Perioperative Outcomes Following Open vs Closed Geriatric Ankle Fractures: A Large, Propensity-Matched Cohort Study

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INTRODUCTION: Open ankle fractures in the geriatric population display poor outcomes. However, limited data exists comparing operative outcomes between open and closed geriatric ankle fractures. Our purpose was to investigate differences in perioperative complications and mortality among open and closed ankle fractures in geriatric patients.

METHODS: The TriNetX US Collaborative Network database was queried to identify patients aged 65 and older who experienced operatively treated, isolated open or closed ankle fractures between 2014 and 2024. Patients were divided into two propensity-matched cohorts depending on open vs closed injuries. Rates of complications and mortality were compared between operatively treated open and closed ankle fractures in geriatric patients.

RESULTS:

Overall, 27,860 patients met inclusion criteria. Of these, 25,257 (90.7%) sustained closed ankle fractures and 2,603 (9.3%) sustained open ankle fractures. After 1:1 propensity matching, each cohort included 2,565 patients. At early time points (<30 days), DVT, MI, sepsis, pneumonia, AKI, ABLA, opioid use, deep infection, ED visits and rehospitalizations were higher in open ankle fractures ($p < 0.05$). At delayed time points from 90 days to 1 year, DVT, pneumonia, ARDS, AKI, ABLA, SSI, deep infection, sepsis, BKA, emergency department visits, rehospitalizations and death remained significantly higher in open ankle fractures ($p < 0.05$). Notably, open ankle fractures had significantly increased rates of mortality at 90 days ($p=0.007$), 180 days ($p=0.004$), and 1 year ($p<0.0001$). At 1 year, bimalleolar and trimalleolar open ankle fractures also demonstrated significantly higher mortality rates ($p < 0.05$).

DISCUSSION AND CONCLUSION: Open geriatric ankle fractures, irrespective of fracture morphology, demonstrate significantly higher rates of mortality and postoperative complications including DVT, MI, pneumonia, AKI, sepsis, SSI, deep infections, BKA, emergency department visits and rehospitalizations. Our findings suggest the need for enhanced perioperative counseling and preventative strategies to address modifiable risk factors in geriatric orthopaedic patients undergoing operative fixation for open ankle fractures.

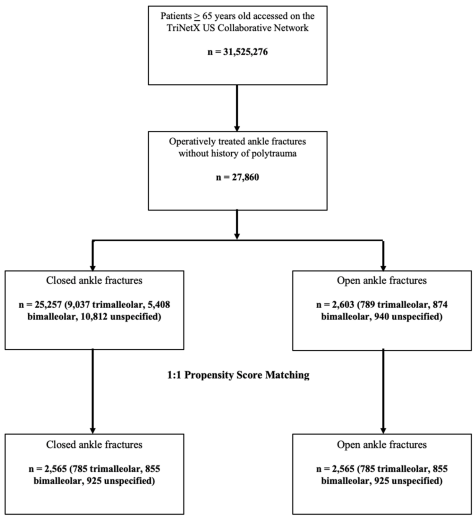

Table 1. Baseline demographics and comorbidities before and after 1:1 propensity matching

	Before Matching			After Matching		
	Open Fracture (n=2,603)	Closed Fracture (n=25,257)	*p*-value	Open Fracture (n=2,565)	Closed Fracture (n=2,565)	*p*-value
Demographics						
Age	70.0 ± 9.5	68.4 ± 8.7	<0.001	70.0 ± 9.5	70.1 ± 9.5	0.57
Male	867 (33.3)	7,330 (29.0)	<0.001	864 (33.7)	850 (33.1)	0.679
Female	1,577 (60.6)	16,518 (65.4)	<0.001	1,577 (61.5)	1,591 (62.0)	0.688
Body Mass Index, BMI (kg/m2)	31.4 ± 8.1	30.2 ± 6.7	<0.001	31.4 ± 8.1	31.4 ± 8.0	0.969
White	1,978 (76.0)	19,124 (75.7)	0.626	1,975 (77.0)	1,994 (77.7)	0.526
Black or African American	173 (6.6)	2,199 (8.7)	<0.001	173 (6.7)	177 (6.9)	0.825
Hispanic or Latino	120 (4.6)	1,315 (5.2)	0.197	120 (4.7)	106 (4.1)	0.341
Asian	33 (1.3)	397 (1.6)	0.235	33 (1.3)	30 (1.2)	0.704
Comorbidities						
Essential (primary) hypertension	1,293 (49.7)	14,546 (57.6)	<0.001	1,293 (50.4)	1,299 (50.6)	0.771
Diabetes Mellitus	608 (23.4)	6,390 (25.3)	0.034	608 (23.7)	589 (23.0)	0.531
Chronic Lower Respiratory Disease	546 (21.0)	5,773 (22.9)	0.033	545 (21.2)	537 (20.9)	0.784
Heart Failure	370 (14.2)	2,739 (10.8)	<0.001	367 (14.3)	363 (14.2)	0.873
Chronic Kidney Disease	330 (12.7)	3,330 (13.2)	0.489	330 (12.9)	337 (13.1)	0.771
Nicotine Dependence	308 (11.8)	3,331 (13.2)	0.055	308 (12.0)	291 (11.3)	0.46
Alcohol Dependence	97 (3.7)	790 (3.1)	0.112	97 (3.8)	84 (3.3)	0.325
Opioid Use Disorder	43 (1.7)	441 (1.7)	0.736	43 (1.7)	45 (1.8)	0.83
Ankle Fracture Morphology						
Trimalleolar	789 (30.3)	9,037 (35.8)	<0.001	785 (30.6)	785 (30.6)	1
Bimalleolar	874 (33.6)	5,408 (21.4)	<0.001	855 (33.3)	855 (33.3)	1
Unspecified	940 (36.1)	10,812 (42.8)	<0.001	940 (36.6)	940 (36.6)	1

All data are presented as mean ± SD or n (%) unless otherwise specified. *Statistically significant with $p<0.05$.