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Clinical profile of patients undergoing bilateral total knee replacement at a tertiary care hospital

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Abstract

During standing, the joint reaction force increases with increasing knee flexion as the force vectors of quadriceps and patellar tendons become more parallel to the joint reaction force. It has been calculated, patella-femoral joint reaction forces is of 2-5 times body weight during activities of daily living; during squatting to 120 degree of knee flexion, the joint reaction force may be as high as 7-8 times body weight. During knee flexion, the patella makes a rolling or gliding motion along the femoral articulating surface. This study was conducted in Department of Orthopaedics, twenty patients who Consented (12 female and 8 male) and underwent SBTKR for tricompartmental arthritis of knee using a posterior stabilized type of knee prosthesis, were assessed functionally using knee society score and oxford knee score. In the present study Knee society score and oxford scores were assessed in patients post operatively after simultaneous bilateral total knee replacement at 3 months, 6 months and 12 months. it was observed that the mean KSS score right knee improved from 132.9 at 3 months to 144.57 at 6 month and 159.86 at 12 months. Mean KSS score left knee improved from 133.7 at 3 months to 145.29 at 6 month and 161.1 at 12 months. Mean oxford score improved from 32.4 at 3 months to 36.76 at 6 month and 40.38 at 12 months.

Keywords: SBTKR, tricompartmental arthritis, KNEE

Introduction

The primary function of the patella-femoral joint is to increase the lever arm of the extensor mechanism about the knee thus increasing the efficiency of the quadriceps contraction. The quadriceps and patellar tendons insert anteriorly on the patella, with the thickness of the patella displacing their force vectors away from the center of rotation of the knee. This displacement or lengthening of the extensor lever arm changes throughout the arc of the knee motion^[1].

The extensor lever arm is greatest at 20 degree of flexion and the quadriceps force required for knee extension increases significantly in last 20 degree of extension. As a consequence of its role in transmitting the force of contraction of the quadriceps muscle to the patellar tendon around a variably flexed knee, the patella experiences a joint reaction force as the trochlea opposes its posterior displacement. This joint reaction force depends on both the angle of knee flexion and the magnitude of the forces transmitted to the patella from the quadriceps and patellar tendons.

During standing, the joint reaction force increases with increasing knee flexion as the force vectors of quadriceps and patellar tendons become more parallel to the joint reaction force. It has been calculated, patella-femoral joint reaction forces is of 2-5 times body weight during activities of daily living; during squatting to 120 degree of knee flexion, the joint reaction force may be as high as 7-8 times body weight. During knee flexion, the patella makes a rolling or gliding motion along the femoral articulating surface^[2].

Throughout the entire flexion range, the gliding motion is clockwise. The mean amount of patellar gliding for all knees is approximately 6.5mm per 10 degree of flexion between zero degrees and 80 degree and 4.5mm per 10 degree of flexion between 80 degree and 120 degree. The muscles, ligaments, menisci, osseous geometry and joint capsule all combine in a complex manner to produce joint stability. If any of these structures malfunction or disrupted, knee joint instability occurs.

These factors are all interdependent & serve the function of both determining normal motion and limiting motion beyond a certain point^[3].

The constraints provided by the femoral and tibial joint surfaces are not adequate for functional stability. The distal femur is convex, whereas the proximal tibia is partially flat, slightly concave medially and slightly convex laterally. However, the tibial intercondylar eminence and the articular geometry to provide some potential for stability.

Hsieh and Walker found that geometric conformity of the condyles was the most important criteria for decreasing laxity under load bearing. They stated that in order to perform anterior or posterior, rotatory and medial or lateral movements, the femur must ride upward on the tibial curvature. Similarly, to rotate the femur "screws out", giving an upward movement. Medial/lateral motion produces this effect to an even greater degree because of the tibial spines. This is called the "uphill principle"^[4].

These authors concluded that under low loading conditions, the soft structures (ligaments, capsule and meniscus) provided joint stability and that as loading increases; the condylar surface conformity becomes the most important factor.

The ligament structures are able to resist translational forces and thus prevent translation of their bony attachments if the translation takes place in the direction of ligament fibers. This principle is particularly relevant provision of anterior and posterior translational stability. Li *et al.* have shown at the hamstrings provide an active restraint to anterior displacement in the tibia. This restraint indicates that muscle contraction contributes to the stability of the knee joint by increasing the stiffness of the joint. The collateral ligaments provide varus and valgus stability of the knee. The rotational forces are not resisted by the ligaments acting alone. Increased compressive force generated at the joint articular surface produce a torque that resists the rotation movement. Burstein and Wright have also indicated the importance of muscle forces contributing to knee joint stability in the frontal plane. At full knee extension the knee may be expected to show a balance of compressive forces between the medial and lateral compartments in response to axial loading^[5].

Understanding the loads across the knee joint is important for understanding knee prosthesis design and preference. The knee muscles are relatively inefficient because of small, effective moment arms compared with the external applied forces and moments.

