

## Octogenarian and Nonagenarians Are at a Higher Risk for Experiencing Adverse 30-Day Outcomes Following ORIF for Ankle Fractures

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**Introduction/Purpose:** Despite an increasing number of elderly individuals undergoing surgical fixation for ankle fractures, few studies have investigated peri-operative outcomes and safety of surgery in an octogenarian and nonagenarian population (age  $\geq 80$  years). Past literature has shown octogenarians to be a potentially vulnerable population that have drastically different adverse outcomes and higher resource utilization as compared to individuals below the age of 80 years.

**Methods:** The 2012-2017 American College of Surgeons – National Surgical Quality Improvement Program (ACS-NSQIP) was queried using Current Procedural Terminology codes for patients undergoing open reduction internal fixation (ORIF) for isolated uni-malleolar (CPT-27766, CPT-27769, CPT-27792), bi-malleolar (CPT-27814) and tri-malleolar (CPT-27822, CPT-27823) ankle fractures. The study cohort was divided into three distinct groups for comparisons (Age  $< 65$  years, Age 65-79 years and Age  $\geq 80$  years/octogenarians + nonagenarians). Multi-variate regression analyses were used to compare the independent effect of varying age groups on 30-day post-operative outcomes while controlling for differences in baseline clinical characteristics (age, gender, sex, race, fracture type/severity, open vs. closed fracture, admission status, BMI, co-morbidities, functional health status, ASA group and operative time). For comparison purposes, Age  $< 65$  years was taken as reference group in multi-variate regression models.

**Results:** A total of 19,585 patients were included – out of which 1,033 (5.3%) were octogenarians/nonagenarians ( $\geq 80$  years). Following multivariate analysis, individuals aged  $\geq 80$  years were at a significantly higher risk of 30-day wound complications (OR 1.84;  $p=0.019$ ), pulmonary complications (OR 3.88;  $p<0.001$ ), renal complications (OR 1.96;  $p=0.015$ ), septic complications (OR 3.72;  $p=0.002$ ), urinary tract infections (OR 2.24;  $p<0.001$ ), bleeding requiring transfusion (OR 1.90;  $p=0.025$ ), mortality (OR 7.44;  $p<0.001$ ), readmissions (OR 1.65;  $p=0.004$ ) and non-home discharge (OR 13.91;  $p<0.001$ ). Individuals between the age of 65-79 years only had a higher risk of pulmonary complications (OR 2.30;  $p=0.004$ ), urinary tract infections (OR 2.24;  $p<0.001$ ), readmissions (OR 1.41;  $p=0.005$ ) and non-home discharges (OR 3.55;  $p<0.001$ ), with the effect sizes being small as compared to age  $\geq 80$  years group.

**Conclusion:** Based on the findings, it appears that octogenarians and nonagenarians (age  $\geq 80$ ) are a fundamentally distinct and vulnerable age group that is at a higher risk of complications, readmissions, mortality and non-home discharges as compared to other geriatric (65-79 years) and non-geriatric ( $< 65$  years) patients. Providers should understand the importance of pre-operative counselling and risk-stratification in this vulnerable patient population.

30-Day Outcomes	Adjusted OR [95% CI]	P-value
<b>Wound Complications</b>		
- Age ≥80 years	1.84 [1.10-3.06]	<b>0.019</b>
- Age 65-79 years	1.15 [0.80-1.65]	0.451
- Age <65 years	Ref.	-
<b>Pulmonary Complications</b>		
- Age ≥80 years	3.88 [1.99-7.56]	<b>&lt;0.001</b>
- Age 65-79 years	2.30 [1.31-4.05]	0.004
- Age <65 years	Ref.	-
<b>Thromboembolic Complications</b>		
- Age ≥80 years	0.64 [0.22-1.92]	0.431
- Age 65-79 years	1.34 [0.79-2.26]	0.274
- Age <65 years	Ref.	-
<b>Cardiac complications</b>		
- Age ≥80 years	1.64 [0.52-5.21]	0.398
- Age 65-79 years	0.92 [0.36-2.37]	0.868
- Age <65 years	Ref.	-
<b>Renal Complications</b>		
- Age ≥80 years	1.96 [0.59-6.44]	<b>0.015</b>
- Age 65-79 years	5.28 [1.38-20.26]	0.271
- Age <65 years	Ref.	-
<b>Septic Complications</b>		
- Age ≥80 years	3.72 [1.60-8.63]	<b>0.002</b>
- Age 65-79 years	1.36 [0.66-2.83]	0.404
- Age <65 years	Ref.	-
<b>Urinary tract infections</b>		
- Age ≥80 years	3.06 [1.81-5.16]	<b>&lt;0.001</b>
- Age 65-79 years	2.24 [1.45-3.44]	<b>&lt;0.001</b>
- Age <65 years	Ref.	-
<b>Bleeding requiring transfusion</b>		
- Age ≥80 years	1.90 [1.08-3.34]	<b>0.025</b>
- Age 65-79 years	1.13 [0.70-1.81]	0.628
- Age <65 years	Ref.	-
<b>Mortality</b>		
- Age ≥80 years	7.44 [2.66-20.83]	<b>&lt;0.001</b>
- Age 65-79 years	1.57 [0.59-4.22]	0.369
- Age <65 years	Ref.	-
<b>Reoperations</b>		
- Age ≥80 years	1.44 [0.90-2.31]	0.125
- Age 65-79 years	0.99 [0.70-1.38]	0.931
- Age <65 years	Ref.	-
<b>Readmissions</b>		
- Age ≥80 years	1.65 [1.18-2.31]	<b>0.004</b>
- Age 65-79 years	1.41 [1.11-1.79]	<b>0.005</b>
- Age <65 years	Ref.	-
<b>Non-Home Discharge</b>		
- Age ≥80 years	13.91 [11.46-16.89]	<b>&lt;0.001</b>
- Age 65-79 years	3.55 [3.12-4.04]	<b>&lt;0.001</b>
- Age <65 years	Ref.	-