

Gender Specific Knee Replacement- Do Indian Females Need It

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ABSTRACT

Introduction: Total knee replacement is a revolutionary procedure aimed at relieving pain improving knee function and the quality of life, Indian women are more prone for osteoarthritis and recent researches have led on to manufacturing implants specific to their anatomy to achieve the above mentioned goals.

Aim: The study aimed at analysing whether these modifications in the newly designed gender specific implants translate to any additional significant improvement in functional outcome in comparison to the commonly used traditional knee implants.

Materials and Methods: It was a prospective comparative study done in 30 knees of 30 women patients aged between 55-70 years in GV Hospital, Trichy, India between July 2011-January 2013. A total of 15 patients (Group B) had Zimmer Legacy Posterior Stabilized (LPS) knee implant and the other 15 (Group A) had Zimmer gender specific knee implants. Patients were followed up for 24 months post surgery, preoperative and postoperative data were recorded according to the knee society

scoring system. All the patients were operated by standard anterior midline incision by a single surgeon and underwent the same postoperative protocol.

Results: The average age in Group A was 59.93 and in group B was 59.4. The mean preoperative Knee Score (KS) and Functional Score (FS) was 50.2 and 49.3 in Group A and B respectively. The range of motion increased following surgery in all patients but there was no statistically significant difference noted between the two groups. The postoperative KS and FS were assessed at 6 weeks, 3 months, 6 months, 12 months and 24 months and statistical significance using Student's t-test, on SPSS 13.0 (SPSS Inc., Chicago, Illinois) was done during each follow-up. There was no statistical significant difference in KS and FS between the groups at the end of 24 months.

Conclusion: Based on the results of our study we found no significant advantage of using gender specific implants oriented to female knees. Our study shows the goal of the design of the gender-specific high-flexion knee prosthesis has not been achieved.

Keywords: Functional score, Implant design, Knee replacement, Knee score

INTRODUCTION

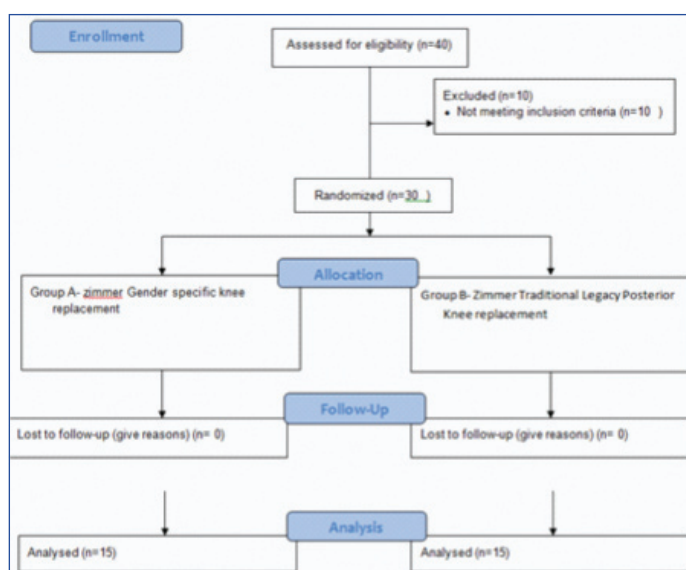
Knee replacement implants of different types have evolved over the years with the aim of achieving good patient outcomes and increased longevity of the implants [1]. The concept that implants specifically matching the anatomy of females will help achieving the above mentioned goals led on to the development of gender specific knee implants [2,3]. There is paucity of literature among Indian women about the real benefit of these implants. Indian women expect implants with maximal longevity allowing a high functional activity like squatting and sitting cross legged. Theoretically a gender specific knee implant distinctively matching the anatomy of the female knees should help them fulfill these expectations [3-5]. These implants have been in use in western and other developed nations since 2005 with studies showing no obvious benefits of them. Our study was carried out to find whether the aim was achieved in women operated for primary osteoarthritis of knee as there is no literature from India.

The gender specific knee replacement implant was defined as an implant matching the narrow mediolateral diameter for any given anteroposterior dimension of the female knee with increased angle of trochlear groove and decreased anterior flange thickness and width [5-7]. Our study analyses whether the gender specific implants offer any additional functional outcome improvements in comparison to the commonly used traditional knee implants.

MATERIALS AND METHODS

It was a prospective comparative study conducted in GV hospital, Trichy, India from June 2011 to January 2013 in 30 knees of 30 women. In 15 knees, Zimmer gender specific knee replacement implants was used and among the rest 15, Zimmer traditional LPS

knee implants was used. Patient randomly choose the implants by picking from the lots and were grouped into A and B [Table/Fig-1].



[Table/Fig-1]: Patient allocation.

Group A was women with gender specific implants and Group B was women with traditional LPS implants. After obtaining the local ethical committee approval and informed written consent from the patient surgery was performed. We included only primary osteoarthritis of the knee.

