Mobile bearing unicompartmental knee arthroplasty and total knee arthroplasty done on the same patient: does the patient perceive a benefit with one or the other?

Jeremy James Rowe
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2009
ACKNOWLEDGEMENTS

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Thank you to all of the staff at Dr. Foetisch’s office, Dr. Kiechel’s office, and Toledo Orthopedic Surgeons. I would especially like to recognize Mandi Randall, Maggi Morrin, Gwen Howland, Rita Barton, Gil Sinco, Shawn Morrison, and Mark Bublick for both assisting in the gathering of data for this paper and aiding in communication. Thank you so much for investing your time, and most of all, for your patience.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Literature Review</td>
<td>4</td>
</tr>
<tr>
<td>Materials and Methods</td>
<td>17</td>
</tr>
<tr>
<td>Results</td>
<td>19</td>
</tr>
<tr>
<td>Discussion</td>
<td>23</td>
</tr>
<tr>
<td>Conclusions</td>
<td>25</td>
</tr>
<tr>
<td>References</td>
<td>28</td>
</tr>
<tr>
<td>Tables</td>
<td>31</td>
</tr>
<tr>
<td>Appendices</td>
<td>34</td>
</tr>
<tr>
<td>Abstract</td>
<td>38</td>
</tr>
</tbody>
</table>
INTRODUCTION

Recent, conservative CDC statistics quote the prevalence of arthritis at 33.6%, 12.4 million adults, age 65 and older [1]. Of the large joints, the knee is most frequently affected. Knee osteoarthritis, more specifically, was quoted at 12.1%, 4.3 million individuals, of adults age 60 and older, in a survey conducted from 1991-1994 [2]. With the surging number of elderly in the U.S. population, it is certainly reasonable to consider this area of medicine vital to preserving the quality of life in our aging population.

For many years the gold standard for the treatment of osteoarthritis (OA) of the knee has been total knee arthroplasty (TKA). This surgery is highly invasive and has inherent complications associated with it. However, there has been a recent resurgence of popularity for unicompartmental knee arthroplasty (UKA), particularly with regard to isolated medial compartment OA. The advent of more advanced prosthetic designs, one of which is a mobile bearing design, has given renewed promise to the less invasive UKA.

Instead of looking at objective data, which often analyzes irrelevant differences, this study is intended to determine if there is a perceived advantage to UKA in the opinion of the patient. This study examines patients’ perspectives on pain and function in a group of patients having a modern, mobile bearing unicompartmental replacement on one side and a total knee replacement on the other. The study aims not just to find a majority of preference, but rather, a statistically significant (p < .1) difference between TKA and UKA with respect to patient preference, complications, or specific functional activities. Additionally, the more technical mobile bearing UKA procedure is weighed, with respect to difficulty and results, against TKA and fixed bearing UKA, by surgeons that do both types of procedures.
LITERATURE REVIEW

Blood loss [3], vascular injuries [4], pulmonary emboli [5], fat emboli [6], and infections [7] are all major complications to deal with in the operative and post operative periods of TKA. It would seem correct to assume that many of these complications, and recovery, could be reduced by a less invasive procedure that required less soft tissue and bone violation, as is the case with UKA [3]. Although some of these complications are inherent to joint arthroplasty in general, blood loss [3,8] and pulmonary embolism [9] in particular have been shown to be decreased with UKA.

Fair results have been obtained with fixed bearing designs as early as 1985 [28]. However, early unicompartmental prostheses did not yield survivorship comparable to total knee replacements [28] and the consideration of an inevitable revision must be considered when weighing the two options (TKA vs. UKA). Early, fixed bearing unicompartmental prostheses often failed due to tibial collapse [10], accelerated polyethylene wear [11-14] and/or tibial component loosening, particularly with obese or active patients [15].

