

# Ability to kneel after total knee replacement

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**We** have investigated the ability to kneel after total knee replacement. We asked 75 patients (100 knees) at least six months after routine uncemented primary total knee replacement, to comment on and to demonstrate their ability to kneel. Differences between the perceived and actual ability to kneel were noted. In 32 knees patients stated that they could kneel without significant discomfort. In 54 knees patients avoided kneeling because of uncertainties or recommendations from third parties (doctors, nursing staff, friends, etc). A total of 64 patients was actually able to kneel without discomfort or with mild discomfort only and 12 of the remainder were unable to kneel because of problems which were not related to the knee. Twenty-four patients therefore were unable to kneel because of discomfort in the knee.

There was no difference between the 'kneelers' and 'non-kneelers' with regard to overall knee score, range of movement and the presence of patellar resurfacing.

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There have been a number of studies of knee replacement systems which have shown adequate functional results at middle- to long-term follow-up.<sup>1-6</sup> Most of the functional scoring systems quoted in these studies use pain, the ability to walk or to ascend and descend stairs, the use of a walking aid, etc as measurements of outcome.<sup>7-10</sup> The ability to kneel is usually not considered. Some recently

introduced scoring systems, derived from patient questionnaires, include kneeling as a criterion of function of the knee.<sup>7,11,12</sup>

The kneeling position is important in many activities of daily living and in certain occupations.<sup>13,14</sup> It has been shown to be a predisposing factor for osteoarthritis of the knee and so preselects patients who will need to kneel after surgery. Kneeling has also been shown to be an intermediate position used by older adults to enable them to rise from the floor.<sup>15</sup>

Many patients advised to have surgery for arthritis of the knee enquire about the ability to kneel after operation, but there is little published information on the subject. We have therefore assessed subjectively and objectively the ability of patients to kneel after total knee replacement.

## Patients and Methods

We studied 100 knees in 75 consecutive patients attending a follow-up clinic after primary total knee replacement at a minimum of six months after operation. The knee replacement used in all the patients was an unconstrained, uncemented, hydroxyapatite-coated posterior-cruciate-ligament-retaining prosthesis with the option of a cemented polyethylene patellar button. All patients had a medial parapatellar skin incision. We recorded age, the time from surgery, the Knee Society score (KSS),<sup>8</sup> the range of movement and whether a patellar button was implanted at arthroplasty.

The patients were asked about their ability to kneel and then to demonstrate kneeling on a firm surface and to record the level of pain experienced on a scale of from 0 to 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. Thus two groups emerged: those able to kneel without pain or with only mild pain (score 0 to 4) and those unable to kneel because of pain in the knee (5 to 10). Those patients who stated that they were unable to kneel because of back pain, stiffness of the hip, etc, were excluded from this group.

The mean age of the patients was 66 years (43 to 82) with a mean time from surgery of 30 months (6 to 127). The mean knee score was 179/200 (123 to 200). The mean range of movement was 1° to 114° (-5 to 135). The number of knees with patellar resurfacing was 35.

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We compared and analysed differences in patellar resurfacing, range of movement and knee scores between those who were able to kneel and those who could not using SPSS 10.0 (SPSS Inc, Chicago, Illinois) statistical software (Fisher's exact test, Mann-Whitney U test).

## Results

In 32 knees patients stated that they could kneel without significant discomfort. In 54 knees patients avoided kneeling because of uncertainties or recommendations from third parties (doctors, nursing staff, friends, etc). A total of 64 patients was actually able to kneel without pain or discomfort or with mild discomfort only. Twelve were unable to kneel because of problems which were not related to the knee. Twenty-four were therefore unable to kneel because of discomfort in the knee.

Of the knees with patellar resurfacing, 26 were in patients who were able to kneel and five in those who could not. Of those without resurfacing, 38 were in patients who were able to kneel and 19 in those who could not ( $p = 0.1$ ).