This constraint requires muscles to contract at high forces to maintain joint equilibrium. Consequently, knee joint shear and contact forces are surprisingly high in magnitude.

Joint forces during stair ascent and descent are slightly higher than those used for walking. The forces increase during isokinetic exercise and in rising from chair and are greatest during downhill walking. Moreover, the peak forces during stair walking and exercise, either isokinetic or cycling, occurs at greater degrees of knee flexion^[6].

Methodology

This study was conducted in Department of Orthopaedics, twenty patients who consented (12 female and 8 male) and underwent SBTKR for tricompartmental arthritis of knee using a posterior stabilized type of knee prosthesis, were assessed functionally using knee society score and oxford knee score

The follow-up period was at 3 months, 6 months and 1 year.

Inclusion criteria

- Age 50-70 years
- Patients with ASA grade 1&2
- Patients presenting with severe O.A or R.A of B/L knee
- Patients consented for SBTKR

Exclusion criteria

- Age <50 and >70
- Patients with ASA grading ≥ 3
- Previous history of infection in knee joint
- Previous history of trauma around knee

Results

A total of 21 patients with simultaneous bilateral total knee replacement admitted in SVS were recruited for the present study. After obtaining informed consent detailed history, medical examination and routine investigations for surgical profile were done.

Patient who underwent total knee replacement surgery were followed up post operatively at 3 months, 6 months and 12 months. At all preoperative and postoperative visits, Knee society scores and oxford knee scores were determined.

The data obtained was analyzed using SPSS version 17.0. Continuous variables were expressed as mean \pm SD values. Appropriate statistical tests were used to determine outcomes of Knee society scores and oxford knee scores before and after simultaneous bilateral total knee replacement. Probability value (p value) was used to determine the level of significance p value < 0.05 was considered as significant, p value < 0.01 was considered as highly significant.

Table 1: Distribution of patients based on Age

Age group in years	SBTKR	
	Number	%
56 - 60	9	42.8
61 - 65	6	28.6
66 - 70	6	28.6
Total	21	100
Mean \pm SD	62.29 \pm 4.46	

In the present study it was observed that age range was between 56 and 70 yrs with a mean age of 62.29 \pm 4.46. 42.8 % patients were in the age group of 56 – 60 yrs, 28.6 % each were in the age group of 61 – 65 and 66 – 70 yrs respectively.

Table 2: Distribution of patients based on gender

Gender	Number	%
F	13	61.9
M	8	38.1
Total	21	100.0

In the present study it was observed that 61.9 % were females and 38.1 % were males female to male ratio was 1.6: 1

Table 3: Distribution based on etiology

Etiology	No.	%
Osteo Arthritis	16	76.2
Rheumatoid arthritis	5	23.8
Total	21	100.0

In the present study 76.2 % cases had osteoarthritis and 23.8 % cases had rheumatoid arthritis.

Table 4: Mean \pm SD of KSS and oxford score pre operatively

Pre operative score	Mean	SD	Minimum	Maximum
KSS Rt knee	99.67	26.12	40	127
KSS Lt knee	100.76	26.38	49	133
Oxford score	21	3.9	13	28

In the present study Knee society score and oxford scores were assessed in patients preoperatively before simultaneous bilateral total knee replacement it was observed that the mean KSS score for right knee was 99.67, mean KSS score for left knee was 100.76 and oxford score was 21.

Table 5: Mean \pm SD of KSS and oxford score post operatively

post operative	KSS Rt knee		KSS Lt knee		Oxford	
	Mean	SD	Mean	SD	Mean	SD
3 months	132.90	9.391	133.71	7.149	32.40	2.583
6 months	144.57	8.418	145.29	5.917	36.76	1.895
12 months	159.86	8.138	161.10	7.402	40.38	1.802

In the present study Knee society score and oxford scores were assessed in patients post operatively after simultaneous bilateral total knee replacement at 3 months, 6 months and 12 months. it was observed that the mean KSS score right knee improved from 132.9 at 3 months to 144.57 at 6 month and 159.86 at 12 months. Mean KSS score left knee improved from 133.7 at 3 months to 145.29 at 6 month and 161.1 at 12 months. Mean oxford score improved from 32.4 at 3 months to 36.76 at 6 month and 40.38 at 12 months.

Discussion

Only 24% of knee surgeons in 3 regions of the United Kingdom would regularly perform bilateral TKR under one anaesthetic session. Many surgeons opine that the rates of peri-operative complications and morbidity were higher after simultaneous bilateral TKR than unilateral TKR. The complication rates were associated with age-related comorbidities, blood loss, and delayed rehabilitation [7].

In the current study, no patient developed safety-related complication, owing to proper patient selection using our inclusion and exclusion criteria.

