



IS iASSIST SUPERIOR TO CONVENTIONAL METHOD IN TOTAL KNEE REPLACEMENT FOR FUNCTIONAL OUTCOMES? PROSPECTIVE OBSERVATIONAL STUDY IN INDIAN POPULATION FOR OXFORD KNEE SCORE, SF 12 AND KNEE SOCIETY SCORE.

Orthopaedics

Dr. Sanket Tanpure 3rd year DNB orthopaedic resident at Jupiter Lifeline Hospital.

Dr. Shweta Tripathi BPTH, Physiotherapist at Jupiter Lifeline Hospital.

Dr. Vaibhav Shingade DNB Ortho.

Dr. Bharat Dhanani 2nd year DNB orthopaedic resident at Jupiter Lifeline Hospital.

Dr. Darshan Bafna 2nd year DNB orthopaedic resident at Jupiter Lifeline Hospital.

Dr. Ashish Phadnis MS Ortho, DNB Ortho, FCPS, MRCS

ABSTRACT

Background: The iASSIST (Zimmer) system is an accelerometer base navigation tool use for total knee arthroplasty (TKA) which guides surgeon to take bone cuts during surgery. The purpose of this study was to compare the functional outcome between accelerometer base iASSIST system and the conventional system.

Method: A prospective study between two groups of 28 patients (14 iASSIST and 14 conventional) of primary osteoarthritis of the knee who underwent TKA using Zimmer iASSIST™ or conventional method from January 2018 to December 2019. A single surgeon performs whole operations with the same instrumentation and same surgical approach. Pre-operative and postoperative management protocol are same for both groups. Preoperative oxford knee score, SF12 and Knee society score was taken 1 week prior to surgery and postoperative scores was taken 3 weeks after surgery.

Results: There was no difference between the two groups for age, height and weight ($p > 0.05$). No significant difference was observed in SF 12(Physical and mental score),OKS and knee score preoperatively and postoperatively. Significant difference was observed in knee society functional score preoperatively and postoperatively between 2 groups but no significant difference was observed in difference of score. Significant correlation observed in preoperative short form(SF)12 physical component score (PCS) and preoperative oxford knee score.

Conclusion: Our study concludes that despite being a useful guidance tool during TKA, iASSIST does not show any difference in functional and satisfaction outcomes when compared with the conventional method.

KEYWORDS

Total knee arthroplasty, iASSIST, functional outcome, Oxford knee score, SF12, Knee society score.

INTRODUCTION

Osteoarthritis (OA) knee is a chronic disease affecting older population above 60 years of age that imposes an economic burden and significant impact on patient's quality of life and health. Knee pain and functional impairment are the most presenting complaints. Among available surgical treatment, total knee replacement (TKR) has been shown to be safe and effective to improve function, quality of life and reduce knee pain⁽¹⁾.

Outcomes of knee surgery are measure in form of radiological data (component alignment) or surgeon assessment of joint function in areas such as stability, alignment and range of motion (ROM) traditionally but in recent years, patient report outcome has been growing interest to know outcome of surgical intervention.

There are numerous validated patient-reported outcome measures (PROMs) are available to assess the outcome of TKA in which the Knee Society Score⁽²⁾, Western Ontario and McMaster Universities Osteoarthritis Index⁽³⁾, Short Form (SF-) 12⁽⁴⁾ and 36⁽⁵⁾ scores, and the Oxford knee score (OKS)⁽⁶⁾ are commonly employed to assess the outcome of TKA. Some reported studies suggest that both joint-specific and health measures should be used to assess the outcome of TKA^(7,8).

Outcomes of knee replacement depend on precise positioning of the components, alignment of mechanical axis and gap balancing to ensure kinematic and stability of joint. The Knee Society scoring system allocates maximum points to the category of anteroposterior stability, if the knee is able to be translated < 5 mm, whereas no points are awarded if the values are > 10 mm^(2,9).

however, Seon et al⁽¹⁰⁾ suggested that 5 mm to 10 mm sagittal movement may provide ideal function and ROM compared to tight(<5 mm) or lax (>10 mm) when assessed for anteroposterior translation^(9,11). Better range of knee is directly related to functional outcome and satisfaction of patient after total knee replacement surgery.

MATERIAL AND METHODS.**The Oxford Knee Score (OKS)⁽⁶⁾**

The OKS is questionnaire of twelve questions based on a Likert scale with values from 0 to 4 with descending severity. a total score is then calculated where 48 is the best possible score (least symptomatic) and 0 is the worst possible score (most symptomatic).

The American Knee Society (AKS) Score⁽²⁾

It has two components, -1) a knee score and 2) function score, each of which is scored from 0 to 100, with higher values indicating better knee condition. The knee component has four items that add points (pain, flexion, mediolateral stability, and anteroposterior stability) and three items that subtract points (malalignment, flexion contracture and extension lag). In the functional component, two items add points (walking and stairs) and one item removes points (use of a walking aid).