It has been reported that patient perceptions favor that of a UKA versus a TKA [21]. However, it seems that orthopedists more often perform TKA on a patient with a previous total knee, regardless of whether or not the patient meets the criteria for a UKA. This concept of the “matching pair” combined with the strict criteria for patient selection when using a mobile bearing unicompartmental prosthesis (intact cruciate ligaments, correctable varus deformity, and mild patellofemoral arthritis) is a hindrance to the direct comparison of UKA and TKA done on the same patient.
Unicompartmental knee replacements have been associated with higher functional potential, increased range of motion, increased proprioception, and better kinematic restoration than total knee replacements [24-27]. It has also been shown that patients with unicompartmental knee replacements return to a higher level of functioning than those with total knee replacements [21], although these results compared two different patients and is subject to many variables. A search of PubMed yielded two other studies, which compare UKA and TKA on the same patient. The results of these two studies show that a majority of patients preferred UKA to TKA or saw no difference. One study showed a small percentage of patients preferring TKA, but this was only 12%. Another distinguishing factor is that both studies examined older, fixed bearing UKA designs [22-23]. A glossary of terms is available in Appendix A.
MATERIALS AND METHODS

The Oxford® (Biomet; Warsaw, IN) unicompartmental prosthesis was selected for comparison to total knee designs. The Oxford® was chosen due to its modern, mobile bearing design, which most appropriately mimics natural knee kinematics by allowing free anterior to posterior glide and more natural extensor mechanism function [29]. Many studies have also reported more favorable reported survivorship [17-20], comparable to TKA in some studies, and superior to many previous unicompartmental designs. As previously mentioned, the Oxford® is among the most recent unicompartmental designs in the U.S. Its mobile bearing design was intended to combat excessive polyethylene wear, which was a consistent problem in early fixed bearing designs [11-14, 16]. The downside to the Oxford® prosthesis appears to be its technically demanding nature, as surgeons must complete a course before being able to use the prosthesis. Therefore, surgeons were also subjectively surveyed to determine the level of difficulty of the surgery and the reproducibility of the favorable results previously published.

All subjects were at least 1 year post-operative from the last knee procedure, as UKA has been shown to improve with time [25, 28]. Further, the one year mark was important so as not to skew the data with someone being in the rehabilitative phase, unable to be as objective. All subjects had a primary total knee replacement on one knee and an Oxford® unicompartmental knee replacement on the other. Patient billing codes for Dr. Paul Fenton, M.D. (The Toledo Hospital, University of Toledo Medical Center, Toledo, OH), Dr. Christopher Foetisch, M.D. (Flower Hospital, St. Anne’s Hospital; Toledo, OH), Dr. Anthony Frogameni, M.D. (The Toledo Hospital, University of Toledo Medical Center; Toledo, OH), and Dr. Stephen Kiechel, M.D. (Flower Hospital, St. Anne’s Hospital; Toledo, OH) were screened, by office staff, for candidates. Nineteen qualifying patients were identified. At least three types of total
knee prostheses were used (1. NexGen®, Zimmer, Warsaw, IN, 2. Vanguard®, Biomet, Warsaw, IN, and 3. Maxim®, Biomet, Warsaw, IN). Identifying information for some total knee prosthesis types were unavailable in patient charts.

Patient surveys, assessing patient perceptions on pain, function, and complications, were sent after receiving both surgeon and patient consent to participate. Privacy was assured by providing self addressed, pre-paid return envelopes without a return address. Office staff provided chart data regarding pre-operative and post-operative flexion and extension to stratify the severity of the knees prior to operation and an objective measurement of improvement. Finally, surgeons were surveyed regarding their perceptions of the operative procedure. Data was compiled into three groups: 1) Pre/post operative range of motion measurements, 2) patient survey information, and 3) surgeon survey information. These three groups of data were interpreted independently of one another. There was no comparison of the Oxford® to any specific total knee prosthesis, no surgeon by surgeon analysis, and no institution by institution analysis. The surveys given to patients can be found in Appendix B and those given to surgeons in Appendix C.
RESULTS

