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RETROSPECTIVE ANALYSIS OF INCIDENCE OF COMPONENTS ASYMMETRY IN CASES OF SEQUENTIAL BILATERAL TOTAL KNEE ARTHROPLASTY.

Orthopaedics

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ABSTRACT

Introduction: Anatomic variation of distal femur or tibia may have been described in literature, but there are few studies to describe components asymmetry in sequential bilateral total knee arthroplasty. We did retrospective analysis of incidence of femoral, tibial and patellar component asymmetry in sequential bilateral total knee arthroplasty.

Materials and methods: We selected 134 patients for retrospective analysis of femoral, tibial and patellar component asymmetry in sequential bilateral total knee arthroplasty, assuming hypothesis that component sizes in bilateral knee arthroplasty may or may not be same.

Results: We found asymmetry rate of 19.4% in femur components, 21.17% in patellar components and 14.17% in tibial components, which is higher than other studies. However, when pre- and postoperative knee society scores were compared between the symmetric and asymmetric cases the difference was found to be insignificant.

Conclusion: We conclude that there is significant percentage of both femoral, tibial and patellar component asymmetry and each knee should sized independently while doing sequential bilateral total knee arthroplasty.

KEYWORDS

sequential bilateral total knee arthroplasty, flexion-extension gap, component asymmetry

INTRODUCTION

Total knee arthroplasty has become a highly successful joint reconstruction procedure. Surgical outcomes, patient satisfaction, and implant survival have improved steadily since its inception and the operation has become widely accepted to afford relief of pain, restoration of range of motion and function.[1] In bilateral knee osteoarthritis knee cases, arthroplasty can be done in one stage or in two stage. The bilateral total knee arthroplasty (TKA) during one anestheticsession has advantages like patient convenience and a shortened hospital stay and rehabilitation.[2]

Although bilateral arthritis is frequently symmetric in appearance and deformity, component sizes during bilateral TKA should not be assumed the same. Improper component sizing may adversely affect functional results including range of motion and stability. An improper sizing of the femoral component can lead to a flexion-extension gap mismatch. A large-sized femoral component can lead to the loss of the flexion space causing postoperative loss of flexion and overstuffing of the patellofemoral joint. Whereas, anundersized femoral component leads to flexion instability.[3] Also improper sizing of patella causes patellar maltracking, which may result in poor functional outcomes.[4]An oversized properly rotated tibial components has shown to cause overhang , tissue irritation or overstuffing of the joint space and associated compromise of range of motion. Whereas, smaller tibial component may compromise alignment, potentially leading to component subsidence and loosening due to compromised cortical support.[3,4,5]

We did retrospective analysis of femoral, tibial and patellar component asymmetry in sequential bilateral total knee arthroplasty, assuming hypothesis that component sizes in bilateral knee arthroplasty may or may not be same.

MATERIALS AND METHODS

Weanalyzed retrospectively all patients who underwent sequential bilateral total knee arthroplasty from March 2016 to July 2017.Data was collected from patient's indoor files and ISHKS (Indian society of Hip and Knee surgery) registry from our institute.

Inclusion criteria (a) the use of a posterior-stabilized cruciate sacrificing prosthesis of the same model and manufacturer in both knees ;(b)operated by same surgeon; (c)sizing done by same method for both knees (d) Available preoperative and postoperative knee society scores.

Exclusion criteria(a) asymmetrical bilateral knee osteo-arthritis (b) postoperative complication, (c)presence of constrained prosthesis (d) prosthesis of different models, (e) cases in which femoral or tibial cut was increased by 2mm (f)incomplete data.

A total of 134 patients who met our inclusion and exclusion criteria were selected for study.

Patient data were recorded from the operative notes and outpatient charts and entered into a computer database. The final database included patient demographic data, diagnoses, prosthesis data including component types and sizes, and preoperative and postoperative Knee Society Scores (KSS).

The preoperative evaluation of the patients included detailed history, clinical assessment, diagnosis, knee society score anteroposterior and lateral X-rays, and routine hematological workup. The only implant used was Nexgen-LPS (Zimmer, Warsaw, IN, USA) (n=71).

All patients underwent a standard surgical approach, a medial parapatellar approach with a cemented posterior-stabilized total knee prosthesis and a standard postoperative protocol. All bilateral TKAs were performed in an enclosed vertical laminar flow room. Both lower extremities were draped sequentially. The surgery was performed under a single anesthesia, and the arthroplasties were done in a sequential fashion by single surgical team. Regional anesthesia was the preferred anesthetic method, but general anesthesia was administered if the regional anesthesia was not achieved.

Surgery was performed without tourniquet, except at time of cementing, tourniquet was used. Femoral intramedullary and tibialextra medullary guide systems were used. Femoral component sizing was done to optimally match femoral anatomy and create balanced flexion and extension gaps by an anterior referencing

technique. When a femur is noted to be between sizes, closer size of femoral component is selected. Tibial component sizing was performed to maximize the coverage of the resected surface and maintain proper component rotation. . If patellar resurfacing indicated, we resect patella using patellar resection guide to ensure symmetrical cut. The patellar component was medialized to enhance patellofemoral tracking. Standard closure done.

