After Partial Knee Replacement, Patients Can Kneel, But They Need to Be Taught to Do So: A Single-Blind Randomized Controlled Trial

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Background and Purpose. Kneeling is an important functional activity frequently not performed after knee replacement, thus affecting a patient's ability to carry out basic daily tasks. Despite no clinical reason preventing kneeling, many patients fail to resume this activity. The purpose of this study was to determine whether a single physical therapy intervention would improve patient-reported kneeling ability following partial knee replacement (PKR).

Subjects. Sixty adults with medial compartment osteoarthritis, suitable for a PKR, participated.

Methods. This was a single-blind, prospective randomized controlled trial. Six weeks after PKR, participants randomly received either kneeling advice and education or routine care where no specific kneeling advice was given. Reassessment was at 1 year postoperatively. The primary outcome measure was patient-reported kneeling ability, as assessed by question 7 of the Oxford Knee Score. Other factors associated with kneeling ability were recorded. These factors were scar position, numbness, range of flexion, involvement of other joints, and pain. Statistical analysis included nonparametric tests and binary logistic regression.

Results. A significant improvement in patient-reported kneeling ability was found at 1 year postoperatively in those participants who received the kneeling intervention. Group allocation was the only factor determining an improvement in patient-reported kneeling ability at 1 year postoperatively.

Discussion and Conclusion. The single factor that predicted patient-reported kneeling ability at 1 year postoperatively was the physical therapy kneeling intervention given at 6 weeks after PKR. The results of this study suggest that advice and instruction in kneeling should form part of a postoperative rehabilitation program after PKR. The results can be applied only to patients following PKR.

Kneeling is an important functional activity affecting the ability to carry out basic tasks of everyday life such as housework, playing with children, and gardening. It has major clinical significance to the patient population undergoing knee surgery, and many patients with proposed knee surgery ask about the possibility of kneeling after their operation.[1]

The Oxford partial knee replacement (PKR) is appropriate for about 1 in 4 osteoarthritic knees requiring joint replacement.[2] It was approved by the Food and Drug Administration in April 2004, and its use in the United States had risen to slightly more than 21,000 in 2007 (personal communication with Biomet UK Ltd*). The PKR has many advantages over total knee replacement (TKR), including quicker recovery, increased range of motion (ROM), a reduced complication rate, and improved kinematics.[3,4]

This study was conceived following feedback from patients who had undergone PKR at a specialist orthopedic hospital. During routine audit,[5] patients with an otherwise good recovery of function following PKR commented during their clinical visits that they could not kneel, or had been told not to kneel, and many expressed a desire to do so. As a result of these comments, an audit of question 7 of the Oxford Knee Score (OKS), which specifically asks about a patient's ability to kneel, was completed. A convenience sample of the OKS of 50 patients tested preoperatively and at least 1 year postoperatively was selected. This audit showed that 28% of patients preoperatively and 34% of patients postoperatively reported that kneeling was impossible. Whitehouse et al[6] also noted in their audit of TKRs that even for the 3.7% of patients with the highest 2 scores for all other questions on the OKS, kneeling was still recorded as impossible.

Few studies relate to kneeling following PKR.[7–10] Those studies that do relate to kneeling following PKR suggest that many factors may be involved in being able to kneel. These factors include scar position and skin hypoaesthesia (or numbness),[11–15] restricted range of flexion,[7,8,16,17] involvement of other joints,[4,18,19] and pain.[2,7,8,15,16,20] It is probable that a complex relationship exists between these factors and the ability to kneel.

Hassaballa et al[8] suggested that many of the reasons given by patients for not kneeling could be addressed by including kneeling as part of their rehabilitation program. However, whether postoperative kneeling difficulties would respond to a physical therapy intervention of education, advice, reassurance, and, most importantly, instruction on kneeling has not been shown.

With this in mind, the primary aim of this study was to determine whether a single physical therapy intervention provided at 6 weeks postoperatively would improve patient-reported kneeling ability following PKR. A secondary aim was to investigate whether factors such as scar position, numbness, ROM, involvement of other joints, and pain were predictive of kneeling ability after PKR.

