

INTRAMEDULLARY NAILING OF TIBIAL FRACTURES: PATIENT CHARACTERISTICS ASSOCIATED WITH POSTOPERATIVE COMPLICATIONS

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INTRODUCTION

- Intramedullary nailing (IMN) is a common procedure for patients with tibial fractures requiring surgery
- The technology has been utilized for > 50 years and has shown favorable outcomes
- However, there are limited data available from nationally representative databases on postoperative complications following IMN for patients with tibial fractures

OBJECTIVES

To evaluate patient characteristics associated with postoperative complications following IMN for patients with tibial fractures

METHODS

Study Design: Retrospective, observational cohort study

Data Source: Health care claims from the IBM® MarketScan® Commercial database

Study population:

- Patients <65 year of age with tibial fractures during an inpatient admission with surgery requiring IMN between 2007-2019 were identified
- The date of inpatient admission for IMN was defined as index
- Patients were included if they had continuous enrollment 6-months pre-index
 - Continuous medical enrollment in the pre-index period was required to capture the patient demographic and clinical characteristics
- Patients were excluded if they had prior long bone fractures in the 6 months pre-index period

Outcomes:

Postoperative complications at 365 days post discharge were reported. These included nonunion, compartment syndrome (CS), deep infection (DI) and mechanical complication (MC)

Statistical Analysis:

- Means and standard deviations (SD) were provided for continuous variables
- Proportions were provided for categorical variables
- Kaplan-Meier survival analyses were performed and the median time to each complication type was reported
- Multivariable Cox proportional hazard models were built to evaluate the factors associated with nonunion, DI and MC

RESULTS

- The study included 9,999 patients with tibial fractures requiring IMN
- The mean (SD) age of the cohort at the index was 37.8 (15.4) and there were 37.8% females (**Table 1**)
- Top three comorbidities among these patients were hypertension (13.1%), depression (8.3%) and diabetes (5.3%)
- Most patients had few comorbidities at time of index, Charlson comorbidity index: mean: 0.3 (SD: 0.9)

Table 1. Patient demographic and clinical characteristics

	Overall (n=9,999)
Gender	
Female	37.8%
Age	
Mean (SD)	37.8 (15.4)
Charlson Comorbidity Index	
Mean (SD)	0.3 (0.9)
Region	
Northeast	15.1%
North Central	22.0%
South	43.4%
West	18.3%
Unknown	1.2%
Year of Procedure	
2007	6.8%
2008	7.7%
2009	8.1%
2010	8.6%
2011	10.1%
2012	9.4%
2013	7.5%
2014	7.6%
2015	5.0%
2016	10.1%
2017	9.1%
2018	8.3%
2019	1.8%
Fracture Type	
Open	36.4%
Shaft fracture	94.3%
Lower end	16.5%
Comminuted	14.3%

