

Early Failure in Unicondylar Arthroplasty

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Introduction:

Unicondylar arthroplasty has reemerged as an option for isolated compartment knee arthritis. Proponents of this procedure cite preservation of normal knee kinematics, accelerated recovery and preservation of bone stock as reasons for its use. Single center studies of unicompartmental arthroplasty report results comparable to total knee arthroplasty (TKA). However, results of unicompartmental arthroplasty in large registry studies are inferior to total knee arthroplasty.

Recent direct to consumer advertising and the advent of minimally invasive procedures has led to a significant increase in the demand for this procedure to treat isolated compartment disease. Coincident with this increase, we have noted an increase in the demand for early revision of this construct in our revision practice. This study sought to determine if the need for unicondylar revision has increased over time and to determine what factors may have led to such early failures.

Materials and Methods:

Between April, 1988 and January 2008, 50 revision unicondylar arthroplasties were performed. A retrospective review of medical records including hospital records, clinic records and radiographs was completed to determine the following: Patient demographics, date of primary unicondylar arthroplasty, primary surgeon, implant type, modes of failure and surgical error. The date of revision surgery was categorized into two time periods. Time period 1 was from 1988-1999. Time period 2 was from 2000-2008.



Figure 1 and 2: Patients referred for revision with malpositioned components

Figure 3: Over-resected tibia leading to fracture

Results:

Between 1988 and 2008, 1169 revision total knees were performed at the OrthoCarolina Hip and Knee Center. Fifty of these were revisions of unicondylar arthroplasty (4.3%). Of the 50 revisions performed at our center, 26 were referred for treatment while 24 were revisions of unicompartmental arthroplasties performed at our center. During this time period, we performed 416 unicompartmental arthroplasties at our center, 24 of which we revised (5.8%). Those patients referred for revision of their unicompartmental arthroplasty came from an unknown pool of patients.

Of the 425 revisions performed in Period 1, 7 (1.6%) were revisions of unicompartmental arthroplasties. Of the 744 revisions performed in period 2, 43 (5.8%) were revisions of unicompartmental arthroplasties. This difference was significant ($p=0.0008$).

The average time in situ for the unicompartmental arthroplasties revised during Period 1 was 127.9 months (Range 12.9-248.2) compared to an average time in situ of only 36 months (Range 4.2-159.5 months) for those revised during Period 2. This difference was significant ($p<0.0001$).

The dominant reason for failure in Period 1 was tibial loosening and polyethylene wear, while in Period 2 the reasons for failure were variable and included a large number of technical errors.

Of the 43 patients revised during Period 2, there were 14 surgical errors identified for a surgical error rate of 32.5%. Of these 14 surgical errors, 11 components were malpositioned (5 tibial components and 6 femoral components) (Figure 1 and 2). There was one intraoperative tibial plateau fracture (Figure 3) and one retained trial component (Figure 4). The final case had multiple errors. In contrast, only one of the patients in Period 1 was noted to have a surgical error leading to failure. Of the 15 surgical errors, 12 were noted in patients referred to our center.

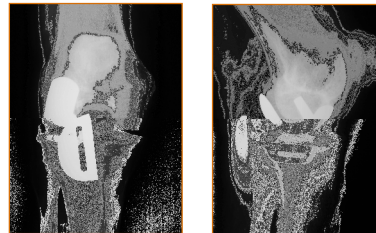


Figure 4a and 4b: Retained trial in patient referred for revision

Discussion:

Since its introduction in the infancy of knee arthroplasty, unicondylar replacement has been controversial. Some single center studies note success comparable to TKA while others appear inferior.

These single center studies are relatively underpowered when compared to registry data. Gioe evaluated over 5000 knee arthroplasties and noted that unicondylar arthroplasty was 7.2 times as likely to fail as an all polyethylene cemented TKA. The Norwegian registry noted two times the revision rate with unicompartmental arthroplasty versus TKA in their evaluation of over 2200 unicondylar knees. Similarly, a Mayo Clinic study of over 9200 knee arthroplasties, noted a 68% unicondylar survivorship versus 91% for TKA.

In 1996 and 1997, 1% of the total knee arthroplasties in the United States were unicondylar arthroplasties, increasing to 6% of all knees in 2000 and 2001. The increased prevalence of this procedure in the US seems linked to direct to consumer advertising and interest in minimally invasive techniques.

Reasons for early failure of unicompartmental arthroplasty include: Implant design, patient selection, and surgical technique. We are unable to comment on implant design due to the small number of patients and variety of implants revised in our series. Also, we were unable to obtain accurate information concerning patient selection in this retrospective study.

Surgical technique is a variable we linked to early failure. In our study of the 43 failures in Period 2, 14 major surgical errors were noted (32.5%). Such errors may be linked to a surgeon's inexperience with this procedure.

Conclusion:

We conclude that at our center the prevalence of unicondylar revision has increased significantly in the last eight years. Additionally, the unicondylar arthroplasties revised in Period 2 appeared to be failing early rather than after a long service life. We are concerned that market pressure may have led to inappropriate patient selection and surgical inexperience with this procedure may have led to technical problems. While we still perform unicondylar arthroplasty in select patients, we advise our patients of the inferior survivorship of unicondylar versus total knee arthroplasty as well as the potential for early failure with this procedure.