Is extreme flexion of the knee after total knee replacement a prerequisite for patient satisfaction?

Karthik Narayan · George Thomas · Ravi Kumar

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Abstract The focus of this study was to evaluate the functional result and to specifically ascertain whether the absence of the ability to squat and sit cross-legged altered the patient's satisfaction level after a successful standard total knee replacement. Squatting and sitting cross-legged are common practices in Asia. These activities are not possible following standard total knee replacement. Patients were followed-up for a minimum of 12 months post surgery. Their level of satisfaction was assessed using a Likert scale. The Knee Society Score (KSS) was used to assess range of motion and function of the knee. Twenty-one out of 25 patients were satisfied with the surgical result in spite of an inability to squat. Deep knee flexion may not be an essential prerequisite for patient satisfaction after total knee replacement, even in a population where squatting and sitting cross-legged are part of the normal lifestyle.

Résumé L'objectif de cette étude est d'évaluer la possibilité et la satisfaction des sujets concernant l'accroupissement et la position assise après prothèse totale du genou. Ces positions sont des pratiques fréquentes en Asie. Ces positions ne sont pas possibles après une prothèse totale de genou standard. Matériel et méthode : des patients ont été suivis sur un minimum de 12 mois après l'intervention chirurgicale. Leur niveau de flexion a été évalué selon l'échelle de Likert. Le score de la « Knee Society » a également été utilisé de façon à évaluer la mobilité et la fonction du genou. Résultats : 21 patients sur 25 sont

satisfaits du résultat chirurgical en dépit de l'impossibilité de s'accroupir. En conclusion, l'hyper flexion n'est pas un prérequis essentiel dans la satisfaction des patients après prothèse totale du genou y compris dans une population où l'accroupissement et la position assise avec jambes repliées font partie du mode de vie normal.

Introduction

Total knee replacement offers reliable relief of pain and instability in properly selected patients [1, 4]. Squatting and sitting cross-legged are common practices in Asia [7], and these activities are not possible with standard designs used in knee replacement. A belief that deep flexion would improve patient satisfaction is driving the design of so-called high flexion knees. We are not aware of any study that addresses the question of whether inability to squat affects patient satisfaction after total knee replacement.

This retrospective study is to evaluate the functional result and to specifically ascertain whether the absence of the ability to squat and sit cross-legged altered the patient's satisfaction level after a successful knee replacement.

Materials and methods

We performed 67 total knee replacements in 53 patients for different indications between February 2000 and October 2005.

All patients were accustomed to squatting and sitting cross-legged before the onset of disease. None of them had been able to perform these activities for at least 6 months prior to surgery.

K. Narayan (✉) · G. Thomas · R. Kumar
Department of Orthopaedic Surgery,
Southern Railway Headquarters Hospital,
Ayanavaram, Chennai, 600 023, India
e-mail: karthikortho@gmail.com

Table 1 Results of patient satisfaction using the Likert scale

Satisfaction number	Satisfaction description	No. of patients
1	Extremely satisfied	7
2	Satisfied	15
3	Neutral	3
4	Unsatisfied	0
5	Extremely unsatisfied	2 (both had deep infection and subsequent arthrodesis)

All patients received a standard knee replacement, either Press Fit Condylar (PFC, Depuy Johnson and Johnson) or Genesis II (Smith and Nephew). The choice of cruciate retainment or cruciate substitution depended on the surgeon. Patients were followed-up regularly at 1, 3, and 6 months and annually thereafter. The functional result and range of motion of the knee were assessed at a minimum period of 12 months post surgery by an independent surgeon.

The function of the knee was assessed using the Knee Society Score (KSS) [3]. Patient satisfaction was assessed by using the Likert scale, and patients were grouped as:

- 5 *Extremely satisfied*
- 4 *Satisfied*
- 3 *Neutral*
- 2 *Unsatisfied*
- 1 *Extremely unsatisfied*

The patients were also specifically asked whether the absence of squatting affected their satisfaction level. The results were analysed statistically using SPSS software, version 10.0.

Results

At the time of the last follow-up in October 2006, 36 knees in 27 patients were available for examination. Seven patients were either in different countries or in other states. Four were contacted by telephone. Eleven patients were lost to follow-up. Nine of the cases available for examination had bilateral knee replacements. One of the patients contacted by telephone also had replacement of both knees. Eight patients had died in the intervening period.

