Does the ability of a patient to perform straight leg raise early postoperatively affect the outcome of total knee replacement?

R Gupta, A Abosala, M Lovell, J Borill

Citation

R Gupta, A Abosala, M Lovell, J Borill. *Does the ability of a patient to perform straight leg raise early postoperatively affect the outcome of total knee replacement?*. The Internet Journal of Orthopedic Surgery. 2008 Volume 11 Number 1.

Abstract

Patient motivation during this period influences the outcome of the surgery. The aim of this study was to find out whether patients who straight leg raise (SLR) early achieve greater clinical results. We used straight leg raise as the factor relating to patient motivation as SLR is one of the first exercises a patient is asked to achieve, this seemed a suitable point to assess patients from.

We mailed a questionnaire to 158 TKR patients. The day the patient could straight leg raise (SLR), flexion they achieved on discharge and flexion achieved on follow up (approximately 1 year), were used as guides to clinical function.

The response rate from the questionnaire was 56%. There was a significant difference between the groups for the amount of flexion achieved on the follow up at 1 year ($p = 0.005$). In conclusion patients who SLR early achieve greater clinical results in the long term.

INTRODUCTION

Total knee replacement (TKR) is the definitive treatment for osteoarthritis and inflammatory arthritis of the knee. TKR aims to reduce pain and improve function of the knee for the patient. The rehabilitation of the patient post TKR is essential. Patients post-operatively are placed in a splint that keeps the knee straight. On the first day postoperatively the patients is encouraged to SLR in the splint, and strengthen their quadriceps muscles with static quadriceps exercises. Patients were fully mobilized weight bearing on day 2 and flexion exercises are commenced. By five to seven days the patient is expected to be fully mobile with crutches or stick and be able to flex knee to 70-80 degrees.

Peerbhoy et al ($_2$) studied into the recovery after TKR, looked at 66 patients and how they progressed in the first few days. They concluded that the older patients generally took longer to get mobilize. Patients who took longer to mobilize tended to be slow to gain function.

As a straight leg is one of the first exercises a patient is asked to achieve this seems a suitable point to assess patients from. The earlier a patient can perform a straight leg raise may indicate how motivated a patient is. By comparing patients who SLR on different days to each of the various aspects of the questionnaire it may highlight any significant differences between the groups. This leads to the hypothesis; does the ability of a patient to perform a straight leg raise early postoperatively affect the outcome of TKR?

METHOD

Wythenshawe hospital performs approximately 150 TKR in a year. Patients who only had regional anesthesia were included in the study to maintain uniformity. Only patients who had the Deupoy LCS mobile-bearing total knee replacement system were included as this was the most commonly used implant system. Patients who had bilateral TKR were excluded from the study. In this study, 158 patients were mailed questionnaire.

The selected patients ranged in age and sex, and with an equal spread between consultants.

The questionnaire mailed comprised of three parts, WOMAC a disease specific questionnaire, SF-36 a general health questionnaire. To allow scores to be compared in this study we used a Likert scoring scale of 1 + none and 5+ extreme. Patients were finally asked to rate their surgery

(excellent – dreadful)? We also gave the patients opportunity to tell us any other comments that the questionnaire failed to enquire about.

The other part of this retrospective study was gathering information from medical records. The data taken from the medical and physiotherapy records included, on what day the patient could straight leg raise, what flexion angle they achieved on discharge from in-patient care and flexion angle on consultant follow-up.

Data analysis was done using SPSS-11.5. Descriptive statics were used to summaries data. The straight leg raise group was compared using the one way ANOVA test for those that followed a normal distribution and Kruskal Wallis for those that were not normally distributed. Significance was set at p less than 0.05.

RESULTS

The average patient age at the time of operation was 70.3 years. 66.7% were female, with an average age of 71.1 years. 33% of men had average age of 68.8 years. The number of right and left knees operated on was equal.

The clinical information collected gave us the data on how the patients was physically rehabilitating. The mean time it took to SLR was 2.15 days however there was a range of 1 day to 10 days. The median number of days was 2.

The flexion a patient could achieve before discharge from hospital averaged 69.2°, with a range of 30° to 100°. Flexion on follow up averaged 99.9° with a range of 60° to 130°.

To answer a part of our hypothesis we looked for a difference in the patients who could SLR on day 1 (group 1). Day2 (group 2) and day 3 to 10 (group 3). It was necessary to group day 3 -10 patients because of the small number of patients in theses days, it would be otherwise be extremely difficult to conclude any significant results.

Figure 1

Flexion on discharge	Mean (+/- SE)	Standard deviation (SD)
GROUP 1	74+/-3	17.8
GROUP2	66+/-4	15.2
GROUP3	66+/-4	18

Figure 2

Flexion on follow up	Mean (+/- SE)	Median	Interquartile range (IQR)
GROUP 1	104 +/-2	107.5	16.25
GROUP2	97+/-3	95	15
GROUP3	95+/-3	95	12.5

Because each group followed a normal distribution curve we used a parametric test to test for any differences. One way ANOVA was used. This gave a p= 0.089. This means that that there is no evidence of a relationship between flexion on discharge and SLR.

The flexion in the follow up group was not normally distributed. Therefore a non-parametric test was needed. The kruskal-Wallis test was applied P = 0.005 was noted. This was significant and a suggestion made that there are differences between patients who can SLR on day 1 compared to day 2, day 3 and above. Thus if on day 1 a patient can SLR they do achieve greater range of movements when followed up at 1 year.

The range of question asked gave us a comprehensive guide to how the patient was feeling about their knee and their general health. The first section WOMAC asked specifically about their knee and problems they have. To analyze the results as a whole were looked at.

