

## Total Ankle Arthroplasty Is Safer than Total Hip and Knee Arthroplasty

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**Introduction/Purpose:** Total hip and knee arthroplasty (THA and TKA) are performed far more commonly than total ankle arthroplasty (TAA), so patients and the orthopaedic community have a better understanding of the complication profile for THA and TKA than for TAA. The present study compares adverse event rates, the rate of blood transfusion, operative times, length of stay, and the rate of hospital readmission between TAA, THA, and TKA procedures.

**Methods:** Patients were identified who underwent TAA, THA, or TKA during 2006-2016 as part of the American College of Surgeons National Surgical Quality Improvement Program (NSQIP). Multivariate regression was used to compare TAA to THA and TKA in terms of adverse event rates, the rate of blood transfusion, operative times, length of stay, and the rate of hospital readmission. All analyses were fully adjusted for differences in baseline demographic, comorbidity, and procedural characteristics, including type of anesthesia. The level of significance was set at  $p < 0.05$ .

**Results:** A total of 138,325 patients were identified as having undergone THA, 223,587 TKA, and 839 TAA. The total complication rate was lower for TAA (2.98%) compared to THA (4.92%,  $p = 0.011$ ) and TKA (4.56%,  $p = 0.049$ ; Table 1). Similarly, the rate of blood transfusion was lower for TAA (0.48%) compared to THA (9.66%,  $p < 0.001$ ) and TKA (6.44%,  $p < 0.001$ ). Interestingly, operative time was approximately an hour longer for TAA (157.7 minutes) compared to THA (93.6 minutes,  $p < 0.001$ ) and TKA (93.7 minutes,  $p < 0.001$ ). Length of stay was approximately one day shorter for TAA (1.9 days) compared to THA (2.9 days,  $p < 0.001$ ) and TKA (3.0 days,  $p < 0.001$ ). Finally, the rate of readmission was lower for TAA (1.5%) compared to THA (3.7%,  $p = 0.002$ ) and TKA (3.4%,  $p = 0.005$ ).

**Conclusion:** TAA is a relatively rare procedure to which patients may not have had much exposure. Patients considering TAA are more likely to have had exposure to more common procedures such as THA and TKA (through family, friends, their own procedures, etc.). Patients can be counseled that relative to THA and TKA, TAA is a safer procedure in the perioperative time frame, with significantly lower rates of adverse events, blood transfusion, additional surgery, and hospital readmission. Their procedures can be expected to take longer, but their hospital stays can be expected to be shorter.

**Table 1.** Comparison of outcomes between total ankle arthroplasty, total hip arthroplasty, and total knee arthroplasty.

	Event rates (%) or means			TAA versus THA*		TAA versus TKA*	
	TAA	THA	TKA	RR or difference (95% CI)	P-value	RR or difference (95% CI)	P-value
Total adverse event rate	2.98%	4.92%	4.56%	<b>0.60 (0.41 to 0.89)</b>	<b>0.011</b>	<b>0.68 (0.46 to 0.99)</b>	<b>0.049</b>
Specific adverse event rates							
Death	0.36%	0.20%	0.11%	1.70 (0.54 to 5.32)	0.361	<b>3.38 (1.07 to 10.60)</b>	<b>0.037</b>
Surgical site infection	0.95%	1.19%	0.84%	0.78 (0.39 to 1.56)	0.482	1.21 (0.60 to 2.41)	0.596
Wound dehiscence	0.24%	0.10%	0.20%	2.18 (0.53 to 8.91)	0.277	1.29 (0.32 to 5.18)	0.722
Pneumonia	0.24%	0.39%	0.35%	0.58 (0.14 to 2.34)	0.447	0.67 (0.17 to 2.71)	0.579
Deep vein thrombosis	0.00%	0.41%	0.88%	-	-	-	-
Pulmonary embolism	0.12%	0.28%	0.62%	0.39 (0.05 to 2.75)	0.344	0.22 (0.03 to 1.59)	0.134
Unplanned intubation	0.00%	0.23%	0.17%	-	-	-	-
Acute kidney injury	0.12%	0.16%	0.18%	0.64 (0.09 to 4.60)	0.659	0.76 (0.11 to 5.38)	0.780
Urinary tract infection	0.72%	1.04%	0.87%	0.69 (0.31 to 1.53)	0.363	0.93 (0.42 to 2.01)	0.857
Stroke	0.00%	0.10%	0.08%	-	-	-	-
Coma	0.00%	0.00%	0.00%	-	-	-	-
Peripheral nerve injury	0.00%	0.02%	0.01%	-	-	-	-
Cardiac arrest	0.00%	0.09%	0.08%	-	-	-	-
Myocardial infarction	0.12%	0.25%	0.21%	0.46 (0.06 to 3.29)	0.441	0.59 (0.08 to 4.23)	0.603
Sepsis	0.12%	0.37%	0.28%	0.29 (0.04 to 2.07)	0.217	0.42 (0.06 to 3.01)	0.391
Return to operating room	0.48%	1.79%	1.04%	<b>0.26 (0.10 to 0.70)</b>	<b>0.007</b>	0.45 (0.17 to 1.19)	0.106
Blood transfusion	0.48%	9.66%	6.44%	<b>0.05 (0.02 to 0.12)</b>	<b>&lt;0.001</b>	<b>0.07 (0.02 to 0.17)</b>	<b>&lt;0.001</b>
Operative time	157.7 min	93.6 min	93.7 min	<b>+58.7 min (+56.0 to +61.4)</b>	<b>&lt;0.001</b>	<b>+59.9 (+57.3 to +62.4)</b>	<b>&lt;0.001</b>
Length of stay	1.9 days	2.9 days	3.0 days	<b>-0.9 days (-1.1 to -0.8)</b>	<b>&lt;0.001</b>	<b>-0.9 days (-1.1 to -0.8)</b>	<b>&lt;0.001</b>
Hospital readmission	1.5%	3.7%	3.4%	<b>0.39 (0.22 to 0.70)</b>	<b>0.002</b>	<b>0.43 (0.24-0.78)</b>	<b>0.005</b>

TAA = total ankle arthroplasty; THA = total hip arthroplasty; TKA = total knee arthroplasty; CI = confidence interval.

\* Adjusted for age, body mass index, sex, functional status, diabetes, dyspnea on exertion, hypertension, chronic obstructive pulmonary disease, smoking status, anemia, and anesthesia type.