Method

Design Overview

A prospective, randomized controlled trial with blinded assessments was conducted. All participants gave written informed consent prior to inclusion in the study.

Participants were randomly assigned to 1 of 2 groups: a kneeling intervention group (n=30) or a routine intervention group (n=30). Data were collected preoperatively and at 6 weeks and 1 year postoperatively. Data collection took approximately 30 minutes to complete. At the 6-week visit, the physical therapist conducting the trial saw all of the participants, collected all of the data, and after randomization administered the kneeling intervention to the kneeling intervention group. Those participants in the routine intervention group who asked about kneeling were told that they would be fully informed about the trial when they attended their routine 1-year review. An independent physical therapist masked to treatment allocation collected all participant data at 1 year. After this 1-year visit, the kneeling intervention given to the kneeling intervention group was offered to the routine intervention group. All participants accepted this offer of instruction and advice on kneeling, and this intervention was given by the trial therapist.

Setting and Participants

Between February 2004 and August 2005, all potential participants attending a specialist orthopedic hospital and satisfying the inclusion criteria were sent details of the trial prior to their preoperative assessment clinic (POAC) visit. Patients were eligible for inclusion if they were listed for a primary medial PKR. They were excluded if they lived more than 45 minutes from the hospital, were likely to require a TKR, had severe problems with their other lower limb, or were unable to kneel for other reasons. They were not excluded if they already had a contralateral PKR.

Sixty adults (31 women, 29 men) with a mean age of 66 years were recruited. Twenty-seven participants had their right knee replaced, 42 participants had joints other than their knee affected, and 14 participants had a PKR on the contralateral side (Tab. 1).

* Biomet UK Ltd, Waterton Industrial Estate, Bridgend CF31 3XA, United Kingdom.

Table 1.
Patient Demographics

Variable	Kneeling Intervention Group (n=30)	Routine Intervention Group (n=30)
Age (y), mean (SD)	66 (8.3)	67 (7.6)
Sex, male/female, no. (%)	13 (43)/17 (57)	18 (60)/12 (40)
Side, right/left, no. (%)	15 (50)/15 (50)	12 (40)/18 (60)
Involvement of other joints, knee only/other joints, no. (%)	7 (23)/23 (77)	11 (37)/19 (63)

The trial clinician was a specialist orthopedic physical therapist with more than 10 years of experience. Once recruited in the POAC, the trial participants followed the usual protocol for PKR and were assessed by medical and nursing staff. They had routine and stress radiographs and completed all of the outcome measures, which included the OKS[21] and a digital photograph of their knee.

Randomization and Interventions

All participants followed the standard PKR treatment protocol both preoperatively and postoperatively[22] until randomization[23] at the routine 6-week postoperative clinic appointment.

Randomization at 6 weeks followed the method described by Pocock,[23] and block sizes of 10 and 20 were used to help preserve unpredictability.[24] An independent assistant filled the opaque envelopes where the wording "Kneeling" or "Routine" was written in highlighter pen to aid further concealment within the envelope. Random assignment of participants to treatment groups postoperatively helped prevent the participants in the 2 groups from coming in contact with each other during their hospital stay and exchanging information on the trial.

Participants assigned to the kneeling intervention group received a "one-off" 30-minute physical therapy intervention designed to provide verbal and written information on kneeling. In particular, they were told that even though kneeling might be uncomfortable or painful, kneeling on their partial knee would not damage the new joint. They were shown how to kneel carefully and safely on a soft exercise mat using arm support on a plinth to help lower themselves down to the kneeling position and return to standing. This advice is similar to that available in the NHS Direct encyclopedia Web site[25] on how to get up from the floor after a fall. They were encouraged to kneel on both knees and keep their knees, hips ,and shoulders in line and perpendicular to the floor, as described by Ulbrich et al.[19] They were told not to attempt to sit with their bottom on their heels initially because at this stage they were unlikely to have sufficient knee flexion to do so. The benefits and problems of kneeling were discussed in detail. Following this demonstration from the physical therapist, any concerns or problems were addressed and the participants knelt on the soft exercise mat. They were then advised to try to kneel at home on a soft surface, as required for everyday tasks. As with all patients following the standard hospital protocol for PKR, all the trial participants were given a contact telephone number to call if they had any problems or concerns about their knee and were told that their next routine appointment would be at 1 year postoperatively (when a letter would be sent to them).

