Kneeling Ability After Total Knee Replacement


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Abstract

The purpose of study was to investigate kneeling ability after total knee replacement. 100 patients who were at least 6 months following routine un cemented primary total knee were asked to comment on and then asked to demonstrate the ability to kneel. Differences in perceived and actual kneeling ability were noted

32% of patients stated they were able to kneel without significant discomfort. 80% of those that did not kneel stated they avoided this activity because of uncertainties or recommendations from third parties. 64 (64%) of patients were actually able to demonstrate kneeling ability without discomfort or with mild discomfort only. 12 (12%) of the remainder were unable to kneel because of problems that were not related to the knee. 24 (24%) of patients were unable to kneel because of discomfort in the knee.

There was no difference in the “kneelers” and “non-kneelers” with regard to overall knee score, range of motion and the presence of patella resurfacing.

Introduction

Many knee replacement systems have demonstrated adequate functional results at middle to long term follow-up 1-6. Most functional scoring systems used in these studies use pain, ability to walk, ability to ascend or descend stairs, use of a walking aid etc. as measures of outcome 7-10. Kneeling ability is usually not considered. Some recently introduced scoring systems, derived from patient questionnaires, include kneeling as a measure of knee function 7,11,12. These are not widely used.

The kneeling position is important in many activities of daily living and also is important in some vocations 13,14. The kneeling position has been shown to be a predisposing factor for osteoarthritis of the knee and so pre-selects patients who will need to kneel after total knee arthroplasty. Kneeling has also been shown to be an important intermediate body position used by older adults to enable them to rise from the floor 15.

Many patients ask questions about kneeling ability before total knee replacement surgery. It is difficult to answer this enquiry because of the dearth of studies on this subject. This study therefore was designed to assess subjectively and objectively patients’ ability to kneel after total knee replacement surgery.
Materials and Methods

100 knees in 75 consecutive patients attending primary total knee replacement follow-up appointments at a minimum of 6 months after surgery were identified. The knee replacement used in all patients was an unconstrained, uncemented, hydroxyapatite coated, PCL retaining prosthesis with the option of a cemented polyethylene patella button. All patients had a medial parapatellar skin incision. The age, time from surgery, Knee Society clinical rating score, range of motion and presence of a patella button for the patient was recorded.

Each patient was asked about their ability to kneel. Each patient was then asked to demonstrate kneeling on a firm surface and to record the level of pain experienced (0-10). Those patients unwilling or unable to kneel were asked to explain the reason (knee pain, back or hip stiffness, anxiety etc) and this was recorded.

This allowed two groups to be identified: those able to demonstrate kneeling ability without pain or with only mild pain (score 0-4) and those unable to demonstrate kneeling ability because of significant knee pain (5-10). Those patients who stated they were unable to kneel because of back pain, hip stiffness, anxiety etc were excluded from this group.

Differences in patella resurfacing, range of motion and knee scores between those able to kneel and those unable to kneel were compared and analysed with SPSS 10.0 statistical software (Fishers exact test, Mann Whitney U test).

Results

100 knees in 75 patients had completed data. The mean age was 66 years (range 43-82) with a mean time from surgery of 30 months (range 6-127). The mean knee score was 179/200 (range 123 – 200). The mean range of motion was 1 – 114 degrees (range -5 – 135). The number of knees with patella resurfacing was 35 (35%).

The number of patients who stated they were able to kneel without significant discomfort was 32 (32%). 80% of those that did not kneel stated they avoided this activity because of recommendations from third parties (doctors, nursing staff, friends etc). 64 (64%) of patients were actually able to demonstrate kneeling ability without pain or discomfort or with mild discomfort only. 12 (12%) of the remainder were unable to kneel because of problems that were not related to the knee. 24 (24%) of patients were therefore unable to demonstrate the ability to kneel because of discomfort in the knee.

The number of patients in each group with and without patella resurfacing can be seen in table 1.
The range of motion and knee scores in the two groups can be seen in table 2.