The SF-12 score⁽⁴⁾

It has two parts -1) physical component summary (PCS) and 2) mental component summary (MCS) scores, both reported on a scale of 1–100 with a greater score representing a better health status. This score of 1–100 is calculated independently for both the PCS and MCS based on the responses recorded on Likert scales to six questions (each), which are then converted into the validated score with the help of defined algorithm.

The OKS, KSS and the SF-12 score measures different aspects of the patient's functional ability and their physical and mental health. The OKS is a joint-specific score and measures symptoms directly related to the knee joint, KSS score is functional score and measures pain, ROM, alignment and stability along with function, whereas the SF-12 score is a measure of the overall physical and mental health of the patient.

Study Population

We included 28 patients (14 patients in conventional group) and 14 patients in iASSIST surgery group (Total 40 TKA, 20 in each group)

suffering from OA knees opted for TKA surgery from hospital surgery waitlisted database. Preoperative score evaluation was done 1 week prior to surgery and postoperative score evaluation was done 6 months post-surgery on printed scores form on follow up. We collect the following data- age, Height ,weight, side affected and presence of other orthopaedic disorders which likely affect scoring. Study was conducted in Jupiter hospital, Thane after informing consent from all patients.

Statistical Analysis

Statistical analysis was carried out using IBM® SPSS® 20.0. The Fisher test and Mann-Whitney U test was used to compare the two groups for categorical variables and continuous variables respectively which were deemed significant (p<0.05). Pearson's correlation was used to assess the relationship between linear variables(significance <0.05).

RESULTS

There was no difference between the two groups for age, height and weight (p > 0.05)(Table 1). No significant difference was observed in SF 12(Physical and mental score),OKS and knee society score preoperatively and postoperatively(Table 2)(Fig 1,2). Significant difference was observed in knee society functional score preoperatively and postoperatively but no significant difference was observed in difference of all scores(Table 3).Significant correlation observed in preoperative short form(SF)12 physical component score (PCS) and preoperative oxford knee score(Figure 3).

Table 1: Patient Demographics.

Parameters	iASSIST (Mean± SD)	Conventional (mean± SD)	P - value
Age (years)	69.35 ± 5.04	67.35 ±6.27	0.36
Height (m)	1.54±0.07	1.56±0.1	0.49
Weight (kg)	67.39±9.54	74.33±13.32	0.45

Table 2: SF12,OKS,KSS (iASSIST vs Conventional).

Clinical Parameters Score	iASSIST		Conventional		p value
	Median	IQR	Median	IQR	
Physical SF 12 Pre-Operative	36.6	5.7	33.6	7.5	0.229
Post-Operative	51.8	10.2	51.8	6.0	0.619
Mental SF 12 Pre-Operative	38.4	7.6	39.5	11.3	0.334
Post-Operative	51.3	17.1	51.3	8.5	0.554
Oxford Knee Score Pre-Operative	12.0	6.3	14.0	11.0	0.333
Post-Operative	46.0	5.3	47.0	9.0	0.839
Knee society score Pre-Operative	30.0	8.0	30.0	16.5	0.757
Post-Operative	92.5	7.8	90.0	7.0	0.818
Functional Pre-Operative	50.0	15.0	25.0	22.5	0.001*
Post-Operative	95.0	17.5	80.0	15.0	<0.001*

Table 3: Difference In Preoperative And Post-operative Scores.

Difference	iASSIST		Conventional		p value
	Median	IQR	Median	IQR	
Physical SF 12	10.2	17.5	17.8	21.0	0.375
Mental SF 12	1.0	15.4	6.0	13.8	0.854
Oxford Knee Score	30.0	33.8	28.0	22.5	0.474
Knee society score	62.0	8.5	59.0	12.5	0.731
Functional knee score	50.0	20.0	60.0	15.0	0.150

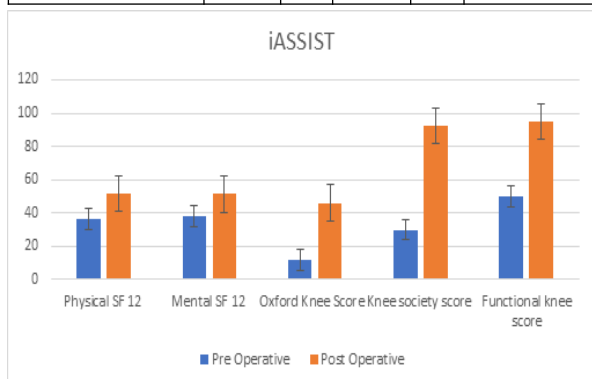


Figure 1:iASSIST (Preoperative Verses Postoperative Score).