Participants assigned to the routine intervention group followed the standard PKR treatment protocol.[22] This protocol follows an accelerated standardized care pathway to encourage rapid mobilization and return to function prior to discharge from the hospital. It assumes a hospital stay of 1 to 2 days, and patients are discharged when they are safely and independently ambulating with an appropriate walking aid, are able to ascend and descend stairs, and are medically well. On discharge, patients independently continue with their physical therapy exercise regimen of ROM and muscle strengthening exercises until their 6-week clinic appointment. This protocol did not mention kneeling at any point. This was in line with normal practice at the time. Participants in this group also were given a contact telephone number to call and told that they would be seen again at 1 year postoperatively.

Outcome Measures

Data for all outcome measures were collected preoperatively and at 6 weeks and 1 year postoperatively.

Primary outcome measure. The primary outcome measure was patient-reported kneeling ability, as assessed by question 7 of the OKS. The OKS is a 12-item, self-report questionnaire. It has been validated and is reliable and sensitive for use with joint replacements. Administering the complete OKS gave an overall knee score that provided a good clinical representation of these patients. The complete OKS ranged from 0 to 48,[26] with a score of 0 representing a poor result and a score of 48 representing an excellent result.

Question 7 of the OKS asks: "Could you kneel down and get up again afterwards?" The possible responses, with their point value, are: "yes, easily" (4), "with little difficulty" (3),

"with moderate difficulty" (2), "with extreme difficulty" (1), and "no, impossible" (0). Question 7 was chosen as the primary outcome measure because it is the item in the OKS that asks the patient specifically about his or her ability to kneel. Question 7 has been reported as a question in the OKS that patients find difficult to answer.[6]

During the development of the OKS,[21] Cronbach alpha was considered as a measure of the individual reliability and internal validity of each of the 12 questions in the OKS. Dawson et al[21] noted that preoperatively all except 3 of the questions (neither question 1 for pain nor question 7 for kneeling were among these) correlated with the total OKS at $r \geq .53$. Postoperatively, all questions correlated at $r \geq .51$, and the Cronbach alpha was not improved by removal of any of the individual questions. In view of these findings, we considered it appropriate to isolate question 7 from the complete OKS and use it as the primary outcome measure.

Secondary outcome measures. The secondary outcome measures were: scar position, numbness, knee ROM, involvement of other joints, and patient-reported knee pain. These were chosen as outcome measures because they have previously been reported as factors associated with kneeling ability.

Scar position was recorded using digital photography. The scar position was marked on the skin using colored makeup pencils. Three scar locations were recorded: (1) medial overlying the patella, (2) medial not overlying the patella, and (3) other.

A digital photograph recorded patient-reported numbness at 1 year postoperatively. Any area of numbness was marked on the skin using colored makeup pencils. The presence of numbness was recorded as "yes" or "no."

Knee ROM was recorded to the nearest degree with a Gollehon extendable goniometer (model 01135).[†] A standardized position and bony landmarks were used as described by Norkin and White.[27]

The presence or absence of other joint involvement was recorded as "yes" or "no."

Question 1 of the OKS provided data on patient-reported knee pain. There were 5 possible responses scored from 0 (no pain in the knee) to 4 (severe pain in the knee).

Follow-up

Follow-up was at 1 year for both groups.

Sample Size

Data for sample size were derived from reviewing a series of patients with PKR.[5] A minimal clinical difference of 1 point in question 7 was agreed on in discussion with the team who developed the OKS. This level of clinical difference also concurs with the amount of change suggested for other knee osteoarthritis trials.[28] With a standard deviation of 1.07 and a minimal clinical difference of 1, at a significance level of .05 and 90% power, it was calculated that 27 patients per group (54 in total) needed to be recruited.[29] We aimed to recruit 60 patients to allow for dropouts.