WOMAC total score range 24-120

Figure 3

WOMAC TOTAL SCORE	Mean (SE+/-)	Median	SD
ALL PATIENTS	58.4+/-2.2	51	20.6
SLR GROUP1	51.3+/-3.5	48	19.9
SLR GROUP2	57.6+/-4.9	51.5	20.7
SLR GROUP2	56.8+/-5.0	53	20.6

One way ANOVA p = 0.487. The WOMAC scores do not seem to show any significant differences when SLR groups are compared. Thus the day a person straight leg raise does not have an influence on the function, pain and stiffness a person suffers post operatively.

The next section of the questioare was the SF-36 general health questionnaire.

Sf-36 total score range 36-160

Figure 4

SF-36 TOTAL SCORE	Mean (SE+/-)	Median	IQR
ALL PATIENTS	101.0+/-2.6	99	33
SLR GROUP1	102.9+/-4.0	100	27
SLR GROUP2	106.1+/-4.8	101	37
SLR GROUP3	99.2+/-6.9	98	51

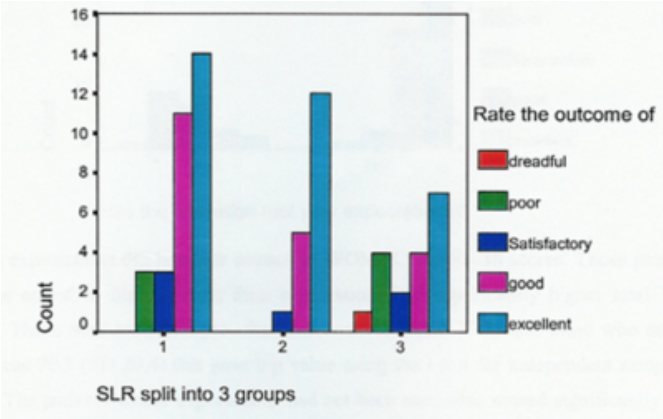
There was a range of results for all patients of 46 to 150 out

of the possible score of 160. The results were not normally disturbed so Kruskal-Wallis test was used, giving a p = 0.707. The SF-36 scores also do not seem to show any significant differences when SLR groups are compared.

The final question asked was to rate their TKR surgery. Chart 1 shows the overall result and the second splits the patients into their SLR groups.

Figure 5

Chart 1



The mean rating of the surgery was slightly better that good when looking at all the patient's responses together. When the patients were split into the days they can SLR, the mean rating was day 1 pts was slightly higher than good (4.2), day 2 pts scored even higher on average (4.7) and the pts who SLR 3-10 days average lower than good. (3.7).

The distribution within the SLR group is not normal. The Kruskal-Wallis test gives a p = 0.070 which although not significant does indicate that there is a trend with the day a person straight leg raises and their rating of the surgery.

DISCUSSION

Using WOMAC and SF-36 as a scoring systems to evaluate the patients views on their knee since their TKR was a strength of this study. Both are widely used in orthopaedic trials and so have been validated.

A design weakness we had was no pre operative data available. WOMAC score and SF-36 scores before and after would have allowed us to calculate changes in the score, rather than just a one off view that we have now.

The response rate and completion rate of the questionnaire was the limitation in this study. We mailed 158 questionnaires out to patients and we received only 88 replies, which is a response rate of 56%. Weiss et al ([7]) noted that those patients with little or no problems may still be in full time employment and may not have the time or feel it necessary to respond, whilst those retired patients or those with chronic problems are more likely to respond.

From the cohort of patients in this study, it was not possible to answer the study hypothesis fully. Patients such as those who could straight leg raise on day 1 trend towards but did not have significant higher satisfaction scores (p=0.07).

The WOMAC and SF-36 scores did not change significantly between the three SLR groups. However those patients who SLR on day 1 did have greater flexion on follow up at 1 year (p=0.005). Therefore to answer the study hypothesis, patients who SLR early achieves better clinical results postoperatively but are not more satisfied with the overall outcome of their TKR.

This conclusion has implications for the rehabilitation post TKR. Greater encouragement to exercise earlier on has benefits, increasing the range of movements in the long term.

References

1. David Heck et al. Patient outcomes after knee replacement. Clinical Orthopedics and Related Research. 1998 Nov ;(356):93-110.
2. D. Peerboy et al. The systematic assessment of short term functional recovery after major joint arthroplasty.Journal of Quality Clinical Practice.. 1999 Sep; 19(3):165-171.
3. Liow Ret al. Functional Rating for Knee Arthroplasty: Comparison of Three Scoring Systems. Orthopaedics.2003 Feb.26 (2):143-9.
4. N. Mohamed et al. Journal of Rheumatology. The Importance of Patient Expectations in Predicting Functional Outcomes after Total Joint Arthroplasty. Jun. 2002; 29(6):1237-9.
5. Otto Robertson, Michael Dunbar. Patient Satisfaction Compared with General Health and Disease Specific Questionnaires in Knee Arthroplasty Patients. The Journal of Arthroplasty 2001 Jun; 16(4):476-82.
6. Pieter Bullens et al. Patient Satisfaction after Total Knee Replacement-A comparison between subjective and objective outcome assessments.. The Journal of Arthroplasty.2001 Sep; 16(6):740-82.
7. Weiss JM, Noble PC, Conditt MA, Kohl HW, Roberts S et alWhat functional activities are important to patients with knee replacements?Clin Orthop Relat Res. 2002 Nov;(404):172-88. PMID: 12439258 .

Author Information

Rohit Gupta, MRCS
South Manchester University hospital NHS Foundation Trust

Abdul Abosala, MRCS
South Manchester University hospital NHS Foundation Trust

Martyn Lovell, FRCS
South Manchester University hospital NHS Foundation Trust

J. Borill, FRCS
South Manchester University hospital NHS Foundation Trust