any other variable that could influence the outcome in addition to axial angulation (coronal and sagittal alignments of the tibial component, material of the tibial component, body mass index, gender and follow-up). Statistical significance level was set at a p-value lower than 0.05. When multiple comparisons were carried out, the Bonferroni correction was performed, and 0.05 was divided by the number of comparisons made [16]. Thus, when patients were divided in two different groups depending on the WOMAC and KSS values, as five comparisons were made for each variable, p-value was established in 0.01.

2. Results

Fifty-three women and 35 men were included in the study. The operated knee was left in 49 cases and right in 52. Thirteen patients had bilateral replacements (six female, seven male), performed on different dates. The average age of the patients on the day of surgery was 63.6 (29 to 79). The patients’ average weight was 76.1 kg (50 to 112), height was 159.8 cm (142 to 180) and body mass index (BMI) 29.7 kg/m² (20 to 40). The follow-up period was 71 months (36 to 150) if patients receiving revision arthroplasty were excluded and 69 (14 to 150) if all patients were included. Flexion of the knee in the last follow-up was 121° (88 to 140), and there were six patients with a lack of extension of 10°. Patient satisfaction with the procedure was 7.6 (0 to 10) out of 10.

The tibial component was positioned with an average angle of 11.9° (−1° to 32°) of external rotation (ER). There was only one implant placed in internal rotation, with an angle of 1°. There was one outlier (32°), which was excluded from the statistical analysis to avoid bias (Fig. 2).

The average WOMAC score at the last follow-up was 31.1 (0 to 86). When the limit score to settle both groups was established at a WOMAC score of 10 or less, the mean rotational angle was 8.7° in group A (n = 21) and 12.5° in group B (n = 79), which was significantly different (p = 0.008). A trend to a lower ER was observed in group A (8.5° vs. 12.4° in group B) when the limit was established at a WOMAC score of 5 or less, nevertheless this difference was not significant after the Bonferroni correction (p = 0.048). When the limit between groups was set at a WOMAC score of 15 or more, the difference between both groups was not significant. Nevertheless, patients with a better outcome in WOMAC had a lower average ER in all the comparisons. Hence, even if the difference between groups was statistically significant in only one comparison, our data show a trend to a lower angle of ER in patients with a better outcome. All the data from the analysis of WOMAC is shown in Fig. 3 and Table 1.

The average KSS score at the last follow-up was 158 (48 to 200), where knee score was 79 (28 to 100) and function score was 79 (5 to 100). When patients were divided into two groups depending on total KSS score, here again, patients with a better outcome had their tibial component in a lower ER in every comparison. However, none of the differences reached significance. All the data from the analysis of KSS are shown in Fig. 4 and Table 2.

When patients were divided into two groups depending on a different value for Visual Analogue Scale (VAS) each time, no differences were found in rotational alignment (RA). A lower angle of external rotation was observed in obese patients (BMI > 30), with 10.1° (−1° to 20), whereas in non-obese patients RA was 13.0° (5 to 32), this difference was statistically significant (p = 0.04). A trend to a lower angle of external rotation was found in right knees (p = 0.12) and when follow-up was longer than 5 years (p = 0.14), however, these differences were not statistically significant. No differences in RA were observed when material of the tibial component, range of motion and patient satisfaction were analyzed. (Table 3)

Multiple linear regression was performed looking for multivariate influence in outcomes. On the one hand, the WOMAC score was observed to be influenced by axial angulation of the tibial component (p = 0.04) and gender (p = 0.005). A relation between the KSS and gender was also found (p = 0.04). On the other hand, coronal and sagittal alignments of the tibial component, the material it was made of, BMI and follow-up period were not related to any of the result scales. With the data available, any variable influencing VAS was found.

A new surgical procedure was required for 15 patients (Table 4). Their average RA was 12° (3 to 19), whereas in patients without the indication of a second surgery RA was 11.7° (−1° to 26), this difference was not statistically significant (p = 0.84). Depending on the surgical procedure performed, RA was 9.5° (3 to 17) in the 4 patients requiring revision arthroplasty, 10.2° (5 to 17) in the 5 patients where a pes anserine tendon tenotomy was performed, 16.2° (10 to 19) in the 5 patients reoperated on by arthroscopy and 16° in the only patient requiring a closed arthrolysis for stiffness. None of these values was significantly different to the average values of the rest of the patients.

