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Evaluation of outcomes of total knee replacement using forgotten joint score

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Abstract

Total knee arthroplasty (TKA) is one of the commonly performed procedure for osteoarthritis knee, rheumatoid arthritis, post traumatic arthritis etc. with a main goal of providing a pain free, stable and functional joint. Assessment of clinical outcomes should be done by both objective findings and by taking into account the patients point of view and his/her own evaluation of the functional trends of the treated joint. Forgotten Joint Score (FJS) is one such recently developed patient reported outcome measure (PRO), with better discriminatory power. The main aim of our study was to evaluate the patient reported outcomes in our patients who underwent TKA for osteoarthritis knee using FJS system and to analyse the temporal relationship of the outcomes of the time since surgery. Though there are various scoring systems, the “forgotten joint score” system is a disease specific and joint specific scoring system. We concluded that the best scores among our patients was obtained in patients operated 12months and 24months before the conduct of study. Therefore we can conclude that the maximum improvement in functional status of patients can be expected between 6months to 12months after surgery. Age, gender had no effects on the outcomes and the FJS score. Patients with unilateral TKR as well as bilateral TKR both had equally better functional outcomes and FJS scores.

Keywords: Total knee arthroplasty, forgotten joint score, patient reported outcome

Introduction

Total knee arthroplasty (TKA) is one of the commonly performed procedure for osteoarthritis knee and other joint damaging conditions like rheumatoid arthritis, post traumatic arthritis etc. The main goals of performing a total knee arthroplasty is to provide a pain free, stable, functional joint. Hence evaluating the results of surgery is of fundamental importance for any orthopedic surgeon. Since the goal of orthopedic treatment is to reestablish functional status, it is important to assess clinical outcomes not only by objective findings but also by taking into account the patients point of view and his/her own evaluation of the functional trends of the treated joint [1]. Forgotten Joint Score (FJS) is one such recently developed patient reported outcome measure (PRO), with better discriminatory power and less ceiling effects compared to other traditional questionnaires like Knee injury and osteoarthritis outcome score (KOOS), Western Ontario and McMaster universities Osteoarthritis Index (WOMAC) ,and Oxford knee score [2]. Moreover FJS is a disease specific as well as a joint specific scoring system which helps us to better evaluate the surgical outcomes of TKA. The aims and objectives of our study was to evaluate the patient reported outcomes in our patients who underwent TKA for osteoarthritis knee using FJS system and to analyse the temporal relationship of the outcomes of the time since surgery. We have also tried to evaluate the influence of factors like age, sex, unilateral and bilateral TKA on the FJS scores [1].

Materials and Methods

A retrospective study was conducted considering 90 patients who were operated with TKA for primary osteoarthritis knee between may 2017 to October 2019 at our centre. These 90 patients were divided into three groups. The first set of patients were operated with TKA 24 months prior to study, the second set of patients were operated 12 months before study and the third set consisted of patients who were operated 6 months prior to study. The contact details of all the patients were collected and each patient were individually evaluated on follow up and the

answers for FJS questionnaire was obtained. Following that the FJS score for each patient was calculated and the mean FJS was obtained for each group. These mean FJS of each group were statistically analysed so as to draw a conclusion regarding the temporal relationship of FJS with the patient reported outcomes post TKR. Patients operated with Primary TKR for osteoarthritis knee were only included and other complex primary TKA and revision TKA were excluded.

Table 1: Difference between groups of patients in relation to time since surgery

Group	N	Median (interquartile range)	Kruskal Wallis test value	p-value
Group 1 Surgery before 24 months	32	82.48 (77.28, 86.37)	39.55	<0.001
Group 2 Surgery before 12 months	28	79.55 (72.73, 87.22)		
Group 3 Surgery before 6 months	30	55.28 (26.33, 68.75)		

Since p value is < 0.001 it can be concluded that the average FJS value is significantly different for each group. Using Bonferroni test it can be seen that there is no significant difference between group 1 and 2 (surgery before 24 months and surgery before 12 months ($p>0.05$)). There is significant difference between the average FJS values between group 1 and 3 (surgery before 24 months and before 6 months) with $p<0.001$ as well as groups 2 and 3 (surgery before 12 months

Results

1. Difference between groups

The FJS values for each group are non-normal, and hence the values are represented using median and interquartile range. The significant difference between the average FJS for groups are studied using Kruskal Wallis test at 5% level of significance

and before 6 months) with $p<0.001$.

2. Difference between gender

The FJS values for both males and females are non-normal and hence the values are represented using median and interquartile range. To compare the significant difference between the average FJS values among males and females Mann Whitney U test is used.

Table 2: Gender distribution of patients

Group	N	Median (interquartile range)	Mann Whitney test value	p-value
Male	29	79.55 (63.75, 85.24)	-0.631	0.528
Female	61	75 53.75, 85.11)		

From Table 2 it can be seen that there is no significant difference in the average FJS values between male and female since $p>0.05$

3. Difference between age groups

The FJS values for different age groups are non-normal. The values are represented using median and interquartile range. The significant difference in average FJS values between age groups is checked using Kruskal Wallis test.