Data Analysis

Following a Kolmogorov-Smirnov test of normality, data were shown not to be normally distributed, and nonparametric tests, therefore, were adopted. Independent Mann-Whitney *U* tests were used to compare preoperative and 1-year postoperative outcomes between groups. The Spearman correlation coefficient was used to analyze the association between the change in score for question 7 and the factors associated with kneeling.

Question 7 generates ordinal data. The data were converted to the dichotomous variable of improved patient-reported kneeling ability (yes/no) for each participant. An improvement in kneeling ability was taken as an increase in the participant's score for question 7 at 1 year postoperatively. No improvement was recorded for those patients whose score for question 7 remained the same or was worse at 1 year postoperatively. Following this data conversion, binary logistic regression analysis was undertaken. This analysis examined more closely the relationship between the dependent variable of improved patient-reported kneeling ability and the independent variables thought to be associated with kneeling ability (ie, group allocation, scar position, numbness, ROM, involvement of other joints, and pain). Dummy variables were created for all categorical data with more than 2 levels (scar position and pain in this instance). Statistical analysis was undertaken using SPSS version 14.0.[‡]

Results

Figure 1 details the recruitment and passage of participants through the trial. At 1 year postoperatively, 29 participants in each group had successfully completed the trial and attended for final analysis. One participant in the kneeling intervention group was lost to follow-up for failing to attend for final review. In the routine intervention group, 1 participant died.

[†] Lafayette Instrument Co, 3700 Sagamore Pkwy North, PO Box 5729 Lafayette, IN 47903.

[‡] SPSS Inc, 233 S Wacker Dr, Chicago, IL 60606.

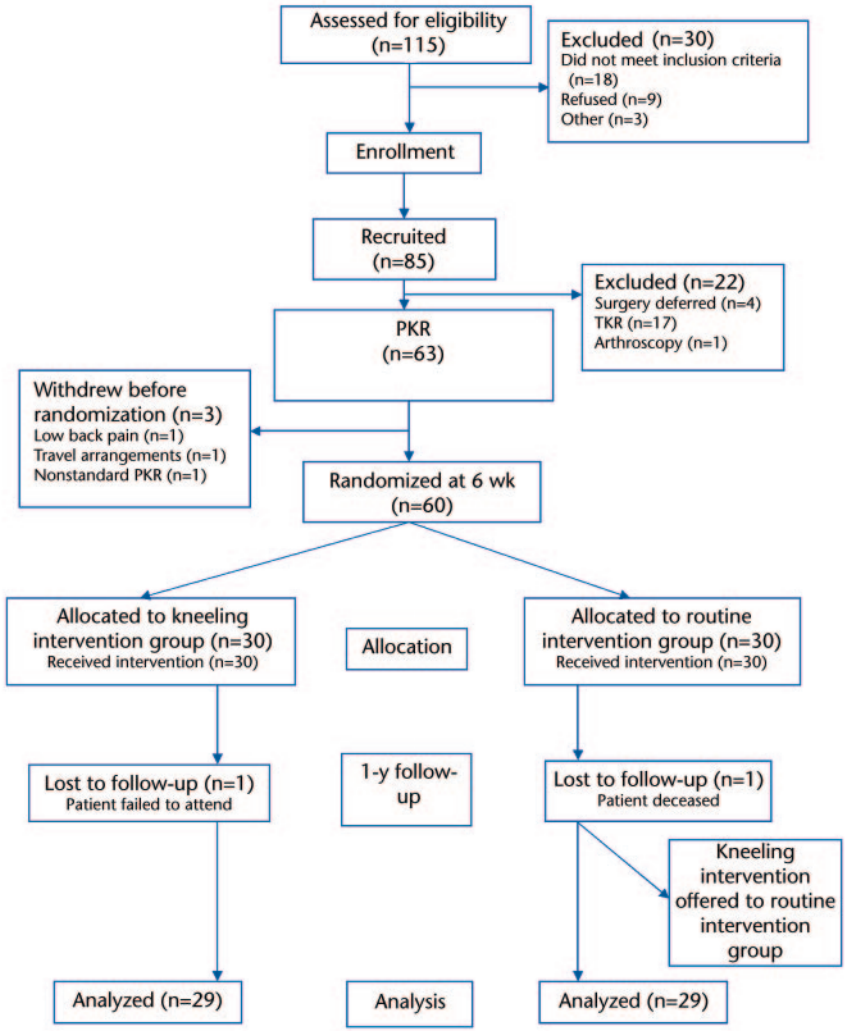

Figure 1.
Flow of participants through the trial. PKR=partial knee replacement, TKR=total knee replacement.

