

Total knee arthroplasty in Indian octogenarians - To do or not to do? Review of 71 consecutive cases at 4years

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Abstract

Introduction: With the success of total knee arthroplasty in treating arthritis, many patients with advancing age are considering surgical over medical management. However, at their age, there are valid concerns regarding the safety profile of the surgery. Our aim was to study the safety and outcome of total knee arthroplasty in Indian octogenarians.

Materials and methods: This was a prospective cohort study of consecutive 71 octogenarians, who underwent total knee arthroplasty, by a single surgeon between 2005-2012. A detailed pre-operative checkup and standardized peri-operative rehabilitation protocol was followed. All patients were evaluated at 3 months, 1 year and midterm follow-up at an average of 46.9 (18-109) months. Clinical data, Knee Society Score, radiological features and occurrence of complications were recorded at follow up visits.

Results: All 71 patients tolerated the procedure well with no mortality intra-operatively or up to one year post-operatively. Three (4.2%) patients developed surgery-related post-operative complications that were successfully managed conservatively. Average pre-operative Knee Society Scores (80.2) improved significantly at 3 months follow up (156) and one year follow up (165.9) in all patients. Of the 50 patients, available for mid-term follow up, all maintained high Function Score except 5 patients, whose scores were affected by comorbidities. All 50 of these patients showed further improvement of Knee Score at mid-term follow up as compared to their one-year score. All the patients were satisfied with their outcome and were happy to recommend surgery to fellow octogenarians.

Conclusion: Total knee arthroplasty is safe and effective in Indian octogenarians, resulting in excellent pain relief and functional outcome. At midterm follow up, patients were happy that they opted for the surgery as they continued to enjoy improved function.

Keywords: octogenarians; knee; arthroplasty; Indian patients

Introduction:

Total knee arthroplasty (TKA) has been established as an effective treatment of knee osteoarthritis [1-5]. The average age of patients undergoing TKA is 67 years, with majority of patients being between 55 to 75 years of age [6]. With prolongation of life expectancy, more

and more patients will require TKA [7-11]. When TKA is offered to octogenarian patients, they have doubts whether the surgery will benefit them as much as it benefits their younger counterparts. A higher incidence of comorbidities and increased possibility of cardiac or thromboembolic

complications is another concern [12]. Due to these apprehensions, they continue to deny themselves the benefits of surgery. However, by this stage the deformity can become so severe, that performing TKA can become more challenging. We performed this study in Indian

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Patients	Score	Pre-Op	3 months	One year	Mid-term follow up
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Mid-term follow up cohort (n=50)	KS	33.1	89.6	94.2	94.4
	FS	-14.7	-13	-9.7	-9.5
One year follow up cohort (n=70)		44.3	66.4	70.4	62.6
		-19	-15	-17	-29
	KS	35.1	89.2	94.6	-
	FS	-15	-12.5	-9.1	-
		44.2	66.9	71.4	-
		-20.1	-14.3	-16.2	-

octogenarian population who underwent TKA with the aims, 1) to evaluate the functional outcome at one year and at midterm follow up; and 2) to study the incidence of complications, morbidity and mortality in immediate post-operative period.

Materials and Methods:

This was a prospective cohort study of patients aged 80 years and above, who underwent primary TKA between April 2005 and December 2012 by the same senior surgeon (RNM). The surgeon performed a total of 2742 knee arthroplasties during this period, out of which 2.9% (71 patients, 80 knees) were above 80 years of age, and were recruited for the study. Demographics at the time of surgery and operative details of these patients were obtained from the hospitals' Medical Record Department. Out of the 71 patients, 46 were females (65%) and 25 males (35%). The mean age at the time of surgery was 81.9 years (range 80 - 88 years). Nine patients underwent staged bilateral knee arthroplasty with a minimum interval of 3 months between the two surgeries. Knee Society Score (KSS) is recorded pre-operatively, at 3 months and at 12 months post-operatively for all patients operated by the surgeon (RNM). The scores of the 71 patients included in the study, were retrieved from the surgeons' personal database. To study their mid-term outcome, we started following-up on these patients in 2014. At mid-term review, the patients were examined to determine their knee score (KS),

function score (FS), complications and radiological outcome.

A standard peri-operative protocol had been followed in all patients:

- A) Pre-Operative:** A team comprising of a physician, cardiologist and anaesthetist thoroughly examined and screened the patients 15 days prior to surgery. Patients determined to have undue risk were managed conservatively. Co-morbidities of patients deemed fit for surgery, were optimized. Adequate blood products and provision for intensive care unit (ICU) were arranged for all patients.
- B) Intra-operative:** Arthroplasty was done under tourniquet control, utilising mid-vastus approach and computer navigation (Ci System; Johnson &

Johnson, New Brunswick, NJ, USA) to achieve accurate limb alignment through precise bony resection and ligament balancing. The use of computer navigation prevented opening of the medullary canal and associated risks of fat embolism. Target alignment was neutral mechanical axis with a deviation of less than 1°. An intra-articular and subcutaneous vacuum suction drain was placed before closure.