Table 3: Age wise distribution of patients

Age Group	N	Median (interquartile range)	Kruskal Wallis test value	p-value
Up to 50	7	81.82 (36.11, 83.33)	0.439	0.932
51 – 60	33	77.28 (66.66, 86.37)		
61- 70	43	77.28 (55.0, 83.40)		
More than 70	7	77.28 75.0, 86.11)		

From the above table it can be concluded that there is no significant difference in average FJS value among different age groups. Since $p>0.05$.

4. Difference between patients with bilateral surgery and unilateral surgery

The FJS values for patients with bilateral and unilateral surgeries are non-normal. Hence the values are represented using median and interquartile range. The significant difference in average FJS values among these groups are studied using Mann Whitney U test.

Table 4: Difference in outcome between bilateral TKR and unilateral TKR patients

Type	N	Median (interquartile range)	Mann Whitney test value	p-value
Unilateral	44	77.28 (58.75, 86.31)	-0.065	0.948
Bilateral	46	77.28 (64.37, 84.1)		

The above table shows that there is no significant difference in the average difference among the patients with bilateral surgery and unilateral surgery since $p>0.05$

Discussion

In the present study we tried to evaluate the temporal

relationship between the duration after total knee replacement for osteoarthritis knee with the patient reported outcomes measured using Forgotten joint score system. Apart from that we also tried to evaluate the effect of age, gender and unilateral total knee replacement versus bilateral total knee replacement on the FJS scores of the patient.

With respect to temporal relationship, our study showed that the average FJS score for the patients operated before two years was 82.48, it was 79.55 for patients who were operated before one year and 55.28 for patients who were operated six months before study.

In a similar study by Carlson *et al.* [3], the average FJS scores for patients operated 6, 12 and 24 months before the study was 59.4, 72.5 and 76.4 respectively. This is similar to the findings in our study. This is also similar to studies by Kim *et al.* [4] and Thienpont *et al.* [5] which had average FJS scores between 57 to 73.2 between one and two years after TKR.

According to study by Carlson *et al.* [2], the maximum improvement after TKR is achieved between one to six months post surgery. The peak values in outcomes are reached at 2 years post surgery after which the improvement graph somewhat begins to flatten. Even in studies by Hiyaman *et al.* [6] shows that best outcomes after TKR can be expected between one to six months post surgery and Merk Vincent *et al.* [7] showed plateau in improvements after TKR reached after two years post surgery.

In our study we could find out that there is a statistically significant improvement in the FJS scores between six months and twelve months post TKR with a p value <0.001 and we found no statistically significant improvement in FJS scores between 12 months and 24 months after surgery.

Influence of Gender on TKR Outcomes

In our study consisting of 90 TKRs, 29 were male and 61 were female we did not find any statistically significant differences in their post operative outcomes evaluated through FJS system with a p value of 0.528.

In a similar study by Behrend *et al.* [8], which evaluated 332 females and 208 males using FJS system, concluded that men has better post operative outcomes compared to women with a p value <0.01. Even a similar study by Linn J B *et al.* [9] showed men had better results compared to women.

But other similar study by Thienpont *et al.* [5] had concluded that gender has no effect on the patient reported outcomes post TKR. This is in line with the conclusions in our study.

Influence of Age on TKR Outcomes

In our study, there were 7 patients under 50 years of age, 33 were between 51 to 60 years, 43 were between 61 to 70 years and 7 were over 70 years of age. The average FJS scores for the above mentioned grouping is 81.82, 77.28, 77.28 and 77.28 respectively and we did not find any statistically significant difference in their FJS values with a p value of 0.932. So age had no effect on outcomes post TKR. This is in line with other studies by Behrend *et al.* [8] and Thienpont *et al.* [5].

Effect of Unilateral Versus Bilateral Tkr on the Post Operative Outcomes

In a study by Latifi *et al.* [10] evaluating the FJS between unilateral and bilateral TKRs had mean scores as 57.5 and 59.9 respectively with no statistical significance between their scores. Similarly study by Zeni and Syndel mackler *et al.* [11] showed no difference in outcomes between unilateral and bilateral TKRs. Whereas in a study by Bagsby *et al.* [12], Bilateral total knee replacement had good outcomes compared to unilateral TKRs.

In our study the average FJS score for both unilateral and bilateral cases was 77.28 and showed no difference in either of the patients.

Conclusion

Patient reported outcomes measures have become the best way to evaluate the functional status of the knee joint post TKR surgery. Though there are various scoring systems, the "forgotten joint score" system is a disease specific and joint specific scoring system with high validity and internal consistency.

Using forgotten joint scoring system in our study we concluded that the best scores among our patients was obtained in patients operated 12 months and 24 months before the conduct of study. Therefore we can conclude that the maximum improvement in functional status of patients can be expected between 6 months to 12 months after surgery.

We also conclude that age, gender had no effect on the outcomes and the FJS score, though few other studies state that with increasing age, the score will be better as the activity level and expectations of the elderly population goes down. Lastly patients with unilateral TKR as well as bilateral TKR both had equally better functional outcomes and FJS scores.

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