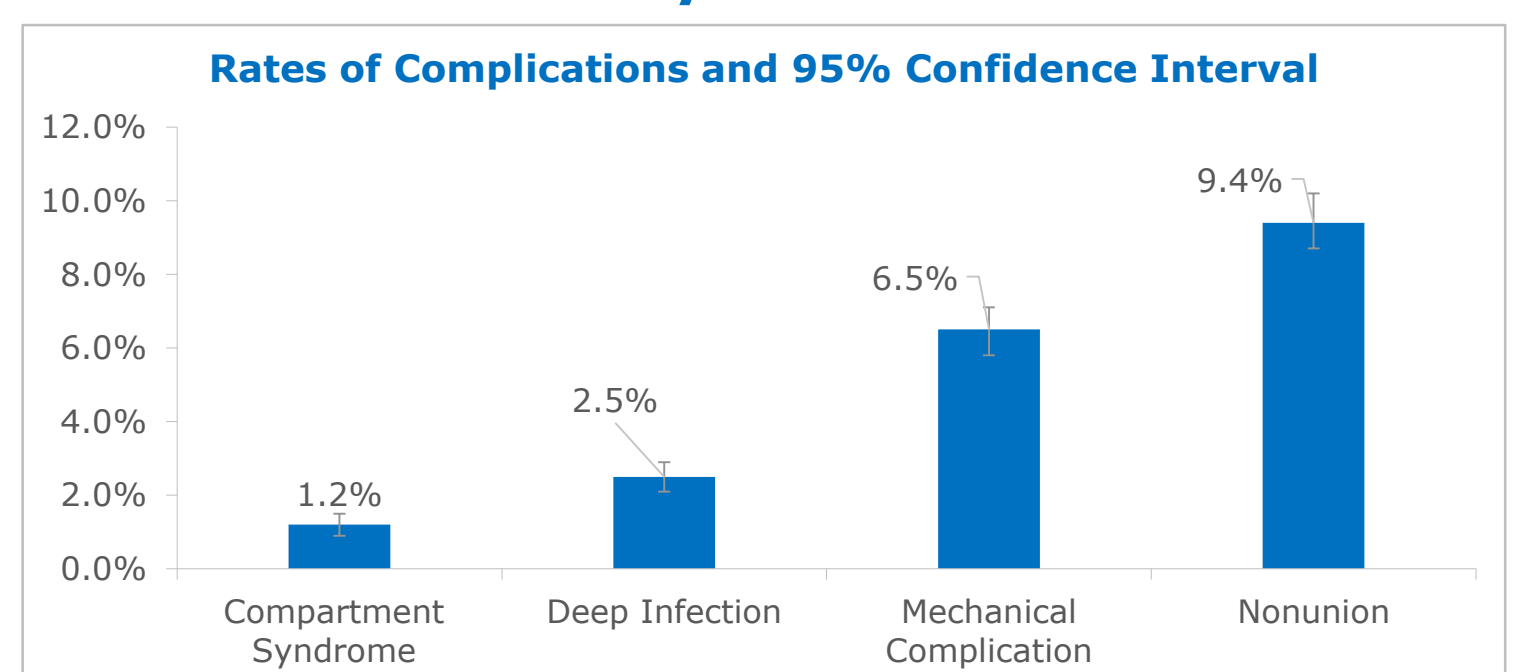
RESULTS

Table 1. Patient demographic and clinical characteristics (cont.)

	Overall (n=9,999)
Comorbidities	
Hypertension	13.1%
Depression	8.3%
Diabetes	5.3%
Chronic pulmonary disease	4.9%
Hypothyroidism	4.0%