In the postoperative period, we mobilize the knee on the operative day itself. Protective weight bearing from 1st postop day onwards. Postop x-ray on the 1st postop day. Follow-up is done at 4weeks, 3 month and 9 months. Suture removal at the end of 2weeks.Xrays of both knees were taken at 4th week and 3 month. Postoperative knee society score was evaluated at end of 9 months.

All the statistical analysis was done using SPSS 12.0 software and an unpaired t test was used for the comparison of numerical data like comparison of range of Knee Society score (KSS) among various groups. For all purposes, a P value <0.05 is considered significant.

RESULTS:

Among our 134 patients, who underwent sequential bilateral total knee arthroplasty, 29 were males and 105 were females. Mean age of patients was 65.36(50-83yrs).

Among the 134 patients, primary osteoarthritis was diagnosed in 120 cases, 11 were of secondary osteoarthritis due to Rheumatoid arthritis and three were due to pseudo-gout.12 cases had valgus alignment while 122 had varus alignment.

The femoral component asymmetry had occurred in 26 of 134 patients and all were found to be of one size difference. Right side was bigger than left in 18 cases. Total incidence of femoral component asymmetry was 19.40%.

The tibial component asymmetry had occurred in 19 of 134 patients and all were found to be of one size difference. Right side was bigger than left in 10 cases. Total incidence of tibial component asymmetry was 14.17%.

The patellar component asymmetry had occurred in 18 of 85 patients and all were found to be of one size difference. Right side was bigger than left in 9 cases. Total incidence of tibial component asymmetry was 21.17 %.(figure 1)

Mean knee society scores of asymmetrical cases were compared with symmetrical cases using unpaired t test. This statistical analysis showed no significant difference between two groups. (Table 1)

DISCUSSION:

Anatomic variation of distal femur or tibia may have been described in literature, but there are few studies to describe components asymmetry in sequential bilateral total knee arthroplasty[6]. In a study done by Brown and Diduch[5], they reported asymmetry rates for femoral (6.7%), tibial (1.1%), and patellar components (0.3%). Capeci et al. reported the asymmetry rates of 8.7%, 6.7%, and 5.1% for femoral, tibial, and patellar components, respectively[3].Also among Indian patients,Reddy et al found 9.2% and 8.7% for femoral and tibial components respectively[7].

Based on our retrospective analyses of component asymmetry in sequential bilateral total knee arthroplasty, it shows that component asymmetry occurs in significant percentage of population. We found asymmetry rate of 19.4% in femur components, 21.17% in patellar components and 14.17% in tibial components, which is higher than other studies. Hence this study shows importance of the sizing of components individually on both sides while doing while doing sequential bilateral total knee arthroplasty.

The surgeons performing the bilateral TKAs in this study independently sized components for each knee during the arthroplasties, demonstrating a difference in bony anatomy between right and left knees in a defined percentage of patients. On basis of findings of similar postoperative knee scores, good component alignment and without any complications postoperatively, we conclude that even in component asymmetrical cases, component sizing was accurate. Insignificantdifference in postoperative scores of both groups shows that the surgeons did not make any error as even the asymmetrical cases had similar results compared to symmetrical cases. Strength of our study is a single surgeon did all the cases, using same anterior referencing technique and same implant, hence reduced bias. Also all the patients selected were operated on single admission. Pitfalls are that it is retrospective analyses and with shorter postoperative follow-up. Another drawback of this study is that it does not document actual anthropometric differences in anatomy of distal femur, proximal tibia and patella.

CONCLUSION:

We conclude that there is significant percentage of both femoral, tibial and patellar component asymmetry and each knee should sized independently while doing sequential bilateral total knee arthroplasty. Relying on the contralateral knee for sizing during sequential bilateral TKAs can lead to improper component selection and poor outcomes. Awareness of component asymmetry can help continue the success of bilateral TKA in a growing and demanding patient population.

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Conflict of Interest:

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

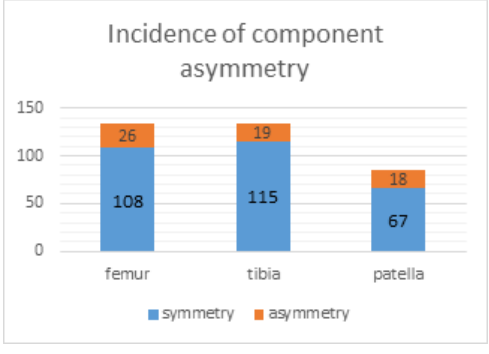

Figure 1

Table 1

	Asym. femoral component	sym. femoral component	Asym. Tibial component	sym. Tibial component	Asym. Patellar component	sym. patellar component	Total patients
NO.OF PATIENTS	26	108	19	115	18	67	134
MEAN± SD KNEE SOCIETY SCORES							
PREOPERATIVE	43.62 ± 2.64	43.59 ±2.85	43.37± 2.24	43.63 ± 2.89	43.22 ± 2.80	43.64 ± 2.83	43.60 ± 2.80
POSTOPERATIVE	91.58 ± 3.06	91.65 ± 2.90	91.89 ± 2.69	91.59 ± 2.97	92.22 ± 2.88	91.84 ± 2.95	91.63 ± 2.92
p-value*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
*Calculated using the t-test. P<0.05 considered statistically significant							

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