After randomization at 6 weeks post-PKR, analysis of the preoperative data (Tabs. 1 and 2), using the Mann-Whitney *U* test, showed no statistically significant difference between the groups ($P>.05$).

Analysis of question 7, using the Mann-Whitney *U* test, showed that there was no significant difference in patient-reported kneeling ability between groups preoperatively ($P=.42$). However, at 1 year postoperatively, after the kneeling intervention was administered to the kneeling intervention group at the 6-week visit, there was a significant difference in patient-reported kneeling ability between groups ($P=.013$). The improvement was greater in the group that received the kneeling intervention, as demonstrated by an increase in the median question 7 score from 1 to 3 for the kneeling intervention group and from 1 to 2 for the routine intervention group.

Table 3 details the results of the binary logistic regression analysis. Even in the presence of, and controlling for, all of the other variables, the group to which a participant was assigned was the only significant factor in determining an improvement in patient-reported kneeling ability ($P=.01$). Notably, the Exp(B) value or odds ratio of 7.5 indicates that the participants in the kneeling intervention group were 7.5 times more likely to report an improvement in kneeling than those in the routine intervention group. For the factor of group allocation, the 95% confidence interval for Exp(B) was 1.6–35.2. Although this interval was large, it indicates that the result was statistically significant at $P<.05$.

Binary logistic regression did not take into account the depth of change, or amount of improvement, in patient-reported kneeling ability of each participant observed in this study. To assess the depth of change following the kneeling intervention, each participant's change score for question 7 from preoperatively to 1 year postoperatively was calculated. The preoperative question 7 score was subtracted from the question 7 score at 1 year postoperatively to obtain a change score for each participant at the end of the intervention. Figure 2A plots the change score for both groups, and Figures 2B and 2C plot the change scores for the kneeling intervention group and the routine intervention group separately. Analysis of the change scores for patient-reported kneeling ability, using the Mann-Whitney *U* test, showed a significant difference between groups at 1 year postoperatively ($P=.003$).

Using the Spearman rho correlation coefficient, group allocation was the only factor significantly associated with the change in scores for patient-reported kneeling ability at 1 year postoperatively ($r=-.389$, $P=.003$) (Tab. 4).

Table 2.
Knee Range of Flexion and Oxford Knee Score (OKS) Preoperatively and at 1 Year Postoperatively

	Preoperatively			1 Year Postoperatively		
	Kneeling Intervention Group (n=30)	Routine Intervention Group (n=30)	Both Groups (n=60)	Kneeling Intervention Group (n=29)	Routine Intervention Group (n=29)	Both Groups (n=58)
OKS (0–48)						
Median	20	24	23	42	42	42
Interquartile range	16–25	18–28	16–27	33–45	33–45	33–45
Range	6–32	10–38	6–38	7–48	14–48	7–48
Significance, Mann-Whitney *U* test	*P*=.118			*P*=.907		
Range of flexion (°)						
Mean	122	123	122	121	121	121
SD	14.9	12.4	13.6	10.6	10.9	10.6
Range	85–140	85–150	85–150	95–138	95–143	95–143
Significance, Mann-Whitney *U* test	*P*=.941			*P*=.863		

Table 2 shows there was no significant difference in the range of flexion or in OKS scores between groups preoperatively or at 1 year postoperatively.

Discussion

This study was very well received by the participants. At the outset, they thought the study was relevant to them, and 59 of the 60 participants said they would like to be able to kneel following their surgery. This is reflected in the high retention rates at 1 year postoperatively, where only 1 person failed to attend for final review and only 9 (8%) of the 115 participants assessed for eligibility refused to participate (Fig. 1).