Table 1

<table>
<thead>
<tr>
<th>Value of WOMAC where the limit is set</th>
<th>Group A, patients (n)</th>
<th>Axial angulation (°)</th>
<th>SD</th>
<th>Range</th>
<th>Group B, patients (n)</th>
<th>Axial angulation (°)</th>
<th>SD</th>
<th>Range</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>13</td>
<td>8.5</td>
<td>4.2</td>
<td>−1 to 17</td>
<td>87</td>
<td>12.4</td>
<td>5.8</td>
<td>1 to 26</td>
<td>0.048</td>
</tr>
<tr>
<td>10</td>
<td>21</td>
<td>8.7</td>
<td>4.3</td>
<td>−1 to 17</td>
<td>79</td>
<td>12.5</td>
<td>5.8</td>
<td>1 to 26</td>
<td>0.008</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>10.3</td>
<td>4.9</td>
<td>−1 to 19</td>
<td>70</td>
<td>12.3</td>
<td>6.0</td>
<td>1 to 26</td>
<td>0.14</td>
</tr>
<tr>
<td>20</td>
<td>38</td>
<td>10.7</td>
<td>5.3</td>
<td>−1 to 24</td>
<td>62</td>
<td>12.3</td>
<td>5.9</td>
<td>1 to 26</td>
<td>0.20</td>
</tr>
<tr>
<td>25</td>
<td>47</td>
<td>11.0</td>
<td>5.4</td>
<td>−1 to 24</td>
<td>53</td>
<td>12.3</td>
<td>5.9</td>
<td>1 to 26</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Fig. 5. Variability of the axial alignment in CT scan images, showing the cases where the tibial component is placed in the minimum (−1°), average (12°) and maximum (32°) ER.
Table 2
Distribution of patients and mean axial angulation of each group, depending on a different KSS score value to determine the limit between groups each time.

<table>
<thead>
<tr>
<th>Value of KSS where the limit is set</th>
<th>Group A, patients (n)</th>
<th>Axial angulation</th>
<th>SD</th>
<th>Range</th>
<th>Group B, patients (n)</th>
<th>Axial angulation</th>
<th>SD</th>
<th>Range</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>190</td>
<td>20</td>
<td>10.9</td>
<td>4.6</td>
<td>4 to 19</td>
<td>80</td>
<td>11.9</td>
<td>6.0</td>
<td>1 to 26</td>
<td>0.47</td>
</tr>
<tr>
<td>180</td>
<td>40</td>
<td>11.4</td>
<td>5.6</td>
<td>1 to 24</td>
<td>60</td>
<td>11.9</td>
<td>5.8</td>
<td>1 to 26</td>
<td>0.70</td>
</tr>
<tr>
<td>170</td>
<td>47</td>
<td>11.0</td>
<td>5.5</td>
<td>1 to 24</td>
<td>53</td>
<td>12.4</td>
<td>5.9</td>
<td>1 to 26</td>
<td>0.65</td>
</tr>
<tr>
<td>160</td>
<td>55</td>
<td>10.9</td>
<td>5.4</td>
<td>1 to 24</td>
<td>45</td>
<td>12.7</td>
<td>6.0</td>
<td>1 to 26</td>
<td>0.13</td>
</tr>
<tr>
<td>150</td>
<td>66</td>
<td>11.6</td>
<td>5.8</td>
<td>1 to 26</td>
<td>34</td>
<td>11.9</td>
<td>5.6</td>
<td>1 to 21</td>
<td>0.65</td>
</tr>
</tbody>
</table>

3. Discussion

Limited studies are available to guide orthopedic surgeons in the positioning of the UKA. Most of them have been focused on the alignment in sagittal and coronal views, almost certainly because they can be easily measured by simple X-rays. CT scans are needed to assess the angle between the prosthesis and the tibial AP axis, and due to economic reasons these kinds of studies are not common. Therefore, the ideal rotational position of the tibial component is still to be determined.

In a group of 101 patients with UKA, we have estimated an average of 11.9° of external rotation in the positioning of the tibial component. The variation identified in our data was much bigger than we expected. Between the most externally rotated (32° of ER) and the most internally rotated (1° of IR) tibial components, a difference of 33° was observed (Fig. 5). Alignment was also measured in the sagittal and coronal views, almost certainly because they can be easily measured by simple X-rays. CT scans are needed to assess the angle between the prosthesis and the tibial AP axis, and due to economic reasons these kinds of studies are not common. Therefore, the ideal rotational position of the tibial component is still to be determined.