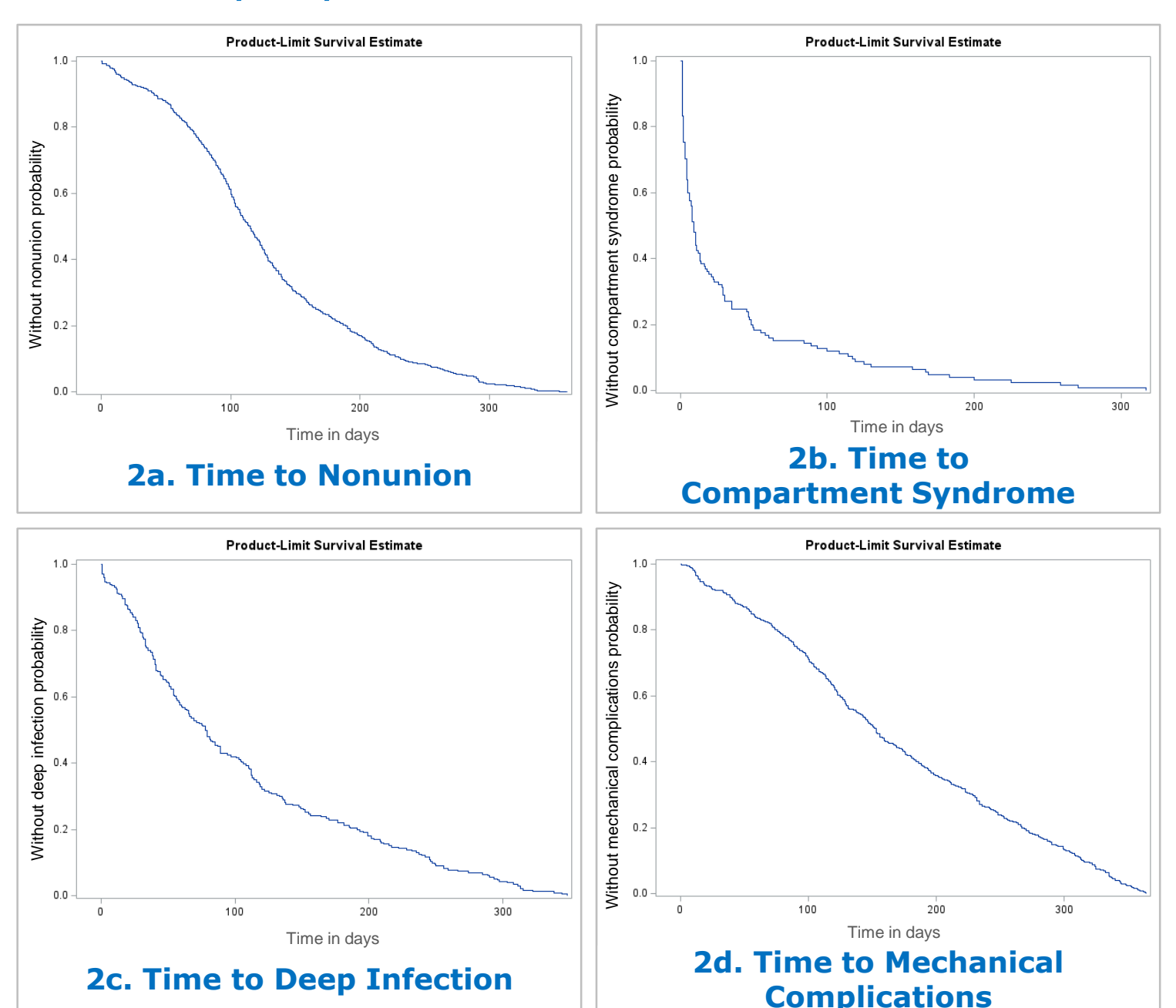
- Among patients with continuous enrollment for 365 days, crude rates over 365 days for CS, DI, MC and nonunion rates reached 1.2% (95% confidence interval (CI): 0.9%-1.5%), 2.5% (95% CI: 2.1%-2.9%), 6.5% (95% CI: 5.8%-7.1%), 9.4% (95% CI: 8.7%-10.2%) respectively (**Figure 1**)

Figure 1. Postoperative complications following Intramedullary nailing for patients with tibial fractures over 365 days



- Among patients that had a complication within 365 days, the median time to CS was 9 days, DI was 78 days, nonunion was 115 days and MC was 153 days (**Figure 2**)

Figure 2. Kaplan Meier curves for time to nonunion, CS, DI and MC



- Age, gender, fluid and electrolyte disorders, and open fractures were significantly associated with nonunion. Gender, Charlson comorbidity index, fluid and electrolyte disorders, open, shaft, and comminuted fractures were associated with DI and only open fractures were associated with MC (**Table 2**)

Table 2. Multivariable Cox proportional hazard models to evaluate the factors associated with nonunion, DI and MC

	HR	95% CI	p-value
For Nonunion			
Age	1.01	1.01	1.02
Female vs Male	0.75	0.65	0.88
Fluid and electrolyte disorders vs Not	1.63	1.01	2.61
Open fracture vs Not	2.01	1.74	2.31
For DI			
Female vs Male	0.66	0.49	0.89
Charlson comorbidity index	1.31	1.15	1.50
Fluid and electrolyte disorders vs Not	2.31	1.30	4.12
Open fracture vs Not	3.56	2.69	4.71
Shaft fracture vs Not	0.60	0.37	0.96
Comminuted fracture vs Not	1.83	1.07	3.13
For Mechanical Complications			
Open fracture vs Not	1.26	1.06	1.50

CONCLUSION

- Nonunion was the greatest complication following fracture treatment with IMN
- Open fractures, comorbidities, age and sex were associated with increased risks for complications