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Impact of socioeconomic factors on outcome of total knee arthroplasty

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Abstract

Background: Several factors are associated to negative outcomes of total joint replacement such as inappropriate expectations, contralateral knee pain, higher psychological distress, high body mass index, use of a walking aid, advanced age, female gender, lower OA grade and thyroid disease Nonetheless, these findings are often not consistent across studies and the exact strength of the associations between these factors and the outcomes remain elusive. It thus remains a challenge to identify which TKA candidates will likely do well, or do poorly following TKA.

Aim of the study: To study Impact of Socioeconomic Factors on Outcome of Total Knee Arthroplasty. **Materials and methods:** A total of 60 patients were selected with 30 patients selected from each low socioeconomic group and high socioeconomic group. Patients who had rheumatoid arthritis or were undergoing revision TKA were excluded from the study. Evaluation was done clinically using Knee society score (KSS), VAS Score and Modified Kuppusamy Socioeconomic status scale.

Results: VAS score for Group 1 dropped significantly from 1st postoperative day to 2nd postoperative day. After 2nd day, the VAS score decreased gradually. The mean VAS score in Group 2 decreased gradually from 1st postoperative day to 14th day postoperatively. On 24th week postoperatively, the mean VAS score was similar in both the groups. The mean difference between Group 1 and Group 2 Knee society score preoperatively was 7.1. At time of discharge, the mean difference dropped to 3.04 and was observed to be 4 at 3rd week post-operatively. The mean difference dropped gradually till 6th month postoperatively. Majority of patients in Group 1 had DVT prophylaxis up to day 6, but it was up to day 9 in Group 2.

Thus, low income is more strongly associated with satisfaction and functional outcomes in young patients after TKA than demographic or implant factors.

Conclusion: Within the limitations of the present study, it can be concluded that it is certainly possible that socioeconomic factors, particularly household income, is strongly associated with satisfaction and functional results.

Keywords: Total Knee arthroplasty (TKA), osteoarthritis, socioeconomic group

Introduction

Osteoarthritis (OA) is the most common joint disorder and a common cause of pain, loss of function and disability in older adults ^[1]. It is the second most common diagnosis made in older adults seeking medical care and the leading cause of disability at older age ^[2, 3]. When suffering from severe OA, Total Joint Replacement (TJR) is the preferred treatment option to significantly improve function and pain ^[4]. Several factors that are associated to such negative outcomes have been identified; inappropriate expectations, contralateral knee pain, higher psychological distress, high body mass index, use of a walking aid, advanced age, female gender, lower OA grade and thyroid disease have all been found to be significantly associated to worse physical function following TKA ^[5]. Nonetheless, these findings are often not consistent across studies and the exact strength of the associations between these factors and the outcomes remain elusive. It thus remains a challenge to identify which TKA candidates will likely do well, or do poorly following TKA ^[6]. Hence, the present study was conducted to study impact of Socioeconomic Factors on Outcome of Total Knee Arthroplasty.

Materials and methods:

The present study was conducted in the Department of Orthopedics of the medical institution. Prior to starting the A total of 60 patients were selected with 30 patients selected from each low socioeconomic group and high socioeconomic group and they were grouped into Group 1 (low socioeconomic group) and Group 2 (high socioeconomic group). Patients who had rheumatoid arthritis or were undergoing revision TKA were excluded from the study. Evaluation was done clinically using Knee society score (KSS), VAS Score and Modified Kuppusamy Socioeconomic status scale.

Surgical technique

All patients were operated under spinal and epidural anaesthesia with the patient in supine position. Patient in supine position with knee in 90 degrees of flexion, under tourniquet control a midline parapatellar approach was used to expose knee joint. Following the soft tissue balancing, tibial and femoral surfaces were prepared. Patella was prepared. Appropriate size of components was used. The tourniquet is deflated, hemostasis is secured. Wound is closed in layers with interrupted sutures and overlaid by continuous sutures. Suction drain is fixed. Sterile dressing and compression bandage are applied with knee brace.

