

Outcomes of Distal Femur Fractures Treated with ORIF Fixation vs. TKA in Elderly Patients

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INTRODUCTION: Distal femur fractures in the elderly population pose significant surgical challenges. They often result from low-energy falls and are associated with high rates of morbidity and mortality. Treatment methods have traditionally focused on open reduction internal fixation (ORIF). However, complication rates and outcomes have remained undesirable. More recently, acute total knee arthroplasty (TKA) has emerged as an alternative treatment method for geriatric distal femur fractures. This analysis seeks to clarify the relative advantages and limitations of each treatment approach, providing valuable insights to optimize care strategies for this vulnerable patient population.

METHODS:

A retrospective analysis was conducted using the TriNetX Database, a national insurance claims database, to evaluate patients who sustained distal femur fractures and were treated with either TKA or ORIF between 2005 and 2025. Distal femur fractures, TKA, and ORIF were identified using ICD-10 and CPT codes (Table 6). The TKA cohort included patients who received primary total knee arthroplasty for distal femur fractures, while the ORIF cohort included patients treated with primary ORIF. Patients were included if they underwent primary TKA or ORIF within 30 days of injury and age > 60. Periprosthetic fractures were excluded. Primary outcomes assessed were transfusions, infections, and irrigation and debridement (I&D) procedures at postoperative days 7, 30, and 90. Revision surgeries and mechanical complications were analyzed at postoperative years 1 through 5. Patients included in the revision surgery group were those who returned to the OR for revision or removal of portions or the entirety of the synthetic substitute in the TKA group and revision or removal of the internal fixation device in the ORIF group. The database was also queried for patients who initially underwent ORIF but were later revised to TKA.

Additionally, comorbidities such as Type II diabetes, obesity, renal disease, hypertension, and tobacco use were examined in these patient populations.

After initial data collection, patients in the TKA and ORIF cohorts were subjected to matching using the greedy nearest neighbor algorithm based on their age, sex, and medical comorbidities (type II diabetes, obesity, chronic kidney disease, hypertension, and smoking status). Demographic data of the cohorts following propensity score matching was collected. The postoperative complication relative risks were also collected following matching to compare to data obtained prior to matching.

The relative risk (RR) was used to compare the risk of the measured complications in the TKA cohort to the ORIF cohort. 95% Confidence intervals (CI) were provided for all RR calculations. P-values <0.05 were considered statistically significant.

RESULTS:

After matching, the patient population was 5,102 with 2,551 patients in both the TKA and ORIF cohorts. At 7 days and 30 days postoperative, the TKA cohort showed an increased risk of infection when compared to the ORIF cohort (RR: 3.300; CI: 1.630-6.681; p=0.0004 and RR: 2.185; CI:1.591-3.001; p<0.0001). At 90 days postoperative, the TKA cohort had an increased rate of transfusion (RR: 1.123; CI: 1.034-1.220; p=0.0058), infection (RR: 2.162; CI: 1.714-2.726; p<0.0001), and I&D (RR: 1.914; CI 1.277-2.870; p=0.0014). Additionally at postoperative years 1 through 5, the TKA cohort was found to have a significantly higher risk of both revision surgery and mechanical complications when compared to the ORIF cohort.

DISCUSSION AND CONCLUSION: This study found that the treatment of distal femur fractures with TKA is associated with a significantly higher risk of transfusion, infection, I&D procedures, revision surgery, and mechanical complications compared to ORIF. Given advancements in ORIF technology that facilitate immediate weight-bearing, our data suggest ORIF should be the preferred treatment for most elderly patients with distal femur fractures. TKA should be considered only for specific cases where preexisting arthritis is severe, fracture pattern is not amenable to ORIF or in cases of failed ORIF. Future research should involve large multi-center prospective, randomized controlled trials with long-term follow-up to refine treatment strategies and further improve patient outcomes.

Diabetes (Pre Match)						
3-Year Postoperative						
Characteristic	N (%)	OR (95% CI)	n	mean or %	n	p value
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
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3-Year Postoperative						
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	

Demographics (Pre Match)						
Characteristic	n	mean or %	n	mean or %	n	p value
Age at Index	2,551	73.6 ± 9.89	2,551	73.6 ± 9.89		0.9396
Sex						
Male	499	19.56%	501	19.64%		0.8438
Female	1,852	73.44%	1,852	73.52%		0.8111
Unknown	192	4.00%	97	3.80%		0.7177
Race or Ethnicity						
Latino or Hispanic	105	4.12%	111	4.35%		0.7600
Asian	73	2.86%	69	2.69%		0.0518
Black or African American	229	8.97%	218	8.51%		0.9026
White	1,827	71.34%	1,812	70.95%		0.8438
Other Race	66	2.59%	70	2.69%		0.8718
Unknown	248	9.72%	248	9.70%		0.9629
Diabetes/Diagnoses						
Type II Diabetes	631	24.58%	631	24.58%		1.0000
Diagnosis of Overweight / Obese						
Overweight / Obese	1,006	39.44%	1,006	39.51%		0.9545
Renal Disease Diagnosis						
Chronic Kidney Disease	526	20.61%	526	20.61%		1.0000
Hypertension Diagnosis						
Essential Hypertension	1,843	72.25%	1,843	72.07%		0.8799
Tobacco Use Status						
Use of Tobacco	84	3.29%	70	2.74%		0.2529

Diabetes (Post Match)						
3-Year Postoperative						
Characteristic	N (%)	OR (95% CI)	n	mean or %	n	p value
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
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Missing	18		10		8	
SD	18		10		8	
3-Year Postoperative						
Controlled	302 (55.1)		88		88	
Not Controlled	247 (44.9)		70		70	
Missing	18		10		8	
SD	18		10		8	

Demographics (Pre Match)						
Characteristic	n	mean or %	n	mean or %	n	p value
Age at Index	2,551	73.6 ± 9.89	2,629	73.7 ± 11.2		0.9500
Sex						
Male	499	19.56%	6,012	24.41%		<0.0001
Female	1,852	73.44%	27,871	73.35%		<0.0001
Unknown	192	4.00%	943	3.83%		0.8176
Race or Ethnicity						
Latino or Hispanic	105	4.12%	1,106	4.49%		0.8337
Asian	73	2.86%	1,090	4.40%		0.0007
Black or African American	229	8.97%	2,845	8.20%		0.0109
White	1,827	71.34%	18,117	73.55%		0.2882
Other	66	2.59%	748	2.86%		0.4742
Unknown	248	9.72%	2,650	10.70%		0.3387
Diabetes/Diagnoses						
Type II Diabetes	631	24.58%	7,953	31.12%		0.1368
Diagnosis of Overweight / Obese						
Overweight / Obese	1,006	39.44%	6,448	26.19%		<0.0001
Renal Disease Diagnosis						
Chronic Kidney Disease	473	18.54%	4,884	19.63%		0.8300
Hypertension Diagnosis						
Essential Hypertension	1,843	72.25%	15,174	61.62%		<0.0001
Tobacco Use Status						
Use of Tobacco	84	3.29%	773	3.14%		0.8729