**Table 1: The presence of patella resurfacing in the two groups.**

<table>
<thead>
<tr>
<th></th>
<th>Patella Resurfaced</th>
<th>Patella Not Resurfaced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABLE TO KNEEL</strong></td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td><strong>NOT ABLE TO KNEEL</strong></td>
<td>5</td>
<td>19</td>
</tr>
</tbody>
</table>

Fishers Exact Test: \( p = 0.1 \)

**Table 2: The range of motion and knee scores in the two groups**

<table>
<thead>
<tr>
<th></th>
<th>ROM *</th>
<th>KS *</th>
<th>Significance**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABLE TO KNEEL</strong></td>
<td>114</td>
<td>183</td>
<td>( p=0.6 ) NS</td>
</tr>
<tr>
<td><strong>NOT ABLE TO KNEEL</strong></td>
<td>110</td>
<td>179</td>
<td>( p=0.6 ) NS</td>
</tr>
</tbody>
</table>

* ROM = Range of Motion, KS = Knee Score   **Mann Whitney U

**Discussion**

The results in this study suggest there are uncertainties about the ability to kneel following total knee replacement surgery. 32\% of patients declared they were able to kneel although 64\% of patients were actually able to demonstrate the ability to kneel comfortably. 80\% of patients did not kneel prior to the study because of advice from medical staff or third parties or because of fear of harming the prosthesis.

The ability to kneel did not appear to relate to the presence or absence of patella resurfacing, the range of motion of the knee or the knee society knee score.

Radiographs of patients demonstrated two types of kneeling (figures 1 and 2): “upright kneeling” which occurs with 90 degrees of knee flexion and “flexed kneeling” which can occur when greater than 110 degrees of knee flexion is achieved. In the first position the points of contact with the ground are the patella and the tibial tuberosity. In the second position only the tibial tuberosity bears weight. In this study the patients did not localise the source of discomfort on kneeling but it would seem that kneeling in a flexed position reduces the forces across the patellofemoral articulation. An adequate degree of knee flexion would be required for this to occur.

Negative advice given to patients on kneeling ability seems to have arisen out of concern of the risk of harming the prosthesis. There is no information available on kneeling and longevity of total knee replacements. Examination of the kneeling radiographs suggests that the compressive forces that occur through the femoral component appear to be similar to those experienced in normal standing and walking (Figure 1 and 2). The tibial tray appears to be protected as it has no contact with the weight bearing surface. The patella button when
present is in compression and because of its obliquity appears to experience a
degree of shear. This is different to kneeling on a normal knee (Figure 3).
Kneeling appears to cause a posterior draw on the tibia. This is prevented by the
PCL and the congruency of the bearing surface in a PCL retained knee
replacement and by the tibial post in a PCL sacrificing knee system. Therefore
the forces through a knee replacement theoretically appear to be benign except
possibly for the patella button and the tibial tray in PCL sacrificing devices. This
is an area that would benefit from further research.

The only previous publication on this subject found similar results 16. 44% of
patients stated they could kneel but 82% were actually observed to kneel easily.
Fear of harming the prosthesis and lack of information prevented kneeling in 49%
of patients. Differences in operative technique from our study included a midline
skin incision and patella resurfacing in 89% of patients. There were similarities in
this paper compared to our study in differences in perceived and actual kneeling
ability. The apparent superior kneeling ability in this study may have occurred
due to differences in study design, as the discomfort experienced by each patient
was not graded unless the ability to kneel was restricted by severe pain. Patients
with moderate or severe pain on kneeling were categorised as “non-kneelers” in
our study.

The use of a lateral parapatellar skin incision has been shown to produce less
neuromas and problems with kneeling after surgical exploration of ligamentous
knee injuries 17. We prefer to use a medial parapatellar skin incision in total knee
arthroplasty surgery to prevent elevation of potentially devitalised skin flaps at the
front of the knee 18. The risk of poor wound healing outweighs the risk of the
marginal improved ability to kneel with a lateral skin incision.

The ability to kneel after total knee replacement differs from perceived ability to
kneel and lies between 64% and 82% on current evidence. Fear of harming the
prosthesis or uncertainties about recommendations on kneeling are the main
reasons for this difference.

It does not appear to be related to the presence of patella resurfacing, the range
of motion and the functional knee score. Information on the risk of damage to the
knee replacement is lacking but analysis of contact points with the weight bearing
surface in the kneeling positions suggest that the forces across the knee
replacement are relatively inconsequential. A range of motion greater than 110
degrees would seem to increase the weight borne by the tibial tuberosity and
may protect the resurfaced patella from shear. This is an area that would benefit
from further research.
Figure 1: A lateral view of the knee from a patient in a “upright” kneeling position

Figure 2: A lateral view of the knee from a patient in a “flexed” kneeling position
Figure 3: Upright kneeling in a normal knee.

References