Post-OP rehabilitation protocol followed as Day 1: Deep Vein Thrombosis (DVT) prophylaxis with Low Molecular Weight (LMW) heparin, in bed mobilization, deep breathing exercises. Day 2: Continuous Passive Movement (CPM), wound inspection and drain removal, patients were on epidural catheter for minimum of two to four days post operatively. Mobilize the patient to make them stand/walk with walker support. Day 5, 8, 11: Wound inspection. Day 14: Suture removal. study, ethical clearance for the study was obtained beforehand. For the study, we selected patients who were scheduled for total knee arthroplasty.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

Results

Table 1 shows the distribution of patients according to sex in both the groups. Group 1 had 16 male patients and 14 female patients. Group 2 had 18 male patients and 12 female patients. Table 2 shows difference in mean VAS score post operatively in Group 1 and 2. We observed that VAS score for Group 1 dropped significantly from 1st postoperative day to 2nd postoperative day. After 2nd day, the VAS score decreased gradually. On the contrary, the mean VAS score in Group 2 decreased gradually from 1st postoperative day to 14th day postoperatively. On 24th week postoperatively, the mean VAS score was similar in both the groups. Table 3 shows mean difference of Knee society score between low and high socioeconomic groups. It was observed that mean difference between Group 1 and Group 2 Knee society score preoperatively was 7.1. At time of discharge, the mean difference dropped to 3.04 and was observed to be 4 at 3rd week post-operatively. The mean difference dropped gradually till 6th month postoperatively. Table 4 showed duration of post-op DVT prophylaxis in low and high socioeconomic groups. It was observed that majority of patients in Group 1 had DVT prophylaxis up to day 6 postoperatively. On the other hand, majority of patients in Group 2 had DVT prophylaxis up to day 9 postoperatively. Thus, low income is more strongly associated with satisfaction and functional outcomes in young patients after TKA than demographic or implant factors.

Table 1: Distribution of patients according to sex in both the groups

Sex	Group 1	Group 2	p-value
Male	16	18	
Female	14	12	0.221
Total	30	30	

Duration	Group 1	Group 2	p-value
1st day post-operative	8.2	8.3	0.221
2nd day post-operative	5.8	7.6	0.02
5th day post-operative	5.2	6.4	0.3
14 th day postoperatively	5.11	6.1	0.06
24th weeks post operatively	4.21	4.32	0.9

Table 2: Difference in mean VAS score post operatively

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Knee society score	Group 1	Group 2	Mean difference	p-value
Pre-operative	42.26	49.36	7.1	0.006
Time of discharge	62.25	59.21	3.04	0.002
3 rd week post-operative	70.36	66.36	4	0.003
6 th week post-operative	75.32	72.35	2.97	0.02
18 th week post-operative	82.55	83.65	1.1	0.21
6 th month post-operative	90.32	89.66	0.66	0.31

 Table 4: Duration of post-op DVT prophylaxis in low and high socioeconomic groups

Duration	Group 1	Group 2
Day 6 Post Op	12	8
Day 9 Post Op	9	11
Day 12 Post Op	3	9

Discussion

In the present study, we observed that VAS score drop in low socioeconomic groups was significant from 1^{st} day postoperatively to 2^{nd} day postoperatively; however was gradual after 2^{nd} day. The VAS score was similar between