Sixteen of the nineteen patients responded to the survey (84.2%). Due to the fact that a fair percentage of the total knee operations were performed by surgeons, other than those surveyed and prior to the UKA, some of the pre and post-operative data for the TKAs was unavailable. Six pre-operative range of motion measurements were available for the TKAs. Eight pre-operative measurements were available for the UKAs. Fifteen TKAs had post-operative measurements available. Fifteen UKAs had post-operative measurement available. Demographic data was available for fifteen of the sixteen subjects who were surveyed. The average follow-up time of post-operative range of motion for the total knee group was 3.3 months (range 3-6 months). The average follow-up time for post-operative range of motion of the unicompartmental group was 2.9 months (range 2-3 months). The average age at time of TKA was 62.9 years of age (range 52-74 years). The average age at UKA was 65.6 years of age (range 51-81 years). Table 1 displays the mean pre-operative and post-operative range of motion values for both the TKAs and UKAs. A mean pre-operative flexion was found to be 111.7 degrees for the TKAs and 118.8 degrees for the UKAs. Mean pre-operative extension was 2.3 degrees for the TKAs and 0.9 degrees for the UKAs. Post-operative flexion was a mean of 113 degrees for the TKAs and 123.3 degrees for the UKAs. Mean post-operative extension was 0.7 degrees for TKAs and 0.5 degrees for the UKAs.

The results of the patient surveys are displayed in Table 2. A copy of the patient survey is available in Appendix B. There were no statistically significant values from the patient surveys depicting any advantageous aspects for either the TKAs or the UKAs (p < .1). Seven patients (43.8%) stated that their UKA was better overall, while four patients (25%) preferred their total knee, and five patients (31.2%) had no preference. The highest value, relative to the
other group (UKA vs. TKA), was easier recovery with the unicompartmental group (73.3%, 11/15). Those patients that experienced more pain with their UKA (4 patients) described it as a dull ache (3/4) or stabbing pain (1/4), with activity (4/4), deep in the joint (1/4), on the medial side (1/4), or on the lateral side (2/4). Those patients that stated more pain with their total TKA (4 patients) described it as a dull ache (4/4), with activity (2/4), on the lateral side (3/4) and on the medial side (1/4). Of the patients that stated that their partial knee felt more “natural” (8 patients), three patients said that the difference in feeling bothered them. Two patients stated a more “natural” feeling with their TKA, both citing that the difference in feeling bothered them. There were two incidents of complications with the total knee group and one for the unicompartmental group. For the TKAs, one patient had a pulmonary embolism and one patient required a manipulation under anesthesia, due to reduced range of motion. The UKA complication was an infection. With regard to the specific functional tasks we inquired about, overall there were a higher number of subjects stating better function with the unicompartmental design. However, the majority of the subjects saw no difference between the total and unicompartmental designs for the specific functional tasks (rising from a chair, stairs, getting out of a car, kneeling, and crossing their legs). With regard to being capable of performing certain activities due to having one partial and one TKA versus two total knees, 4 subjects (6 total functional tasks) stated that they thought there was a difference. Activities listed as being easier due to having the partial knee replacement were getting up off of the floor (2/4), getting up out of a chair (1/4), kneeling (2/4), and getting out of a car (1/4).

Table 3 displays the results of the surgeon surveys. A copy of the surgeon survey is available in Appendix C. Three of the four surgeons had previously performed fixed bearing UKA. The mean number of Oxford® procedures, performed by the surgeons per year, was
approximately 29 (range 10-50). The mean number of Oxford® procedures, that the surgeons felt were necessary before they felt competent (level of competency comparable to that of their total knee procedure), was approximately 16 (range 3-25). The mean operative time that the Oxford® procedure required was approximately 64 minutes (range 55-70). With regard to complaints received (relative to the number procedures performed) regarding the two prosthetic types, 3 surgeons stated that they received more complaints from their total knee patients. One surgeon stated that he received more complaints from the Oxford® patients. When asked how difficult the Oxford® procedure was when compared to fixed bearing unicompartmental procedures, one surgeon stated that the Oxford® procedure was easier, one stated that it was comparable to, and one stated that it was more difficult. Two surgeons stated that the Oxford® procedure was comparable, with regard to length of procedure, to their total knee procedures. One surgeon stated that the procedure took more time and one stated less time. The unanimous agreement (4/4) was that the Oxford® patients appear to have faster recovery times than total knee patients. The following responses were given comparing TKA and Oxford® knee arthroplasty complications: Oxford® patients were said to have less risk of infection by two surgeons and the same risk by two surgeons. Blood loss was considered to be less with the Oxford® by three surgeons and the same by one surgeon. The percentage incidence of pulmonary embolism was said, by two surgeons, to be less with the Oxford® and two surgeons stated no difference. The percentage of fat emboli (admittedly difficult to quantify subjectively) was said to be less with the Oxford® by one surgeon and the same as total knees by three surgeons. One surgeon stated more post-operative dislocations with the Oxford®, while three surgeons stated no difference. Two surgeons stated increased asceptic loosening with the Oxford® and two surgeons saw no difference. Component malalignment was considered to be
increased with the Oxford® by two surgeons and the same by two surgeons. Fractures were said to be less with the Oxford® by one surgeon, more with the Oxford® by one surgeon, and the same by two surgeons. When asked about the difficulty of revising an Oxford® to a total knee compared with a revision of a primary TKA, three surgeons stated that conversion of an Oxford® was easier and one surgeon stated that the two procedures were comparable.
DISCUSSION