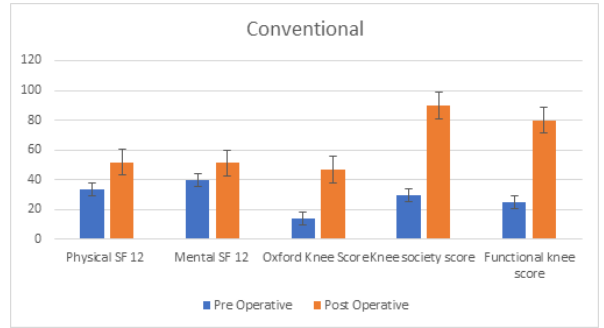


Figure 2: Conventional (Preoperative Verses Postoperative Score).

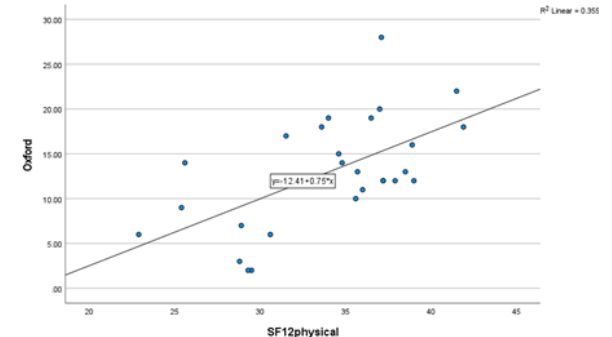


Figure 3: Scatter Plot Shows The Correlation Between Preoperative Short Form(SF) 12 Physical Component Score(PCS) And Preoperative Oxford Knee Score(OKS)(r=0.59,p<0.001).

DISCUSSION

The literature does not provide validated guideline for medium and long-term follow up of TKA patients as they are reviewed at varying time points and using a variety of measurement tools (12-14). Some surgeons preferred to do annual clinical and radiological review of all patients (15) but it's quite costly strategy for follow-up.

The KSS is a commonly used clinician-assessed questionnaire, giving a Knee score reflecting the condition of the arthroplasty and a Function score giving an assessment of the patient's ability to use the knee. The OKS is a short, practical, and easy to use patient-based questionnaire with good validity and a high completion rate.

Greg Anthony Medalla (16) reported that There was good correlation of OKS and KSS at 2 years which implies that patient self-assessment is a screening tool to identify which patients require clinical review at 2 years post TKA surgery. However, the moderate correlation at 5 and 10 years indicates that clinical evaluation remains necessary at these time points.

Huang et al (17) reported that the International Knee Society and SF 12 physical score at 6weeks,3 months,6 months, 12 months postoperatively was superior when coronal alignment was within 3° of neutral. While Harvie et al (18) reported no difference in functional outcome (Knee society, SF 36, WOMAC scale and patient satisfaction score) with navigated and conventional TKA at five years follow up. Our previous study (19) conclude that no significant alignment superiority observed in iASSIST TKR when compared with conventional TKR method, similar functional and satisfaction outcome observed in this study.

Climents et al (20) reported that preoperative OKS was 19.5±7.6 which was improve to 35±9.7 (means difference 15.5) and SF 12 PCS preoperative was 29.3±6.9 which was improve to 39.5±10.4 (means difference 10.1). significant difference in preoperative and postoperative scores ,similar results observed in our study.

The strength of our study was that the 2 groups were compared demographically, operated by similar surgical approach, performed by single surgeon. The only difference was, bone resection in iASSIST is navigation guided. Our study focused only on functional and satisfaction outcome in form of questioners to get scores by OKS,KSS

and SF12 scores as there is lack of published data on post-operative functional outcome of accelerometer based navigational TKA in Indian population despite being widely used in last 10 years.

Limitations of this study is that it is a non-randomized, sequential, observational focuses only on functional outcomes in short period of time, long term effect should be assessed.

CONCLUSION

Our study concludes that inspite of short comings like multiple registrations steps, pin tract infections, increased surgical time and steep learning curve, our study shows iASSIST gives similar short-term functional and satisfaction outcome compared to conventional TKA.

Authors' note

This Prospective comparative study was studied at Jupiter hospital, India.

Declaration of conflicting interests

Dr. Sanket Tanpure, Dr. Shweta Tripathi, Dr. Vaibhav shingade, Dr. Bharat Dhanani, Dr. Darshan Bafna, Dr. Ashish phadnis declared no potential conflicts of interest with respect to the research and publication of this article.

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Inform Consent

Informed consent was obtained from all patients for being included in the study.

Ethical Approval

The procedures were performed in this study after ethical approval from institutional ethical committee.

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Declaration Of Conflicting Interests

Dr. Sanket Tanpure, Dr. Shweta Tripathi, Dr. Vaibhav shingade, Dr. Bharat Dhanani, Dr. Darshan Bafna, Dr. Ashish phadnis declared no potential conflicts of interest with respect to the research and publication of this article.

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