both the groups at 24th week postoperatively. Also, the difference in KSS score was significant at preoperatively, at discharge, and 3rd week postop. It was also observed that majority of patients in low socioeconomic group had DVT prophylaxis up to day 6 postoperatively whereas DVT prophylaxis was up to day 9 postoperatively in high socioeconomic group. The results were compared with previous studies from the literature. Lungu E et al. developed a preliminary prediction rule (PR) to identify patients enrolled on surgical wait lists who are at the greatest risk of poor outcomes 6 months after TKA. 141 patients scheduled for TKA were recruited prospectively from the wait lists of 3 hospitals in Quebec City, Canada. Knee pain, stiffness and function were measured 6 months after TKA with the Western Ontario and McMaster Osteoarthritis Index (WOMAC) and participants in the lowest quintile for the WOMAC total score were considered to have a poor outcome. Several variables measured at enrolment on the wait lists (baseline) were considered potential predictors: demographic, socioeconomic, psychosocial, and clinical factors including pain, stiffness and functional status measured with the WOMAC. The prediction rule was built with recursive partitioning. The best prediction was provided by 5 items of the baseline WOMAC. The rule had a sensitivity of 82.1%, a specificity of 71.7%, a positive predictive value of 41.8%, a negative predictive value of 94.2% and positive and negative likelihood ratios of 2.9 and 0.3 respectively. They concluded that the developed PR is a promising tool to identify patients at risk of worse outcomes 6 months after TKA as it could help improve the management of these patients. Desmeules F et al. measured pain, stiffness, function and HRQoL in patients at enrolment on waiting lists for knee replacement and identified demographic, clinical, socioeconomic and psychosocial characteristics associated with these outcomes. This study is part of a broader study measuring the effects of pre-surgery wait in patients scheduled for knee replacement. From 02/2006 to 09/2007, 197 patients newly scheduled for total knee replacement were recruited from the waiting lists of three university hospitals in Quebec City, Canada. Pain, stiffness and function were measured with the Western Ontario and McMaster Osteoarthritis Index (WOMAC) and HRQoL was measured with the SF-36 Health Survey. Stepwise multiple regression analysis was used to assess the strength of the associations between the independent variables and the WOMAC and SF-36 scores. The scores of all eight HRQoL physical and mental domains of the SF-36 were significantly lower than aged matched Canadian normative data. Contralateral knee pain, higher psychological distress, higher body mass index (BMI) and the use of a walking aid were significantly associated with worse function and contributed to 22% of the variance of the WOMAC function score. A higher BMI, the use of a walking aid, contralateral knee pain and advanced age were significantly associated with worse physical function and contributed to 17% of the variance of the SF-36 HRQoL physical functioning score. They concluded that patients waiting for knee replacement have poor function and HRQoL. Characteristics that were found to be associated with these outcomes could help develop pre-surgery rehabilitation program and prioritize patients that may benefit the most from them. Such programs could include interventions to reduce psychological distress, therapeutic exercises targeting both knees and weight loss management^[7, 8].

Wise BL et al. evaluated whether function as measured by WOMAC physical function subscale was associated with

undergoing TKA; and whether any such association varied by sex. Their study population sample consisted of 2946 patients with 5796 knees; 1776 (60%) of patients were women. They performed a repeated-measures analysis using baseline WOMAC physical function score to predict the risk of TKA from baseline to 30 months and WOMAC score at 30 months to predict risk of incident TKA from 30 months to 60 months. They used generalized estimating equations to account for the correlation between two knees within an individual and across the two periods. They calculated relative risk (RR) of TKA over 30 months by WOMAC function using a score of 0 to 5 as the referent in multiple binomial regressions with log link. Those with the greatest functional impairment had 15.5 times the risk of undergoing TKA over 30 months compared with the referent group, adjusting for basic covariates, and 5.9 times the risk after further adjusting for knee pain severity. At every level of functional limitation, the RR for TKA for women was higher than for men, but interaction with sex did not reach significance after adjustment for covariates including ipsilateral pain. They concluded that baseline physical function appears to be an important element in patients considering TKA. Chan HY et al. compared functional outcomes between patients discharged home and to CHs following TKA. A case-control study was conducted of patients undergoing primary unilateral TKA. Consecutive patients were retrospectively reviewed using the Knee Society Clinical Rating System, 36-item Short Form Health Survey and Oxford Knee Score preoperatively, and at the six-month and two-year follow-ups. Overall, 967 patients were discharged home and 98 to CHs. CH patients were older, female and less educated. Median CH length of stay was 23.0 days. Significant predictors of discharge destination were older age, female gender, lower education, and poorer ambulatory status and physical health. Preoperatively, CH patients had worse KSCRS Function, SF-36 Physical Functioning and Social Functioning scores. CH patients had less improvement for all scores at all follow-ups. Regardless of preoperative confounders, with repeated analysis of variance, discharge destination was significantly associated with KSCRS, SF-36 and OKS scores. They concluded that older, female and less educated patients with poorer preoperative functional scores were more likely to be discharged to CHs after TKA. At the two-year follow-up, patients in CHs had less improvement in functional outcomes than those discharged home [9, 10].

Conclusion

Within the limitations of the present study, it can be concluded that it is certainly possible that socioeconomic factors, particularly household income, is strongly associated with satisfaction and functional results.

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