This study was not without its pitfalls. First and foremost, it is fully recognized that there is a lack of objective data in this research. However, that is exactly the way this study was intended. Too often in medicine we look at numbers and sometimes it is important to remember the people involved, in this case, both the patients and their surgeons. Perceptions are rarely shaped by numbers. Also, this study lacks power due to its small sample size. Further, the variability of the TKAs (different surgeons) lead to more variables such as physical therapy, operative technique, multiple prostheses types, and patient to surgeon relationships. However, this randomness of the total knee component in the study placed the Oxford® relative to a more general total knee, rather than pitting it against a specific prosthetic type or the strengths/weaknesses of a specific surgeon. It should be noted that this type of patient (total knee on one side with contralateral UKA) makes an excellent subject for comparison of UKAs and TKAs. This model neutralizes the most important variable of all, the patient. Further studies, with larger sample sizes of the same type of subjects, should focus on higher level activities in order to better illustrate those individuals that gain some true measure of function other than numerical.

The results of post-operative flexion are similar to the results obtained for both Dalury, et al (123 +/- 9 degrees UKA vs. 119.8 +/-7 degrees TKA) and Laurencin, et al (123 degrees UKA vs. 110 degrees TKA). The results of the previously published studies comparing UKA and a contralateral TKA were considered, by the authors, to be equivocal, comparing functional scores. However, Dalury, et al found that the unicompartmental design was preferred by 52.2% of the subjects (12/23) and 47.8% of the subjects had no preference between the two implant types [22]. Therefore, the authors advocated its use when indicated [22]. Laurencin, et al determined
that UKA provided better range of motion and 44% (10/23) of patients preferred their unicompartmental prosthesis (44% no preference, 12% preferred total knee).

Determining the type of prosthesis to be utilized for isolated medial compartment arthritis is a controversial issue. The advent of direct to consumer marketing of medical prostheses has further complicated the decision for prosthetic type. Many patients are asking for specific types, or even specific brand names of implants. The literature has shown multiple studies, from Europe, touting long term survivorship of the Oxford® unicompartmental prosthesis comparable to that of TKA [17-20]. It would be important, for further studies in the U.S. literature, to determine the long term survivorship of this prosthesis in the U.S. patient population. U.S. patients may not tolerate patellofemoral arthritis as well and the expectations of U.S. patients may be less reasonable than that of European patients. Two U.S. based studies of Oxford® survivorship noted 85% survivorship at ten years and five years, respectively [17, 24]. Although these numbers may be reasonable by unicompartmental standards, they are vastly inferior to the prior European studies, which noted 95-97% survivorship at ten years [18-19]. The survivorship of the unicompartmental component is essential to the decision of UKA versus TKA. Without having an idea of this statistic in the U.S. patient population, one cannot foresee the timing of a possible revision and the subsequent patient populations that may be appropriate or inappropriate. Prior studies have shown an advantage with unicompartmental replacements, relative to total knee replacements, for return to work or sports [21]. However, this study did not address the functional need for higher level activities such as work or sports.
CONCLUSIONS

The results indicate that the UKAs were performed on knees with less severe deformity, which is to be expected when the strict criteria for patient selection are followed. Also, the post-operative range of motion was better with the UKAs than with the TKAs, another theme previously seen in the literature. More importantly, this study raises many important questions as to the use of UKA: 1) If the patient does not receive a functional benefit from the UKA, is it justifiable to do the procedure just because the patient meets criteria (and requests a “partial” knee replacement), even if the life of the implant could increase the likelihood of revision? 2) Which patient subgroups, if any, do see a true functional benefit from UKA (i.e.: what specific higher level activities/sports see a benefit from the extra range of motion)? 3) What are the long term failure rates of the Oxford® UKA in the U.S. patient population? 4) Is there a financial benefit to UKA, in the U.S. healthcare system, as a temporizing treatment prior to TKA? This study does not answer any of these questions. Quite frankly, the conclusions from this study are quite inconclusive.