The results showed that the intervention provided to the kneeling intervention group at 6 weeks post-PKR produced a significant improvement in their reported kneeling ability at 1 year postoperatively (*P*=.013). There also was a significant difference between groups in the change scores for patient-reported kneeling ability at 1 year postoperatively (*P*=.003). In the kneeling intervention group, the increase in the median score for question 7 from 1 (extreme difficulty kneeling) to 3 (little difficulty kneeling) was twice the increase that was regarded as a clinically important difference. These findings are significant because patients with knee replacements have stated that they want to be able to kneel following surgery.[30] The improved kneeling ability that patients have reported will help them to perform their chosen daily activities and give them confidence in their own ability to get up from the floor if they fall.[25] This is important in this population because older adults often have difficulty rising from the floor.[19]

There also, however, was an improvement from baseline in reported kneeling ability in the routine intervention group, which could be explained by their general improvement in function and relief of pain

Table 3.
Binary Logistic Regression Analysis for Improvement in Patient-Reported Kneeling Ability at 1 Year Postoperatively

Kneeling Factor[a]	Significance	Exp(B) Odds Ratio	95% Confidence Interval for Exp(B)	
			Lower Limit	Upper Limit
Scar position 1	.094	4.209	0.784	22.586
Scar position 2	.719	1.922	0.055	67.225
Numbness	.117	7.082	0.611	82.038
Range of flexion	.199	0.948	0.873	1.029
Involvement of other joints	.506	0.546	0.092	3.238
Pain 1	.145	4.649	0.590	36.652
Pain 2	.348	3.508	0.256	48.163
Pain 3	.191	4.865	0.454	52.157
Pain 4	.284	7.266	0.193	273.206
Group	.010	7.550	1.615	35.291

[a] Scar position 1=medial not over patella, scar position 2=other (reference category for variable=medial over patella). Pain 1=very mild, pain 2=mild, pain 3=moderate, pain 4=severe (reference category for variable=no pain).

Table 4.
Spearman Correlation Coefficients (rho) for Association Between Change in Patient-Reported Kneeling Ability as Assessed by Question 7 of the Oxford Knee Score and Group Allocation and the Factors Associated With Kneeling Ability

	Scar Position	Numbness	Range of Flexion	Involvement of Other Joints	Pain	Group
Spearman rho	.097	−.246	.120	.019	.247	−.389[a]
Significance	.469	.063	.368	.889	.062	.003
N	58	58	58	58	58	58

[a] Significant at the .01 level.

following surgery. Table 2 details a median OKS of 42/48 for both groups at 1 year postoperatively, indicating what we would consider an excellent result in terms of overall pain relief and improved function following surgery. Despite this improvement, the reported kneeling ability was still significantly poorer in the routine intervention group compared with the kneeling intervention group. In light of the lack of influence of the other factors associated with kneeling, the continued poorer reported kneeling ability of the routine intervention group could be explained only by their lack of education and instruction by the physical therapist at 6 weeks post-PKR and the opportunity to undertake supervised practice.

Many barriers to kneeling have been reported, namely scar position, numbness, range of flexion, involvement of other joints, and pain. In this study, however, no association between any of these individual factors and a change in patient-reported kneeling ability was found using either the Spearman correlation coefficient or binary logistic regression. Consequently, the improvement in patient-reported kneeling ability was thought to be due to the kneeling intervention provided and not to any of the previously reported barriers to kneeling. The intervention greatly reduced the fear and uncertainties surrounding kneeling and gave patients clear instructions on how to kneel safely and easily.

