Does 'Middle Age' Influence Risk Factors and Outcomes Following Revision Total Knee Arthroplasty?

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INTRODUCTION: Total knee arthroplasty (TKA) has been shown to be an effective treatment for patients with disabling pain and reduced functionality due to severe knee osteoarthritis. As more patients undergo primary total joint arthroplasty before the age of 65, the rate of revision TKA in young and middle-aged patients has distinctly risen. Previous reports demonstrated that growth in primary TKA operations has occurred largely in patients 45-64 years of age. To date, no study has directly explored the variability of risk factors in middle aged patients. Our study aims to compare risk factors and clinical outcomes in young, middle-aged, and older patients following revision TKA.

METHODS: A total of 1489 patients who underwent revision total knee arthroplasty was included in the study. Patients were stratified into 4 subgroups based on age: 46 (3.1%) <45, 227 (15.2%) 46-55, 445 (29.9%) 56-65, and 771 (51.8%) >65 years old. Patient demographics as well as clinical information including indications of failure, risk factors, readmission, and re-revision rates were evaluated (Table 1). Chi squared and ANOVA analysis were used to establish significant differences between the groups with respect to demographics and outcomes.

RESULTS: Patients <45 years of age were significantly more likely to be revised for stiffness and instability when compared to the rest of the cohort. Patients 46-55 years of age were significantly more likely to be revised for infection and malposition when compared to patients <45 years of age. Patients 56-65 years of age were significantly more likely to be revised for stiffness when compared to patients >65 years of age but significantly less likely when compared to patients <45 years of age. Patients >65 years of age were significantly more likely to be revised for periprosthetic fracture when compared to patients 46-55 and 56-65 years of age. Patients >65 years of age were more likely to be revised for infection compared to the rest of the cohort (Table 1). With regards to comorbidities, patients <45 were significantly most likely to be smokers. Patients <45 and 46-55 year of age were significantly more likely to have depression compared to the older cohorts. Patients 46-55 and 56-65 years of age were significantly more likely to have cardiovascular disease and hypertension when compared to patients <45 years of age. Patients 56-65 years of age were more likely to have cardiovascular disease and hypertension when compared to patients 46-55 years of age. Patients 56-65 were most likely to be drinkers. Patients >65 years of age were significantly more likely to have renal disease, cardiovascular disease, diabetes mellitus, malignancy, and hypertension when compared to the other groups. With respect to outcome, patients <45 years of age were more likely to return to the hospital within 30-,60-, and 90-days. They were also more likely to be re-revised. Patients 46-55 and 56-65 were more likely to be revised when compared to patients <65 years old. Patients >65 years of age were significantly more likely to return to the hospital within 60- and 90- days when compared to patients 46-55 and 56-65 years of age. There were no significant differences with respect to infection.

DISCUSSION: As the number of TKA recipients under the age of 60 continues to rise, outcomes of revision TKA in patients of all age groups merits focused study. The findings of this study demonstrate differences for patients between 46-65 when compared to patients <45 and >65 years of age. These patients demonstrated significantly higher rates of cardiovascular disease and hypertension when compared to patients <45, while significantly lower rates when compared to patients >65 years of age. They were more likely to be revised when compared to patients >65 years of age, but less likely to be revised compared to patients <45 years of age. Interestingly, patients between the ages 46-65 were least likely to be return to the hospital for readmission at 60- and 90- day intervals. The knowledge about these findings and differences in medical history and failure mechanisms between different age groups has the potential to assist in clinical decision-making.

SIGNIFICANCE/CLINICAL RELEVANCE: The findings of this study demonstrate that patients aged between 46-65 years exhibit differences in medical comorbidities and clinical outcomes, when compared to younger and older age groups. As the patient cohort aged between 46-65 years represents the largest cohort of the population, knowledge of differences between age groups has the potential to assist in clinical decision-making.

Table 1: Comparison of clinical outcomes between all study cohorts.

Characteristics	<45 years old, n= 46	46-55 years old, n=227	56-65 years old, n=445	>65 years old, n=771	p-value
Smoking	17.39%	9.25%	8.76%	2.98%	**<0.001**
Drug abuse	0.00%	1.76%	0.90%	0.65%	0.061
Alcohol	21.74%	22.03%	29.89%	23.87%	**0.004**
Renal disease	6.52%	3.96%	5.62%	11.15%	**<0.001**
Depression	17.39%	17.62%	12.36%	6.61%	**<0.001**
Cardiovascular disease	4.35%	13.66%	16.85%	31.78%	**<0.001**
Hypertension	17.39%	31.72%	44.27%	56.03%	**<0.001**
Diabetes	6.52%	10.57%	14.38%	17.90%	**0.012**
Malignancy	4.35%	3.08%	4.72%	8.43%	**0.008**
30-day readmission	9 (19.57%)	17 (7.49%)	42 (9.44%)	95 (12.32%)	**0.032**
60-day readmission	11 (23.91%)	29 (12.78%)	55 (12.36%)	131 (16.99%)	0.037
90-day readmission	11 (23.91%)	36 (15.86%)	63 (14.16%)	152 (19.71%)	0.051
Re-revision	13 (28.26%)	43 (18.94%)	78 (17.53%)	102 (13.23%)	**0.008**
Infection risk	5 (10.87%)	14 (6.17%)	36 (8.09%)	54 (7.00%)	0.615
Length of Stay (days)	4.51 ± 3.33	4.06 ± 2.83	3.89 ± 2.65	5.37 ± 6.44	0.782