The mean range of movement was  $114^\circ$  in the knees of patients who were able to kneel and  $110^\circ$  in those who could not. The mean KSS was 183 in the knees of patients who were able to kneel and 179 in those who could not. These differences were not significant for both range of movement ( $p = 0.6$ ) and KSS ( $p = 0.6$ ).

## Discussion

Our results suggest that there are uncertainties about the ability to kneel after total knee replacement. In 32 knees patients declared that they had the ability to kneel although in 64 knees they were actually able to demonstrate the ability to kneel comfortably. Of those patients who did not kneel before the study 80% avoided kneeling 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 whether or not the patella had been resurfaced, the range of movement of the knee or the KSS.

Radiographs showed two patterns of kneeling (Figs 1 and 2). 'Upright kneeling' which occurs with  $90^\circ$  of knee flexion and 'flexed kneeling' which can occur when more than  $110^\circ$  of knee flexion is achieved. In the first the points of contact with the ground are the patella and the tibial tuberosity. In the second, only the tibial tuberosity bears weight. In our study the patients did not localise the source of discomfort when kneeling, but it would seem that kneeling in a flexed position ( $>110^\circ$ ) reduces the forces across the patellofemoral articulation.

Negative advice given to patients regarding kneeling seems to have arisen out of concern for the prosthesis, but there are no published data concerning this risk. Examination of the radiographs taken when kneeling suggests that



Fig. 1

Lateral radiograph of a knee in a patient in an 'upright' kneeling position.

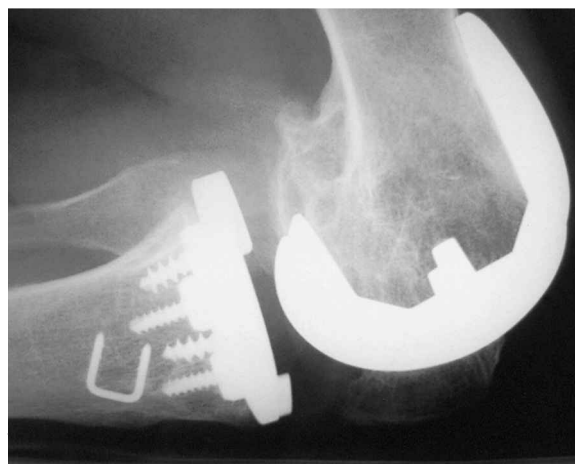


Fig. 2

Lateral radiograph of the knee in a patient in the 'flexed' kneeling position.



Fig. 3

Lateral radiograph showing upright kneeling in a normal knee.

compressive forces through the femoral component are similar to those experienced in normal standing and walking (Figs 1 and 2). The tibial tray appears to be protected since it has no contact with the weight-bearing surface. The patellar button, when present, is in compression and, because of its obliquity, appears to experience a degree of shear. This differs from the normal knee (Fig. 3). Kneeling tends to produce posterior subluxation of the tibia, but this is prevented by the PCL and the congruency of the bearing surface and the tibial post in a PCL-retained replacement system. Therefore the forces through the prosthesis appear theoretically to be benign except possibly for the patellar button and the tibial tray in PCL-sacrificing devices.

The only previous publication on this subject showed similar results. Schai, Gibbon and Scott<sup>16</sup> found that 44% of their patients stated that they could kneel, but 82% were actually observed to kneel easily. Fear of harming the prosthesis and lack of information explained why 49% did not kneel. Differences in operative technique from our study included a midline skin incision and patellar resurfacing in 89% of patients. Both studies recorded differences between the perceived and actual ability to kneel. Minor differences between the design of the studies may account for the different figures. 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 fewer neuromata and kneeling difficulties after surgical exploration of ligamentous injuries.<sup>17</sup> We prefer to use a medial parapatellar skin incision in total knee arthroplasty to prevent elevation of potentially devitalised skin flaps at the front of the knee.<sup>18</sup> The risk of poor wound healing has to be weighed against the marginally improved ability to kneel with a lateral skin incision.

The actual ability to kneel after total knee replacement differs from the perceived ability to kneel and varies 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 patellar resurfacing, the range of movement or the functional knee score.

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