The only definitive determination that this study gives is that this sample of surgeons feels that there is a shorter recovery with the Oxford® procedure (and this is a subjective finding) relative to their TKAs. Surgeons also seemed to feel that there were less or the same rates of perioperative complications (infection, bleeding, pulmonary emboli, and fat emboli). No surgeon stated that they felt that there were more perioperative complications with the Oxford® procedures compared to total knee procedures. Technical complications (dislocations, loosening, malalignment, and fractures) were an entirely different matter, with only one surgeon giving a response of less for the Oxford® procedure (this response was given in regard to fractures). The remaining responses for technical complications were either increased for the Oxford®
procedure or the same when compared to what the surgeons see with their total knee patients. Although these responses are entirely subjective, surgeons are typically very aware of their general complication rates, as complications can be costly, to say the least. The responses show that the less invasive nature of the Oxford® procedure lends itself to less perioperative complications, which one would consider to be directly correlated with the amount of exposure/dissection (and has previously been mentioned in the literature regarding UKA). The responses to the technical complications indicate that the procedure is most likely more technically demanding than TKAs. This may or may not have a correlation to the number of Oxford® procedures performed by a particular surgeon (this parameter was not analyzed in this paper).

All studies comparing total and UKA on the same patient found that there was a slight advantage given to unicompartmental designs, with regard to flexion, compared to the TKAs. All studies determined the flexion of the UKAs to be 123 degrees [22-23]. This may suggest that flexion does not significantly differ between fixed and unicompartmental designs, as the previous same patient studies contained subjects with fixed bearing UKAs. One interesting finding is the fact that half (5/10) of the patients who noticed a more “natural feel” with either prosthetic type noted that the difference in feel between the two knees bothered them. This may suggest that perhaps it is beneficial to stick to a “matching pair” strategy, particularly when only 25% (4/16) of patients felt that their unicompartmental knee allowed them to perform activities that would otherwise not be possible (with bilateral total knee replacements). The decision to give patients identical bilateral prosthetic types would of course be subject to appropriate indications.
Unlike Dalury, et al, the analysis of patient perceptions in this patient sample does not clearly favor that of mobile UKA, rather, the results of the responses in this patient population are similar to those in the Laurencin, et al paper. Four of the sixteen patients (25%) preferred their total knee prosthesis. Although seven patients (43.8%) stated that they preferred their unicompartmental replacement to their total knee replacement, this number does not even represent a majority for this patient sample. Further, five patients (31.2%) had no preference with regard to prosthetic type. Inconclusive patient preferences, decreased perioperative complications, and questionable survival among U.S. patients all add up to an uncertain scenario. There is no doubt that UKA has its place. However, until further information regarding patients that will benefit from UKA and long term survival rates become available, sound clinical judgement will be necessary in order to determine the appropriate prosthetic type for isolated medial compartment arthritis.
REFERENCES


## TABLES

### Table 1

<table>
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<th>Total Knee Replacement</th>
<th>Unicompartmental Knee Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Preoperative Flexion</td>
<td>111.7</td>
<td>118.8</td>
</tr>
<tr>
<td>Mean Preoperative Extension</td>
<td>2.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Mean Postoperative Flexion</td>
<td>113.0</td>
<td>123.3</td>
</tr>
<tr>
<td>Mean Postoperative Extension</td>
<td>0.7</td>
<td>0.5</td>
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### Table 2

