Risk Factors for Infection After Distal Radius Fracture Fixation: Analysis of a National Database and Impact on Cost of Care

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Background

- Although a relatively rare complication, infection after distal radius fracture fixation can be a devastating complication leading to potential hardware removal, prolonged antibiotic course, multiple office visits, and increased overall cost.
- This study aims to identify potential risk factors for infectious complications after distal radius fracture fixation and assess the impact on overall cost as a result of post-operative infection within a large national database.

Methods

- This study utilized the PearlDiver national database encompassing 53 million unique patients from 1/1/2010 – 3/31/2020.
- The cohort included patients undergoing distal radius fracture fixation (CPT 25606 – 25609). Common comorbidities were tabulated.
- The end point is post-operative infection within 180 days of fixation.
- Two-sample T-test compared rates of infection between open and percutaneous fracture fixation techniques.
- Logistic regression analysis was utilized to define independent risk factors for developing post-operative infection.
- A propensity matched cohort was created on patient age, gender, and open fracture.
- Logistic regression analysis of the matched cohorts assessed risk factors for developing post-operative infection.
- Mann-Whitney-U test was utilized to compare cost of care of no infection vs infection.

Results

- The database included 87,169 patients who underwent distal radius fracture fixation (Table 1)
- Post-operative infection was identified in 781 patients (0.9%)
- There was a significant difference in post-operative infection with percutaneous fixation (1.3%) vs open fixation (0.8%) (p<0.005)
- Logistic regression analysis identified male gender, open fracture, lung disease, CKD, diabetes, hypertension, liver disease, obesity, and tobacco use to be independent risk factors for developing post-operative infection (Table 2)
- Logistic regression analysis of propensity matched cohorts demonstrated that tobacco use as a significant risk factor (Table 3)
- Average cost of care for patients undergoing fracture fixation without infection was $6,383 against $23,355 for those with infection, which was significantly different (p = <0.005)

Table 2 & Table 3

Variable	Odds Ratio	95% Confidence Interval		P-Value
Age > 65	0.62	0.52	0.73	<0.005 *
Male gender	1.60	1.37	1.87	<0.005*
Chronic Lung Disease/COPD	1.26	1.08	1.47	0.00286*
History of Cancer	1.05	0.86	1.27	0.628
History of Cerebrovascular Disease	1.18	0.99	1.40	0.067
History of Chronic Kidney Disease	1.28	1.05	1.55	0.014*
History of Coronary Artery Disease	0.99	0.83	1.19	0.933
History of Diabetes	1.24	1.06	1.46	0.008*
History of Hypertension	1.35	1.12	1.62	0.002*
History of Liver Disease	1.20	1.00	1.43	0.005*
History of Obesity	1.28	1.10	1.50	0.002*
Tobacco Use	1.55	1.33	1.81	<0.005*
Open Fracture	2.54	2.03	3.14	<0.005*

Variable	Odds Ratio	95% Confidence Interval		P-Value
Age > 65	0.97	0.76	1.24	0.806
Male gender	1.05	0.84	1.30	0.689
Chronic Lung Disease/COPD	0.91	0.69	1.19	0.390
History of Cancer	1.10	0.88	1.37	0.486
History of Cerebrovascular Disease	1.16	0.90	1.49	0.242
History of Chronic Kidney Disease	1.16	0.87	1.54	0.310
History of Coronary Artery Disease	0.99	0.76	1.29	0.954
History of Diabetes	0.90	0.71	1.13	0.354
History of Hypertension	1.21	0.94	1.56	0.142
History of Liver Disease	1.16	0.89	1.51	0.274
History of Obesity	1.17	0.94	1.46	0.161
Tobacco Use	1.31	1.05	1.64	0.017*

Table 1
Demographics of Patients Undergoing Distal Radius Fixation (n=87169)

Demographics	No.	%
Age, y		
<18	7077	8.1%
18-64	44123	50.6%
65 or older	35969	41.3%
Region		
Midwest	23558	27.0%
Northeast	15203	17.4%
South	35609	40.9%
Unknown	188	0.2%
West	12611	14.5%
Gender		
Female	66842	76.7%
Male	20327	23.3%
Comorbidities		
COPD	28868	33.1%
Cerebrovascular Disease	19478	22.3%
Chronic Kidney Disease	11874	13.6%
Coronary Artery Disease	19491	22.4%
Diabetes	26479	30.4%
Hypertension	55084	63.2%
Liver Disease	12512	14.4%
Previous Cancer Diagnosis	13276	15.2%
Obesity	23330	26.8%
Tobacco Use	20914	24.0%
Open Fracture	4294	4.9%
Treatment Location		
Inpatient	10204	11.7%
Office	379	0.4%
Outpatient	76397	87.6%
Unknown	180	0.3%

Conclusions

- Multiple risk factors for post-operative infection are identified.
- Cost is significantly increased after post-operative infection by almost four-fold.
- Attempts to correct or optimize modifiable risk factors, like clinical care pathways for smoking cessation, may lead to substantial cost savings and improved outcomes for patients.