Preoperative and postoperative outcomes were recorded according to the old Knee Society System (KSS) [8]. The knee

society scoring system consists of two parts a KS and FS. All the patients were operated by standard anterior midline incision and underwent the same postoperative protocol. X-rays of the knee AP and lateral were taken in the immediate postoperative patients [Table/Fig-2].



[Table/Fig-2]: Preoperative and postoperative radiographic evaluation. Group A: Gender specific knee Group B: LPS knee

There were no patients lost to follow-up, We excluded conditions which could adversely affect the postoperative outcome like preoperative complex knee deformity, bone defects requiring grafting and additional screw fixation. The patients were followed up at 6 weeks, 3 months, 6 months, 12 months and 24 months. We also assessed any statistical significance within each group between 6 and 12 months and between 12 and 24 months follow-up. At each follow-up the knee society scoring and X-rays of the knee were taken (none of the patients were excluded but they had lower outcome scores). A KS and FS score in range of 80-100 was considered an excellent outcome.

STATISTICAL ANALYSIS

Statistical analysis was done using non parametric unpaired t-test, on SPSS 13.0 (SPSS Inc., Chicago, Illinois). A p-value <0.05 was taken as significant.

RESULTS

The average age in Group A was 59.93 years and in Group B was 59.4 years. We operated in 17 right sided knees and 13 left sided knees. The mean KS and FS preoperative in Group A was 50.2 and 49.3 respectively. The average range of motion was 85 degrees in Group A and 88 degrees in Group B. The average postoperative range of motion was 115.3 degrees in Group A and 115 degrees in Group B. The postoperative KS and FS were assessed at 6 weeks, 3 months, 6 months, 12 months and 24 months and tabulated [Table/Fig-3,4].

Time period	Knee score		
	GS mean (SD)	LPS mean (SD)	p-value
6 Weeks	81.60 (5.77)	81.8 (6.05)	0.90
3 Months	87.40 (3.89)	89.3 (1.86)	0.09
6 Months	88.53 (4.69)	90.13 (2.56)	0.24
12 Months	92.00 (3.13)	93.00 (2.10)	0.29
24 Months	94.6 (1.00)	93.8 (2.89)	0.38

[Table/Fig-3]: Postoperative Knee Score (KS) of Knee scoring system. GS-Gender specific knee implant, LPS- Legacy Posterior Stabilised

Time period	Functional score		p-value
	GS mean (SD)	LPS mean (SD)	
6 Weeks	63.3 (4.88)	66.0 (7.37)	0.25
3 Months	76 (9.86)	76 (9.86)	1.00
6 Months	87.3 (7.04)	86 (5.07)	0.55
12 Months	89.09 (8.31)	91.8 (4.05)	0.33
24 Months	93.3 (5.77)	98.0 (4.47)	0.24

[Table/Fig-4]: Postoperative Functional Score (FS) of knee scoring system. GS-Gender specific knee implant, LPS- Legacy Posterior Stabilized

Within both the groups, there was statistically significant results in both knee and functional scores between 6 months and 12 months follow-up [Table/Fig-5]. There were no statistically significant difference in both knee and functional scores within the groups between 12 and 24 months follow-up. There was no statistically significant difference in the functional outcome between traditional knee (LPS) and gender specific knee arthroplasty at 24 months follow-up.

Group		6 Months Mean (Sd)	12 Months Mean (Sd)	p-value
		GS*	KS [‡]	
	FS [§]	87.3 (7.04)	9.0 (8.31)	0.022
LPS [†]	KS	90.1 (2.56)	93 (2.10)	0.001
	FS	86 (5.07)	91.5 (4.05)	0.003

[Table/Fig-5]: Comparison of KSS within GS group at 6 and 12 months. *GS-Gender specific knee implant. †Legacy posterior stabilizing. ‡Knee score. §functional score.

DISCUSSION

There has been a constant debate on whether improving the anatomic fit of knee implants will translate to clinical improvement in patients postoperatively, bearing this in mind implant companies started designing implants exactly matching to the female distal femur [9-11].

There is no study in Indian population to decide the advantage of gender specific implants. Few western studies [12,13] assessed the implant design and the outcome of it in improving the postoperative range of motion. In our study, the mean postoperative range of flexion in the gender-specific prosthesis was 115.7 degrees, range (105-125 degrees) and in the traditional prosthesis it was 115 degrees (100-120 degrees) suggesting no gross difference in the range of motion due to the differences in implant design. The results are similar and comparable to the available western literature [12-14].

The other change in trochlear groove which theoretically reduces the rate of any patellar subluxation was highlighted as a prominent change in these implants but our study showed no benefit of such change as none of the patients in any group had patella subluxation [7,14,15].

All patients in our study showed increased functional outcomes irrespective of the implants and there was no implant related complication over the two-year follow-up. The results of our study in Indian women were similar to results of other studies done in western population [9,14].

LIMITATION

A small sample size with midterm follow-up.

CONCLUSION

Based on our study, the goal of design modification has not been attained as there was no statistically significant difference in the functional outcome between traditional knee (LPS) and gender specific knee arthroplasty at 24 months follow-up. Whatever be the implant, a meticulous surgery will only yield the best possible functional outcome.

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