<table>
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<th>Unicompartmental Knee Replacement</th>
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<tr>
<td>More pain</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>More difficult recovery</td>
<td>11</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Required more pain medication</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Feels more natural</td>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Better with stairs</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Better rising from a chair</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Better getting out of a car</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Better kneeling</td>
<td>1</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Better crossing legs</td>
<td>1</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Overall better</td>
<td>4</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Number of infections</td>
<td>0</td>
<td>1</td>
<td>15</td>
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<tr>
<td></td>
<td>Easier/Less</td>
<td>More Difficult/More</td>
<td>Comparable/Same</td>
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<td>Difficulty of Oxford® procedure compared to previous fixed bearing designs</td>
<td>1</td>
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<td>Length of time of Oxford compared with total knee arthroplasty</td>
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<td>1</td>
<td>2</td>
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<td>Length of recovery for Oxford patients as compared to total knee patients</td>
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<td>0</td>
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<td>2</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Percentage of Oxford® patients with surgery associated, significant blood loss as compared to total knee patients</td>
<td>3</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Percentage of Oxford® patients with post-operative pulmonary embolism as compared to total knee patients</td>
<td>2</td>
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<td>2</td>
</tr>
<tr>
<td>Percentage of Oxford® patients with post-operative fat emboli as compared to total knee patients</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>--------------------------------------</td>
<td>----------</td>
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<td>----------</td>
</tr>
<tr>
<td>Percentage of Oxford® patients with post-operative dislocations as compared to total knee patients</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Percentage of Oxford® patients with post-operative aseptic loosening as compared to total knee patients</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Percentage of Oxford® patients with component malalignment as compared to total knee patients</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Percentage of Oxford® patients with intra-operative or post-operative fracture as compared to total knee patients</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Difficulty of revision of a failed Oxford® compared with that of a failed total knee arthroplasty</td>
<td>3</td>
<td>0</td>
<td>1</td>
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</table>
APPENDICES

Appendix A

Patient Survey

Do you know which knee has a total knee prosthesis and which has a partial knee prosthesis?
☐ Yes  ☐ No
If no, please call your surgeon before taking this survey to determine which prosthesis is on each side.

Do you notice more pain in one knee or the other?  ☐ Yes  ☐ No
If yes, which one?  ☐ Partial  ☐ Total
If yes, where on the knee is the pain located (CHECK ALL THAT APPLY)?
☐ under the knee cap  ☐ behind the knee  ☐ deep in the joint  ☐ on the inner side
☐ on the outer side
What type of pain is it (CHECK ALL THAT APPLY)?  ☐ dull ache  ☐ stabbing
☐ burning  ☐ Constant  ☐ With activity

Do you recall your recovery being more difficult with one of the surgeries?
☐ Yes  ☐ No
If yes, which one?  ☐ Partial  ☐ Total
If yes, in what way (pain, a certain activity, etc.)?

Did you recall requiring more pain medication with one operation as opposed to the other?
☐ Yes  ☐ No
If yes, which one?  ☐ Partial  ☐ Total

Does one knee feel “more natural” than the other?  ☐ Yes  ☐ No
If yes, which one?  ☐ Partial  ☐ Total
If yes, does the difference in “feel” bother you?  ☐ Yes  ☐ No

Please mark the following activities/functions with a response of “Partial” or “Total” to denote which leg performs these functions the best/easiest (If there is no difference, please do not mark that activity) ascending stairs up stairs, getting out of a car, etc.)?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Partial</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending stairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rising from a chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting out of a car</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kneeling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crossing your legs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Would there be certain things that you could not do if you had two total knee replacements instead of having one as a partial replacement?  

☐ Yes  ☐ No

If yes, what?

---

Patient Survey

Which knee is better over-all?  

☐ Partial  ☐ Total

Did you have any of the following problems following your partial knee replacement operation?  
(CHECK ALL THAT APPLY):

☐ Infection

☐ Pulmonary embolism (blood clot in your lungs)

☐ Deep vein thrombosis (blood clot in your leg)

☐ Fracture (unanticipated broken bone during the operation)

☐ Second Operation (for any reason other than infection [loosening, dislocation, etc.])

Do you recall any of the following problems following your total knee replacement operation?  
(CHECK ALL THAT APPLY):

☐ Infection

☐ Pulmonary embolism (blood clot in your lungs)

☐ Deep vein thrombosis (blood clot in your leg)

☐ Fracture (unanticipated broken bone during the operation)

☐ Second Operation (for any reason other than infection [loosening, dislocation, etc.])
Appendix B

**Surgeon Survey**

Approximately how many Oxford® procedures do you do per year?

