Comparison of Subvastus Versus Parapatellar Approach in Total Knee Arthroplasty in Patients with BMI >35: A Matched Cohort Analysis

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INTRODUCTION: The medial parapatellar (PP) approach is the most commonly used technique for primary total knee arthroplasty (TKA). The subvastus (SV) approach, which preserves quadriceps integrity, is associated with faster early recovery but is less commonly used in patients with BMI >35 due to exposure challenges. The purpose of this study was to compare outcomes between PP and SV approaches in patients with BMI >35 undergoing primary TKA using matched cohorts.

METHODS: This is an IRB approved, retrospective review of patients with BMI > 35 kg/m² who underwent primary TKA at a single institution. A 1:1 match based on gender, age (±5 years), and BMI (±2 units) yielded 262 matched pairs (n = 524). After excluding revisions and those lost to follow-up, 221 SV and 214 PP TKAs with a minimum 1-year follow up were analyzed. Baseline demographics, including gender, BMI, age, ASA, PROMIS-10 Physical and Mental T-scores, FJS, and KOOS JR, were comparable between groups. Mean follow-up was equivalent between SV and PP groups (27.8 vs 27.3 months). Outcome measures included hospital length-of-stay, range of motion (ROM), KOOS JR, Forgotten Joint Score (FJS), PROMIS-10 Physical and Mental T-scores, satisfaction (Likert scale), and revision rates. Independent t-tests were used for continuous variables, chi-square tests for categorical variables, and Mann–Whitney U tests for Likert scale data. Statistical significance was defined as $P < 0.05$.

RESULTS: The subvastus (SV) group had a shorter length of stay (1.37 vs 1.90 days; $P=0.0008$) compared to the parapatellar (PP) group. The SV group demonstrated higher KOOS JR scores (82.7 vs 79.0; $P=0.021$), and greater satisfaction via Likert scale (4.62 vs 4.47; $P=0.042$). Satisfaction rates were 93.0% vs 88.5% (SV vs PP). Revision rates were 3.4% vs 5.3%, and non-revision procedure rates were 11.1% vs 10.3% (SV vs PP), with no statistically significant differences between groups. A greater proportion of the SV group achieved the KOOS JR MCID compared to the PP group (93.3% vs 83.1%; $P = 0.046$).

DISCUSSION AND CONCLUSION: In patients with BMI > 35 kg/m² undergoing primary TKA, the SV approach was associated with improved patient metrics with respect to KOOS JR scores, patient satisfaction, and length of stay compared to the PP approach, with comparable complication incidence. These findings support the use of the SV approach as an alternative in this challenging population.

SIGNIFICANCE/CLINICAL RELEVANCE: The subvastus approach offers an additional option for surgeons treating patients with elevated BMI undergoing primary TKA, with the potential to enhance recovery, improve patient-reported outcomes, and reduce hospital resource use.

Table 1. Patient Demographics for Patient Undergoing TKA

Demographic	Subvastus	Parapatellar	T-Test/ChiSquare (p)
RA-TKAs (no.)	262	262	
Number of study group cases	221	214	
Age (Years)	62.60 (range 43-83)	62.58 (range 38-86)	P=0.9762
Gender			
Male	77 (29.4%)	77 (29.4%)	P=1
Female	185 (70.6%)	185 (70.6%)	P=1
	Mean ± St. Dev (range)		
ASA Score	2.77 ± 0.45 (1-4)	2.81 ± 0.49 (1-5)	P=0.3069
BMI	39.81 ± 3.30 (35.05-51.77)	40.36 ± 3.43 (35.01-53.4)	P=0.0638
Length of Stay (days)	1.37 ± 1.77 (0-16)	1.90 ± 1.74 (0-9)	P=0.0008
Mean follow up of study cases (months)	27.82 ± 14.24 (11.5-87.9)	27.32 ± 16.07 (11.5-97.5)	P=0.7287

Table 2. Patient Metrics for Subvastus and Parapatellar Cases

Metric	Subvastus	Parapatellar	T-Test/Chi-square test (p)
Pre-operative Degrees Active Extension	1.04 SD= 2.65 Range: 0-20	1.29 SD= 2.80 Range: 0-15	P=0.2980
Post-operative Degrees Active Extension	0.09 SD= 0.60 Range: 0-5	0.15 SD= 0.87 Range: 0-5	P=0.3882
Pre-operative Degrees Active Flexion	113.3 SD= 10.8 Range: 55-150	110.6 SD= 11.1 Range: 50-140	P=0.0053
Post-operative Degrees Active Flexion	117.6 SD= 7.3 Range: 90-130	115.8 SD= 7.0 Range: 90-130	P=0.0095
Pre-operative KOOS JR	40.3 SD= 15.0 Range: 8.29-79.9	42.7 SD= 13.9 Range: 8.29-70.7	P=0.2631
Post-operative KOOS JR	82.7 SD= 16.3 Range: 8.29-100	79.0 SD= 15.7 Range: 28.25-100	P=0.0213
Pre-operative PROMIS-10 Global Physical Health	38.6 SD= 5.9 Range: 23.5-54.1	36.3 SD= 7.6 Range: 23.5-57.7	P=0.8137
Post-operative PROMIS-10 Global Physical Health	77.0 SD=8.9 Range: 26.7-67.7	79.2 SD= 8.9 Range: 26.7-67.7	P=0.4857
Pre-operative PROMIS-10 Global Mental Health	49.8 SD= 7.5 Range: 28.4-67.6	46.9 SD= 9.2 Range: 28.4-67.6	P=0.0544
Post-operative PROMIS-10 Global Mental Health	51.3 SD= 8.8 Range: 25.1-67.6	51.4 SD= 9.3 Range: 33.8-67.6	P=0.9270
Pre-operative FJS	13.5 SD= 11.5 Range: 2.08-59	15.7 SD= 13.8 Range: 2.08-75	P=0.3413
Post-operative FJS	68.3 SD=28.0 Range: 2.1-100	63.6 SD= 27.6 Range: 2.1-100	P=0.0956
Satisfaction (Likert 1-5)	4.62 SD= 0.76 Range: 1-5	4.47 SD= 0.86 Range: 1-5	P=0.0423
% of Patients either Satisfied or Very Satisfied at most recent follow-up	93.0%	88.5%	P=0.0947