Impact of Obesity on Outcomes Following Distal Radius Fracture Open Reduction and Internal Fixation: A Nationwide Study

Introduction

Obesity is a growing public health concern associated with increased perioperative risks across surgical specialties. Excess body mass may impair bone healing in distal radius fractures (DRF), alter biomechanics, and contribute to higher wound complication rates. This study evaluates obesity and DRF open reduction and internal fixation (ORIF) and aims to clarify short- and long-term outcomes to guide risk assessment.

Methods

TriNetX, a de-identified federated health record database, was queried from 2005–2025 to identify adults with DRF. Three cohorts were compared: patients with BMI ≥30 kg/m² undergoing ORIF (n=14,094), patients with BMI ≤30 kg/m² undergoing ORIF (n=86,031), and patients with BMI ≥30 kg/m² treated nonoperatively (n=58,313). Propensity score matching balanced demographics and comorbidities, yielding 13,872 matched patients per ORIF cohort and 14,089 per operative versus nonoperative cohort among obese patients. Outcomes were assessed within 90 days (pneumonia, thromboembolism, acute kidney injury, anemia, infection-related complications, and opioid use) and at two years (delayed healing, malunion, revision surgery, complex regional pain syndrome, stiffness, and opioid use). Risk differences, ratios, and odds ratios were calculated with 95% confidence intervals.

Results

Compared with matched non-obese patients, obese patients undergoing ORIF had higher 90-day risks of pneumonia, DVT, PE, anemia, acute kidney injury, opioid use, skin necrosis, wound debridement, infection, and sepsis, with no significant differences in transfusion or hematoma/seroma (*Table 1*). At two years, obesity was associated with increased delayed healing but not malunion or revision surgery (*Table 1*). Among obese patients, ORIF reduced malunion risk versus nonoperative treatment but was linked to higher rates of delayed healing, stiffness, and prolonged opioid use (*Table 2)*.

Discussion

Obesity is associated with increased short- and long-term complication rates after ORIF for DRF. Although operative management reduces malunion risk, it carries greater risks of delayed healing and stiffness. Incorporating obesity into perioperative risk stratification is essential.

Outcomes [a]	Obese (n=13,872)	Non-obese (n=13,872)	Odds Ratio (95% CI)	NNT	p-value
Short-term (90-day)					
Cerebral infarction	130 (0.9)	104 (0.7)	1.252 (0.967, 1.623)	500	0.088
Pneumonia	238 (1.7)	172 (1.2)	**1.390** (1.141, 1.694)	200	**0.001**
DVT	235 (1.7)	119 (0.9)	**1.992** (1.595, 2.486)	125	**<0.001**
PE	151 (1.1)	62 (0.4)	**2.451** (1.822, 3.298)	167	**<0.001**
Transfusion	116 (0.8)	105 (0.8)	1.106 (0.848, 1.441)	1000	0.458
Anemia	424 (3.1)	302 (2.2)	**1.417** (1.220, 1.645)	111	**<0.001**
AKI	328 (2.4)	224 (1.6)	**1.476** (1.243, 1.752)	142	**<0.001**
Opioid use	11,716 (84.5)	10,587 (76.3)	**1.686** (1.587, 1.791)	12	**<0.001**
Skin necrosis	51 (0.4)	24 (0.2)	**2.129** (1.005, 2.770)	500	**0.002**
Wound debridement	226 (1.6)	140 (1.0)	**1.624** (1.314, 2.008)	167	**<0.001**
Postoperative infection	140 (1.0)	98 (0.7)	**1.433** (1.106, 1.857)	333	**0.006**
Sepsis	117 (0.8)	76 (0.5)	**1.544** (1.156, 2.053)	333	**0.003**
Hematoma/Seroma	27 (0.2)	16 (0.1)	1.689 (0.910, 3.136)	1000	0.093
Long-term (2-year)					
Delayed Healing	231 (1.7)	166 (1.2)	**1.398** (1.144, 1.709)	1000	**0.001**
Malunion	97 (0.7)	91 (0.7)	1.066 (0.800, 1.421)	1000	0.661
Revision Surgery	254 (1.8)	289 (2.1)	0.877 (0.739, 1.039)	333	0.129

Legend: AKI, acute kidney injury; DVT, deep vein thrombosis; PE, pulmonary embolism
[a] Data reported as n (%) unless otherwise indicated
p-values in **bold** are statistically significant (p<0.05)

Table 1. Postoperative outcomes in operative treatment of obese vs. non-obese patients.

Outcomes [a]	Operative (n=14,089)	Non-operative (n=14,089)	Odds Ratio (95% CI)	NNT	p-value
Long-term (2-year)					
Delayed Healing	198 (1.4)	92 (0.7)	**2.169** (1.692, 2.780)	125	**<0.001**
Malunion	87 (0.6)	126 (0.9)	**0.689** (0.523, 0.906)	333	**0.007**
CRPS	111 (0.8)	96 (0.7)	1.157 (0.880, 1.523)	1000	0.295
Stiffness / Contracture	2,268 (16.1)	887 (6.3)	**2.856** (2.632, 3.098)	10	**<0.001**
Opioid use	6,386 (45.3)	6,089 (43.2)	**1.089** (1.039, 1.142)	48	**<0.001**

Legend: CRPS, complex regional pain syndrome
[a] Data reported as n (%) unless otherwise indicated
p-values in **bold** are statistically significant (p<0.05)

Table 2. Postoperative outcomes of operative vs. non-operative distal radius fracture treatment in obese patients.