Between the most externally rotated (32° of ER) and the most internally rotated (1° of IR) tibial components, a difference of 33° was observed. The angle with the AP axis was 11.9° (−1° to 26). The angle with the AP axis was 11.9° (−1° to 26). A trend to a lower angle of ER is observed in patients with better results in WOMAC and KSS scores. These differences reach statistical significance when the alignment is compared between patients with the best results in WOMAC score (under 10 points) and the rest. Thus, a positioning in neutral or slight external rotation could be advocated in order to achieve better clinical and functional outcomes.

During flexion the tibia rotates internally around 20°. The lateral compartment moves posteriorly more or less the double of distance than the medial compartment [1]. Tibial rotation during range of motion is similar in osteoarthritic knees and knees after UKA [1]. Therefore, we believe that neutral rotation could be the ideal position of the tibial component in extension and 20° would be more adequate in flexion. Theoretically, a rotation around 10° could be an appropriate value not to disturb knee kinematics neither in flexion nor extension. In our opinion, this could be the reason for the better outcomes in a lower ER position. Excessive ER would produce a rotational mismatch between femur and tibia in extension; however, this requires confirmation from further studies. In our group of patients, all arthroplasties except one were placed in ER. The angle with the AP axis was 11.9° (−1 to 32). To our knowledge, there is only one reference about rotational position in

Table 3
Differences in axial alignment for other patient characteristics. *Statistically significant.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Number of patients</th>
<th>Axial angulation</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side (left-handed surgeon)</td>
<td>Left</td>
<td>52</td>
<td>12.4 (−1 to 24)</td>
<td>0.12</td>
</tr>
<tr>
<td>Follow-up</td>
<td>&lt;5 years</td>
<td>54</td>
<td>12.5 (2 to 26)</td>
<td>0.14</td>
</tr>
<tr>
<td>Obesity *</td>
<td>BMI &gt; 30</td>
<td>41</td>
<td>10.1 (−1 to 26)</td>
<td>0.04</td>
</tr>
<tr>
<td>Material of tibial component</td>
<td>Metal-back</td>
<td>45</td>
<td>13.0 (5 to 32)</td>
<td>0.74</td>
</tr>
<tr>
<td>Range of motion</td>
<td>Flexion &gt; 120°</td>
<td>59</td>
<td>11.6 (−1 to 24)</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Flexion &lt; 120°</td>
<td>40</td>
<td>12.0 (2 to 26)</td>
<td>0.41</td>
</tr>
<tr>
<td>Patient satisfaction</td>
<td>&gt;7 out of 10</td>
<td>67</td>
<td>11.3 (−1 to 24)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;7 out of 10</td>
<td>29</td>
<td>12.3 (1 to 26)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4
Clinical characteristics of the 15 patients operated on for failure of primary UKA.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Axial angulation</th>
<th>Procedure</th>
<th>Follow-up at 2nd surgery (months)</th>
<th>Pain resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexplained knee pain</td>
<td>17°</td>
<td>TKA</td>
<td>18</td>
<td>No</td>
</tr>
<tr>
<td>Patella baja after complex regional pain syndrome</td>
<td>10°</td>
<td>Patellofemoral arthroplasty</td>
<td>18</td>
<td>Partial</td>
</tr>
<tr>
<td>Tibial component loosening</td>
<td>3°</td>
<td>TKA</td>
<td>14</td>
<td>Yes</td>
</tr>
<tr>
<td>Unexplained knee pain</td>
<td>8°</td>
<td>TKA</td>
<td>23</td>
<td>Yes</td>
</tr>
<tr>
<td>Pes anserine bursitis</td>
<td>8°</td>
<td>Pes anserine tenotomy</td>
<td>13</td>
<td>No</td>
</tr>
<tr>
<td>Pes anserine bursitis</td>
<td>5°</td>
<td>Pes anserine tenotomy</td>
<td>30</td>
<td>No</td>
</tr>
<tr>
<td>Pes anserine bursitis</td>
<td>5°</td>
<td>Pes anserine tenotomy</td>
<td>72</td>
<td>No</td>
</tr>
<tr>
<td>Pes anserine bursitis</td>
<td>17°</td>
<td>Pes anserine tenotomy</td>
<td>59</td>
<td>No</td>
</tr>
<tr>
<td>ACL rupture after fall</td>
<td>16°</td>
<td>Arthroscopy + toilette</td>
<td>24</td>
<td>No</td>
</tr>
<tr>
<td>Patellofemoral pain</td>
<td>18°</td>
<td>Lateral patellar retinacular release</td>
<td>24</td>
<td>No</td>
</tr>
<tr>
<td>Lateral meniscal tear</td>
<td>18°</td>
<td>Parcial lateral meniscectomy</td>
<td>27</td>
<td>Yes</td>
</tr>
<tr>
<td>Patellofemoral pain</td>
<td>10°</td>
<td>Arthroscopy: intercondylar fibrosis resection</td>
<td>24</td>
<td>No</td>
</tr>
<tr>
<td>Rupture of tibial component wire</td>
<td>19°</td>
<td>Wire extraction</td>
<td>57</td>
<td>Yes</td>
</tr>
<tr>
<td>Stiffness</td>
<td>16°</td>
<td>Closed arthrolysis under anesthesia</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>
UKA. Servien et al. [13] measured an angle of 6.5° (−6 to 13) of ER in 19 patients with medial UKA. Therefore, our 101 patients represent an important contribution to previous literature.