Hassaballa et al[8] have reported that kneeling ability improves with increased knee flexion. Other reports suggest that a limitation in knee flexion postoperatively may be one of the factors predisposing an individual to greater pain or increased difficulty when kneeling.[17] In the current study, there was no significant difference in the range of knee flexion between the groups preoperatively or at 1 year postoperatively (Tab. 2). There also was no association between the range of flexion and the patient-reported ability to kneel at 1 year postoperatively. However, sufficient knee flexion is necessary to initiate the action of kneeling. Mulholland and Wyss[17] reported a minimum range of flexion of 111 degrees to kneel, but they accepted that this range may vary among individuals. The Oxford PKR has a reported range of flexion of 108 degrees at 6 weeks post-PKR, increasing to more than 120 degrees by 1 year postoperatively.[22] Our study supports these findings (Tab. 2). This is a greater ROM than is expected following TKR,[4] so ROM was not thought to be a barrier to kneeling. It is likely, therefore, that the improvement in kneeling ability in the kneeling intervention group was due to the intervention provided. With this amount of flexion, these patients should have little limitation to their activities of daily living. However, many daily activities are complex and dynamic, and although the ROM required to kneel may be only 111 degrees,[17] more ROM often is required to enable the person to get down into the kneeling position and return to an upright position and to perform assorted tasks in the kneeling position.

The ROM of other joints, specifically the hip and ankle, is relevant when discussing kneeling. Many patients with knee osteoarthritis have other involved joints, and the participants in our study were specifically asked about other joint involvement preoperatively. We found that the reason why joint comorbidities were not a significant factor in a patient's ability to kneel may relate to the way the participants were instructed how to perform the kneeling task. Instruction in the most efficient way of performing a specific task has been shown to alter the ROM necessary at target joints and to reduce the stresses at these joints.[17,31] The education and advice given to the kneeling intervention group in this study suggest that using the upper limbs and a soft mat provides patients with an efficient way to kneel down and get up again afterward, potentially reducing the strain on the surrounding joints.

There are many reports in the literature concerning injuries to the infrapatellar branch of the saphenous nerve. These injuries are reported as causing suboptimal results following knee surgery, leaving the patient with postoperative pain and hypoaesthesia.[11,13,14,32] The current study showed that, with a medially placed