Twenty-three knees had cruciate-retaining prostheses and 13 knees had cruciate-substituting prosthesis. None of the cases in the study had patellar replacement. The mean age of the patients was 58.7 years (range, 32–72). There were 10 male and 17 female patients who presented for examination. The period of follow-up ranged from 12 to 74 months, with a mean of 25.12 months. Patient satisfaction using the Likert scale is shown in Table 1.

All patients were accustomed to squatting and sitting cross-legged as an integral part of their daily living activities until the progression of arthritis made these activities impossible. All patients had made some modifications in their daily living to accommodate this change prior to seeking operative intervention. Two patients had deep infection and required arthrodesis.

Regarding deep flexion, patients responses fell into three groups:

Group I: Patients felt comfortable with the modifications they made in their daily activities and were not affected by inability to squat. Total patients: 11

Group II: Patients were comfortable with their level of function with their present knee but felt flexion of a few more degrees would have been more comfortable. Total patients: 10

Fig. 1 Comparison of preoperative and postoperative Knee Society Scores

Fig. 2 Comparison of preoperative and postoperative functional scores

Group III: Patients felt inability to squat was a problem and they felt left out in day to day community life, in spite of making modifications in their daily activities at home. Total patients: 4

The four patients who were contacted by telephone all fell into group I.

The Knee Society Score [3] was used to compare the preoperative with the postoperative function of the patient. The mean preoperative knee score was 34.21 and the mean postoperative knee score was 86.76. The mean preoperative functional score was 39.97 and the mean postoperative functional score was 73.74.

Patients were grouped using the Knee Society Objective rating scale [3] according to excellent, good, fair, and poor results. Comparisons of the different groups with knee scores and functional scores are shown in Figs. 1 and 2, respectively.

A comparison of the preoperative and postoperative range of motion and a comparison of the deformities pre- and postoperatively are shown in Figs. 3 and 4, respectively.

The preoperative arc of motion ranged from 15° to 90°, with a mean of 72.06°. The postoperative arc of motion ranged from 60° to 110°, with a mean of 90.44°.

Preoperatively, 28 knees were in varus between 5° and 20°, and eight knees were in valgus between 5° and 25°. Twenty-two knees had flexion deformity ranging from 5° to 30°. Postoperatively, all knees were in valgus between 3° and 6°. Six knees had a flexion deformity ranging from 5° to 20°.

Discussion

The success of total knee arthroplasty depends on the relief of pain, stability, an adequate range of motion, durable function, and an absence of complications.

Recently, in India, companies and private health care providers have been aggressively promoting the concept of “high flexion” after total knee replacement, usually defined as an ability to bend the knee to 150 degrees with proper patellar tracking [2].

Fig. 3 Comparison of preoperative and postoperative range of motion of the knee

Fig. 4 Comparison of preoperative and postoperative knee deformities

We wanted to study whether high flexion was a need expressed by patients and whether absence of high flexion really compromised patient satisfaction after replacement.

Postoperative knee flexion depends on multiple factors [5, 9, 10], but preoperative range of motion is the most decisive [2]. It is also well known that patients with limited preoperative range of motion obtain less amount of motion postoperatively [5, 10]; this has also been our experience (Fig. 3).

It is well known that the standard total knee replacement provides a postoperative range of motion of about 110° and is associated with a high degree of patient satisfaction [2].

Current high flexion knee design features have been a matter of debate [2]. It is believed that extreme knee flexion may increase patello femoral joint stress, disrupting patellar–trochlear groove congruity, and leading to complications including pain, excess wear, patellar fracture, and loosening [2].

The results of high flexion knee implants obtained to date have not shown significant differences in terms of range of motion or clinical parameters when compared with standard total knee replacements [8, 11].

It was also found that in patients with earlier high flexion designed knees (Bisurface total knee), at a mean period of follow-up of 6 years, 20% felt looseness in their knee and 2% required revision for instability [6].

The drawback of our study is that it is retrospective. The patients may have responded differently to the question on satisfaction if they had been promised deep flexion preoperatively. However, the results of the high flexion designs have not shown reproducible results [11]; hence, it may be rash to promise high flexion preoperatively.

Conclusion

In our patient population, squatting was an integral part of the patient's daily activity. However, with progression of degeneration of the knee, the patients made modifications

in their activities to accommodate this change. We found that the range of motion provided by the standard total knee replacement is associated with high patient satisfaction. We therefore feel that deep knee flexion is not an essential prerequisite for patient satisfaction after total knee replacement, even in a population where squatting and sitting cross-legged are generally part of the normal lifestyle.

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