Internal rotational error of the tibial component is a major cause of pain after TKA. Nicoll et al. studied 38 patients with unexplained pain after TKA [17]. A painless control group of 25 patients was selected for comparison. The average rotation of the tibial component was 4.3° of internal rotation in the painful group and 2.2° of external rotation in the pain-free group (p = 0.024). Thus, more than half (56%) of the painful TKAs in their study group had internal rotational errors in the alignment of components, particularly the tibial implant. Bédard et al. found in 34 patients operated on for revision arthroplasty because of stiffness that all patients had an internal rotation of the summed values for tibial and femoral components [18]. Revision arthroplasty improved function and mobility, and postrevision CT scans confirmed correction of component rotation. The authors recommend CT scanning of patients with stiff TKAs before surgical intervention. Therefore, in TKA, internal rotation seems to be a major cause for worse outcomes and external rotation is better tolerated. Although the kinematics in UKA is not comparable to TKA, the rotational condition could certainly have an influence in outcomes. Further information is needed to learn about the consequences of positioning the tibial component of the UKA in internal rotation.

The diagnosis in 4 of our 15 patients where a new surgical procedure was performed was uncertain. Moreover, pain relief was not achieved in the 5 patients operated for pes anserine bursitis, so the reason for the pain in the medial side of the knee in these patients remains unknown. Furthermore, 6 patients without any diagnosis for pain reported an increase in pain after index surgery, although they refused to proceed to revision surgery. Therefore, 15 patients with unexplained knee pain have been detected in our study. Their rotational alignment was 13.9° (5 to 21), against 11.3° (−1 to 26) for patients without unexplained knee pain. So, although the difference does not reach statistical significance (p = 0.10), a trend to a bigger ER is observed in patients with unexplained pain.

Limitations of this study include the heterogeneity of the patients. Different follow-up periods could be a reason itself for a difference in results, as well as the difference in the material of components or the design of the prosthesis (although one was the evolution of the other). The aim was to have the biggest group possible in order to observe the variability pattern. Thus, most of the patients available were included in the study, regardless of their characteristics. However, the patients’ loss was bigger than expected, as only 101 cases out of 210 could be recruited, and minimized the representativeness of our sample for all UKA. CT scans were not performed on the nine patients operated on for revision arthroplasty before this study was set out. This is a real weakness, because it could allow us to see the rotational angle in patients with the worst results. In the four patients operated on for revision after the study started, differences in angulation were not statistically significant. The absence of any preoperative functional outcomes does not allow for observing and comparing the progression in WOMAC and KSS scores, which would be interesting additional information. A longer follow-up should be required to perform a survival analysis.

The strength of this study remains on a large sample size and a long average follow-up for a subject that has been seldom raised in previous literature. To our knowledge, this is the first study including information on the rotational alignment and clinical outcomes. There is little scientific support to assess the ideal position of the tibial component in UKA, and our data could contribute to future studies. Further information is needed to determine whether the rotational alignment is an important factor in UKA outcomes and survival.

4. Conclusions

A high variability rate is observed in the rotational alignment of the tibial component in UKA. A device to guide the surgeon in the sagittal cut should be designed to substitute the free-hand technique and decrease rotational variability.

A lower angle of external rotation of the tibial component is observed in patients with better clinical outcomes after UKA. Thus, a positioning in neutral or slight external rotation could be advocated. Nevertheless, further studies are needed to determine the appropriate angle of rotation of the tibial component to achieve excellent clinical results after UKA.

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References