All the surgeries are done by Dr. K. J. Reddy, Professor of Department of Orthopedics. Simultaneous bilateral TKR is more economical, enables higher patient satisfaction and quicker return to function, and compared with staged bilateral TKR, which doubles the length of hospital stay and is 18%, or even 50%, more expensive [8].

Yoon H S *et al.* in their study concluded that Simultaneous bilateral TKR is suitable for properly selected patients aged <70 years, with an American Society of Anesthesiologists score of 1 or 2. In this study the mean age was 62.29 and all the patients belong to ASA grade 2

In the current study, tranexamic acid was used to reduce intra-operative blood loss and thus the need for blood transfusion was minimal. Routine blood counts and electrolyte examination was performed, and any imbalance was promptly dealt with Parvizi *et al.* in meta-analysis of 44 684 TKRs showed that the pre- valence of major complications such as pulmonary embolus, cardiac events and death was higher after simultaneous bilateral TKR [9]. Conversely, one clinical study suggested that patients having simultaneous bilateral TKRs who were 80 years or older had a significantly higher incidence of pulmonary, neurological and cardiac

complications than patients younger than 80 years [10]. Therefore, it was concluded that age, and not the procedure was more significant.

In the current study no death was reported and all patients were below age of 70 years. (Mean 62.29)

It has been reported that the functional outcomes were not significantly different between bilateral and unilateral TKR [11].

Sanjeev Jain *et al.* achieved a mean KSS score of 158.8 in their study of 150 patients that underwent SBTKR [12].

In the current study though we didn't compare with unilateral TKR there was significant improvement in the functional outcome of patients as compared to preoperatively, which was assessed using the knee society scores and oxford scores. Mean KSS scores were 161.1 and 159.86 for left and right knees respectively after 1 year. Mean oxford score was 40.38 1 year post-operatively. Both scores had a significant p value and F value when compared to pre-operatively (one way ANOVA).

The mortality risk for bilateral TKR under one anaesthetic is reported to be higher in patients with pre-existing cardiopulmonary disease or advanced age. Conversely, several investigators have reported that simultaneous TKR is associated with minimal or no increase in mortality. And in our study no death was reported as we didn't include any high risk patients.

In current study, at 1 year follow-up no case was infected. Our study has limitations. It was not randomized and all the patients in the series received cemented TKR in a large-volume center by a surgeon specializing in joint reconstruction. This may limit the applicability of the findings to other centers. Also, it is possible that a type-II error may have occurred because of a sample size which was less than sufficient.

Conclusion

Total Knee Arthroplasty improves the functional ability of the patient and ability of the patient to get back to pre-disease state, which is to have a pain free mobile joint, as reflected by the improvement in the post-op knee society score and oxford knee score.

References

- Restrepo C *et al.* Safety of simultaneous bilateral total knee arthroplasty. A meta-analysis. J Bone Joint Surg Am. 2007; 89:6.
- Lane GJ *et al.* Simultaneous bilateral versus unilateral total knee arthroplasty. Outcomes analysis. Clin Orthop Relat Res, 1997, 345.
- Dripps RD. New classification of physical status. Anesthesiology. 1963; 24:111-17.
- Vince KG. Bilateral total knee arthroplasty under one anesthesia: a safe protocol. Mayo Clin Proc. 1997; 72:883-5.
- Adili A, Bhandari M, Petruccioli D, DeBeer J. Sequential bilateral total knee arthroplasty under 1 anesthetic in patients > or =75 years old: complications and functional outcomes. J Arthroplasty. 2001; 16:271-8.
- Bullock DP, Sporer SM, Shirreffs TG Jr. Comparison of simultaneous bilateral with unilateral total knee arthroplasty in terms of perioperative complications. J Bone Joint Surg. [Am]. 2003; 85-A:1981-6.
- Gill GS, Mills D, Joshi AB. Mortality following primary total knee arthroplasty. J Bone Joint Surg. [Am]. 2003; 85-A:432-5.

8. Brotherton SL, Roberson JR, de Andrade JR, Fleming LL. Staged versus simultaneous bilateral total knee replacement. *J Arthroplasty*. 1986; 1:221-8.
9. Restrepo C, Parvizi J, Dietrich T, Einhorn TA. Safety of simultaneous bilateral total knee arthroplasty: meta-analysis. *J Bone Joint Surg. [Am]*. 2007; 89-A:1220-6.
10. Lombardi AV, Mallory TH, Fada RA *et al*. Simultaneous bilateral total knee arthroplasties: who decides? *Clin Orthop*. 2001; 392:319-29.
11. Leonard L, Williamson DM, Ivory JP, Jennison C. An evaluation of the safety and efficacy of simultaneous bilateral total knee arthroplasty. *J Arthroplasty*. 2003; 18:972-8.
12. Simultaneous bilateral total knee replacement: a prospective study of 150 patients. Jain S, Wasnik S, Mittal A, Sohoni S, Kasture S. *J Orthop Surg (Hong Kong)*. 2013; 21(1):19-22.