Approximately how many procedures did it take until you felt proficient in the procedure (to the level that you feel with your total knee procedures)?

Have you ever used a fixed bearing design unicompartmental prosthesis?  □ Yes □ No

If yes, do you feel that the Oxford® procedure/instrumentation is □ Comparable, □ easier, or □ more difficult to use?

Approximately how long does the Oxford® procedure usually take you (in minutes)?

Is this time □ comparable to, □ shorter than, or □ longer than your total knee procedures?

In general, how are your patients’ recoveries with the Oxford® compared to a total knee procedure (□ faster, □ comparable, or □ longer)?

Do you see the same, less, or more of the following procedural complications with your Oxford® patients in comparison to your total knee patients? (Please mark appropriate response)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Same</th>
<th>Less</th>
<th>More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant blood loss (post-op Hgb drop &gt; 2 points)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat emboli</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you see the same, less, or more prosthesis related complications with your Oxford® patients in comparison to your total knee patients? (Please mark appropriate response)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Same</th>
<th>Less</th>
<th>More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dislocations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aseptic loosening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Component malalignment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fracture</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you receive more patient complaints regarding □ totals or □ unis (don’t check if the same)?

Have you ever had to revise an Oxford®?

If yes, how do you feel it compares to revising a total knee (□ easier, □ comparable, or □ more difficult)?
Appendix C

**Glossary**

*Articular cartilage* – the cartilage at the ends of two bones that form a joint. The cartilage of two bones that articulate (move against) with one another

*Fat emboli* – droplets of fat that enter the blood and have inflammatory and blockage consequences for the blood vessel. They often migrate to the lung or brain. They are associated with violation of the integrity of a long bone, particularly with exposure of the marrow.

*Fixed bearing* – the plastic bearing between the femoral and tibial metal is fixed to the tibial plate

*Medial compartment* – referring to the medial femoral condyle and the medial tibial surface and the associated articular cartilage

*Mobile bearing* – the plastic bearing between the femoral and tibial metal is not attached/ fixed to the tibial plate

*Osteoarthritis* – degenerative condition of the knee that causes pain and inflammation due to articular cartilage loss

*Osteolysis* – debris from worn polyethylene causes an inflammatory response from the body. Lysozymes cannot degrade the polyethylene, but do dissolve the surrounding bone.

*Partial/Unicondylar/Unicompartmental Knee Replacement* – all terms for a procedure that replaces only half of the femoral and tibial surfaces with metal and uses a plastic bearing between them (for the Oxford it is the medial side only)

*Patellofemoral joint/space/compartment* – referring to the patella and the anterior surface of the femur and the associated articular cartilage

*Polyethylene* – the type of plastic used to make the bearing in knee replacements

*Revision Surgery* – removal of previously implanted arthroplasty components due to failure and the subsequent application of new components

*Total/Tricompartmental Knee Replacement* – terms referring to a procedure that replaces the articular cartilage of both femoral condyles and the tibial plateau with metal. A plastic bearing, attached to the tibial plate, is used between them. The patella is often resurfaced as well.
ABSTRACT

OBJECTIVE: To determine patient perceptions with a mobile bearing UKA and contralateral TKA, to determine the difficulty/reproducibility of mobile bearing UKA, and to subjectively assess complications comparing UKA vs. TKA

METHOD: Chart reviews were performed to determine pre and post-operative ROM. Patients were surveyed and asked to compare UKA and TKA. Surgeons were surveyed regarding the difficulty of the Oxford procedure and the patient results that they generally see.

RESULTS: UKA was preferred by 43.8% (7/16), TKA was preferred by 25% (4/16), and 31.2% (5/16) of patients had no preference. Perioperative complications were less with UKA, however, technical complications were higher according to surgeons.

CONCLUSION: UKA did not appear to significantly increase functional capacity and was not unanimously preferred. However, UKA did appear to offer lower adverse events and faster recovery. It is necessary to use sound clinical judgement when determining prosthetic type for medial compartment OA.