C) Post-operative: All patients were kept under observation in ICU for 24 hours. Both the drains were removed after 48 hours. Weight-bearing walker assisted ambulation was initiated on post-operative day 1 (Day of surgery - day 0). During the hospital stay, low molecular weight heparin (LMHW) was used for deep vein thrombosis (DVT) prophylaxis. Hemoglobin level was recorded post-operatively on Day 1 and Day 3. Blood was transfused if: 1) hemoglobin was less than 8.5 g/dl; 2) patients with cardiac disorders whose hemoglobin was less 10 g/dL; 3) patients whose hemoglobin was 8.5 to 10g/dL but who had symptoms related to anemia such as tachycardia,

Table 2: Summary of reports comparing outcome of knee arthroplasty in octogenarians with younger patients

Author Year	Journal	Methods	Conclusion
Kennedy [14] 2013	Clin Orthop Rel Res	Retrospective 438 patients over 80 years 2754 patients under 80 years	Comparable improvement in pain and overall KSS between the two groups. Lower function score and higher major complication rates in octogenarians.
Seo [23] 2015	Knee Surg Relat Res	Retrospective 141 patients above 80 years 616 patients between 65-70 years	Comparable complication rate. No significant functional improvement in octogenarians as compared to their younger counterparts.
Tay [24] 2017	J Arthroplasty	Prospective matched pair 209 octogenarians 209 younger controls	Multivariate analysis showed that comorbidity index was a risk factor for complications, not age.
Lizaur-Utrilla [25] 2017	J arthroplasty	Prospective 143 octogenarians 149 septuagenarians	Higher SF-12 mental and satisfaction scores in octogenarians. All other outcomes were comparable to outcomes in septuagenarians
Yun [26] 2018	Aging Clin Exp Res	Retrospective case-controlled 38 octogenarians 41 sexagenarians	As compared to sexagenarians the octogenarians had a inferior outcome for WOMAC and SF-36 score. Duration of hospital stay and requirement of blood transfusion was also higher in octogenarians
Cher [27] 2018	Geriatr Orthop Surg Rehabil	Retrospective matched pair 209 octogenarians 209 younger counterparts	Comparable functional outcome improvement in both groups.

tachypnea or decreased exercise tolerance. All the patients were monitored for occurrence of any complications. Any patient with clinical suspicion of DVT was screened by venous colour doppler study.

D) Follow up: KSS was re-administered and radiographs were repeated 3 and 12 months post-operatively. KS and FS were graded as excellent (80-100), good (70-79), fair (60-69) and poor (below 60)[13]. Any complications occurring during this period were noted and appropriately managed.

All the data was entered in Microsoft Excel 2007 and analyzed using SPSS (Statistical Package for Social Sciences) 18.0 version and SAS (Statistical Analysis System) 9.2 software packages. Students paired 't' test was applied to compare means and level of significance (α) was taken as $p=0.05$.

Results:

Of the seventy-one patients, eighteen patients expired in the time period between 12 months post-surgery and mid-term follow up. However, all patients had completed their 3 and 12 months follow up except one who lived in a distant geographical location. Two more patients were subsequently lost to follow up after their 12 months visit. Therefore, out of the original cohort of 71 patients, 50 patients (57 knees) completed their mid-term follow up at an average of 46.9 months (range, 18 – 109 months). For these 50 patients the final average KS was 94.4, which was significantly ($p<0.0001$) higher than pre-operative mean KS of 33.1 (Table 1). They maintained their 12 months KS (94.2) even up till mid-term follow up (94.4). The FS was also significantly ($p<0.0001$) higher at mid-term follow up (62.5) as compared to pre-operative FS (44.28). At mid-term follow-up, mean knee flexion was 127.4° (range, 100°-145°). Radiological evaluation showed the mean mechanical axis