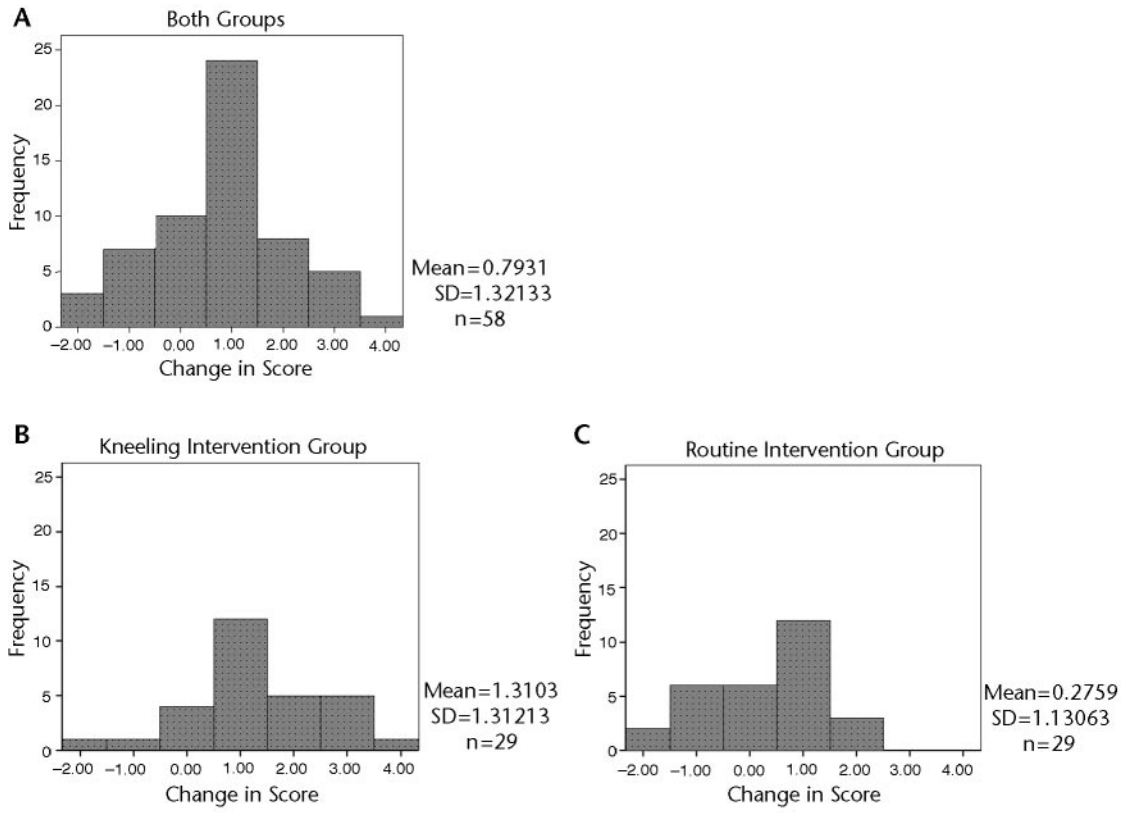

Figure 2.
Change in score on question 7 (patient-reported kneeling ability) of the Oxford Knee Score.

and minimally invasive incision, any resulting numbness does not affect a person's ability to kneel at 1 year postoperatively. Nevertheless, anecdotal evidence from this study suggests that many patients do not like the D-shaped patch of altered sensation lateral to the scar, and every effort should be made during surgery to protect the nerves around the knee, especially in the "kneeling sensitive" area,[33] to improve patient satisfaction postoperatively.

Not every joint will be pain-free postoperatively,[20] but the presence of pain at 1 year postoperatively, as recorded by question 1 of the OKS, was not found to be significant in terms of kneeling ability. However, of the 4 possible explanations for postoperative pain described by Goodfellow et al[34] (medial tibial condyle overload, pes anserinus bursitis, medial overhang of the tibial component, and overstretching of the medial collateral ligament at the time of surgery), only the first 2 can conceivably be aggravated or reproduced by kneeling, as the relevant structures are orientated in the anterior aspect of the knee.

Hassaballa et al[8] and Schai et al[15] reported that patients generally are uncertain about the recommendations given to them concerning kneeling and perhaps, as a result, are afraid of damaging their prosthesis. This trial has attempted to put an end to patient and physician uncertainties concerning kneeling by providing patients with clear advice and instruction on kneeling from an experienced therapist during routine clinic visits.

This trial has shown that it is possible to improve one specific activity post-PKR. However, it is unrealistic to think that everyone will be able to perform all functional activities following knee replacement. An increase in the expectation of performance of joint replacements in recent years[35] may have left health care professionals expecting too much from patients postoperatively. Noble et al[36] suggested that approximately 40% of the decreased function seen after TKR is due to the normal physiological effects of aging. Activities such as kneeling, squatting, climbing stairs, and getting up from a low chair—traditionally difficult activities after TKR—also were found to be difficult in age- and sex-matched control subjects with no previous knee problems, although to a much lesser degree. Kneeling is regarded as a demanding activity in this population, and it may be that kneeling is not a realistic op-

tion for many patients following knee replacement due to other joint problems or advancing years. However, some patients may need to kneel to return to full employment, and other patients may need to perform household tasks, care for children, or undertake leisure activities such as gardening and home improvements. In addition, many religions have ceremonies that require the ability to kneel during worship.[37] All of these activities arguably contribute to improving a person's quality of life and as such cannot be underestimated.

The findings of this study are limited because they can be applied only to patients with an Oxford PKR. A further study educating patients with TKR on kneeling would provide further information and an interesting comparison in this field. Continued review of the trial participants would show whether the improved ability to kneel continued past 1 year postoperatively.

A further criticism may be leveled at how kneeling was assessed in this study. We aimed to determine whether patient-reported kneeling ability could be improved with education and advice. This intervention was chosen because patients themselves had reported difficulties completing question 7 of the OKS (patient-reported kneeling ability). We chose not to collect data on therapist-assessed kneeling ability. One reason for this was a lack of standardized criteria for assessing kneeling ability. As reported by Ulbrich et al,[19] there are many ways to rise from the floor, and many of them involve different patterns of kneeling. To devise such criteria would be a topic for further study and a possibility for further work.

Conclusion

The results of this study suggest that a single physical therapy intervention given at 6 weeks postoperatively significantly improves patient-reported kneeling ability following Oxford PKR. As such, it should be incorporated into patients' rehabilitation programs to help give them the confidence they require to kneel for daily activities or to help them rise from the floor after a fall.

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