alignment of the limb to be 0.13° varus. None of the patients had osteolysis or radiolucency on radiographs. For the 18 expired patients (20 knees), the mean KS at last available follow up was 91.7 as compared to 42.5 pre-operatively and 91.8 at one year. Mean FS had improved from 40.5 pre-operatively to 68 at last available follow up. Closest family members of these patients were contacted and enquired about their patients' knee status prior to death and the cause of death. For all of them the knee was reported to be functioning well prior to death and the cause of death was not related to the knee surgery. All patients had tolerated the procedure well with no intra-operative mortality or major complications. Only two patients had an eventful early post-operative period. One patient developed urinary tract infection which was treated by antibiotics as per sensitivity. DVT was clinically suspected in the other patient (venous colour doppler showed no evidence of DVT), which was managed with higher doses of LMWH and an extended course of oral anticoagulant prophylaxis. In addition, one patient developed a prosthetic joint infection, one year post-operatively, which was managed by debridement and chronic antibiotic suppression. He expired 2.5 years after debridement from an unrelated cardiac event. The knee was symptom free and functioning well. All 70 patients who were followed during the first year after surgery, had an improvement of mean KS from 35.1 pre-operatively to 89.2 at 3 months and 94.6 at 12 months (Table 1). The mean FS also improved from 44.2 pre-operatively to 66.9 at 3 months and 71.4 at 12 months. The improvements in both KS and FS were statistically significant ($p<0.001$). At mid-term follow up, 80% of the patients felt that they should have opted for the surgery earlier and 60% wanted to undergo TKA on the opposite knee. Also 75% of the

patients were able to walk more than half a kilometer, climb stairs up or down, get up from commode or chair, and could travel independently to socialize or do recreational activities.

Discussion:

With increasing awareness and popularity of TKA, a growing number of elderly patients with osteoarthritis want to opt for this surgery. There is, however, hesitancy and indecision because of concerns regarding functional outcome and associated comorbidities. Literature from the western world has shown that TKA in octogenarian population improves knee scores and quality of life [14-17]. In Indian octogenarians, outcome of unicompartmental knee arthroplasty has been reported by Marya and Thukral [18]. Ours is the first study to analyze outcome and incidence of complications of total knee arthroplasty in an Indian octogenarian population. One of the limitations of study was that 21 (29%) of 71 patients could not be seen for midterm review. Eighteen of these 21 had died. This is inevitable for an octogenarian cohort. However, none of these patients expired within a year of the surgery and the cause of death was unrelated to their knee surgery. The deceased patients had good to excellent KS and FS at their last available follow-up. Mortality, to the tune of 52% has been reported at a mean follow up of 6 years following TKA in octogenarians [14]. To minimize loss to follow up in our study, the patients who were unable to come, were visited at their place of residence by one of the authors. Arrangements were also made for portable digital x-rays and clinical photographs were taken for all these patients. Hence, we lost only 3 patients, in spite of 10 patients not being able to come for follow up. Incidence of complications following TKA are known to be higher in older patients (19%) than in the younger patients

(15%)[14]. Some of the early post-operative complications are delirium, infection, DVT, pulmonary embolism and delayed wound healing. Late complications can be implant loosening, instability and stiffness. Although, 71% of patients were hypertensive, 14% were diabetic and 14% were hypothyroid, there were no major complications. All patients were discharged on the morning of post-operative day 4, except for the two patients that developed minor post-operative complications. Only one patient developed a surgical site infection one year after the surgery, which was successfully managed by debridement and chronic antibiotic suppression. Such a low complication rate can be attributed to two factors. Firstly, all octogenarian candidates for TKA were thoroughly screened for risk assessment. Patients with undue risk for surgery were managed conservatively. This inevitably introduced a selection bias leading to recruitment of relatively healthy octogenarians into the study. The comorbidities of these patients were then optimized prior to surgery. Secondly, the use of computer

navigation circumvents the need to violate the medullary canal during TKA. This softens the surgical insult on the body by reducing blood loss and incidence of fat embolism [19-21]. Computer navigation also assists in achieving accurate limb alignment and ligament balancing, thus decreasing the chances of delayed complications and implant failure [22]. We observed that there was a substantial relief of joint pain, increased mobility, correction of deformity and an improvement in the quality of life following TKA in octogenarians. The KS and FS had significantly improved at 3 months and then improved further at 12 months post-operatively. This improvement was then maintained till the patients' last available follow-up. The Knee Score at the latest follow-up was graded excellent in all the cases. The Function Score was graded excellent in 26%, good in 43%, fair in 20% and poor in 10%. Poor functional grading was a result of comorbid conditions which limited the patients' activities. These patients, however, had excellent pain relief, stability and range of motion. FS has been observed to be lower in octogenarians as compared to

their younger counterparts (Table 2). However, it must be highlighted that the final FS was still significantly higher than pre-operative FS in octogenarians. At mid-term follow-up, all the patients were satisfied with their knee function and responded positively to recommend this surgery to others at their age. When compared with younger patients, octogenarians can expect comparable pain relief and improvement in KSS. Complications are not significantly higher in this age group when strict peri-operative protocols are followed and computer navigation is used.

Conclusion:

Total Knee Arthroplasty is a safe and effective treatment in Indian octogenarians who have been screened by a detailed pre-operative check. It results in excellent pain relief and improvement in function. At mid-term follow up, patients were happy with the outcome of the surgery and were willing to recommend the surgery to fellow octogenarians.

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