

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

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INTRODUCTION

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

OBJECTIVES

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

METHODS

Study Design: Retrospective, observational cohort study

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

Study population:

- Patients with femoral 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 occurrence of compartment syndrome (CS), deep infection (DI), mechanical complication (MC) and nonunion

Statistical Analysis:

- Means and standard deviations were provided for continuous variables
- Proportions were provided for categorical variables
- Kaplan-Meier survival analyses was 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 13,864 patients with femoral fractures requiring IMN (**Table 1**)
- The mean (standard deviation (SD)) age of the cohort was 40.4 (18.8) years and there were 56.4% females
- Top three comorbidities among these patients were hypertension (18.8%), osteoarthritis (14.6%) and depression (9.2%)
- Most patients had few comorbidities at time of index, Charlson comorbidity index: mean: 0.9 (SD: 1.9)

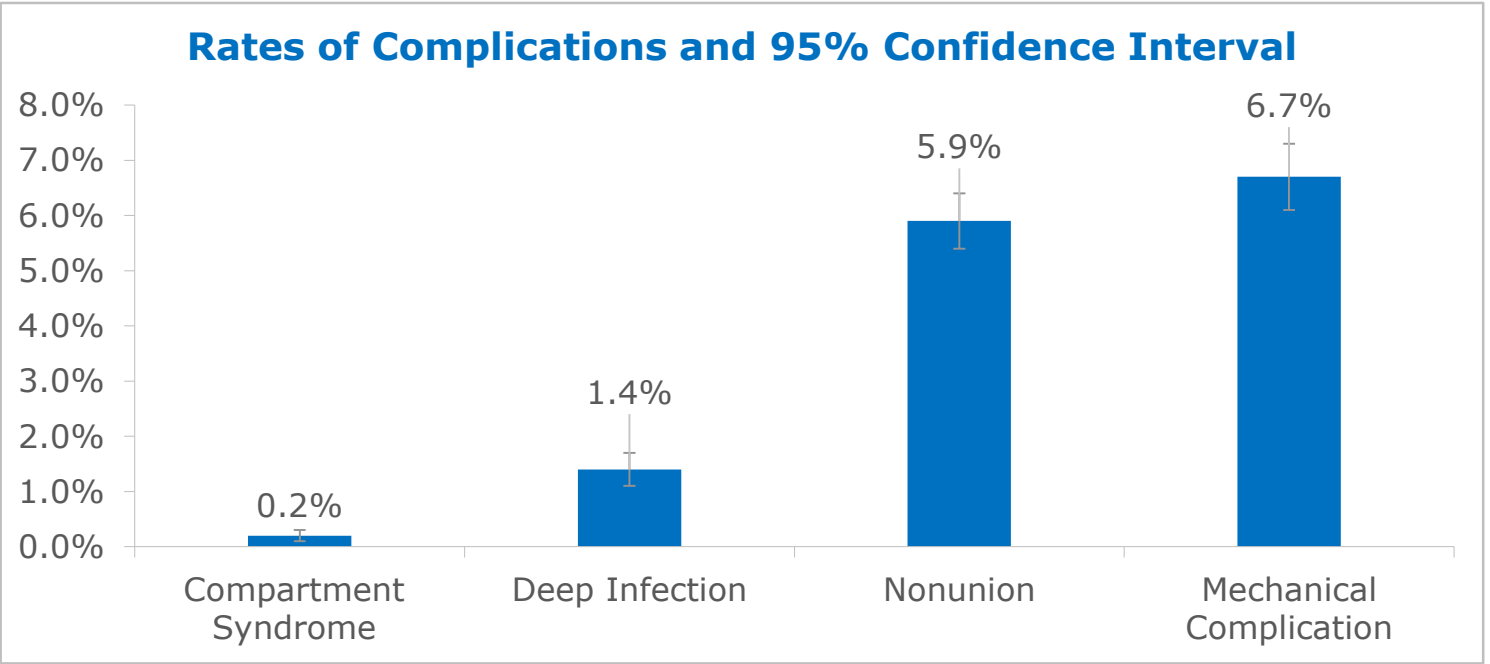
Table 1. Patient demographic and clinical characteristics

	Overall (n=13,864)
Gender	
Female	56.4%
Age	
Mean (SD)	40.4 (18.8)
Charlson Comorbidity Index	
Mean (SD)	0.9 (1.9)
Region	
Northeast	12.7%
North Central	22.1%
South	47.4%
West	16.7%
Unknown	1.2%
Year of Procedure	
2007	6.5%
2008	6.5%
2009	7.1%
2010	7.7%
2011	9.2%
2012	9.2%
2013	6.8%
2014	6.9%
2015	5.8%
2016	11.3%
2017	11.4%
2018	9.9%
2019	1.6%
Fracture Type	
Open	12.4%
Shaft fracture	58.6%
Pertrochanteric	43.2%
Comminuted	9.8%
Comorbidities	
Hypertension	18.8%
Osteoporosis	14.6%
Depression	9.2%
Diabetes	8.6%
Chronic pulmonary disease	8.3%

RESULTS

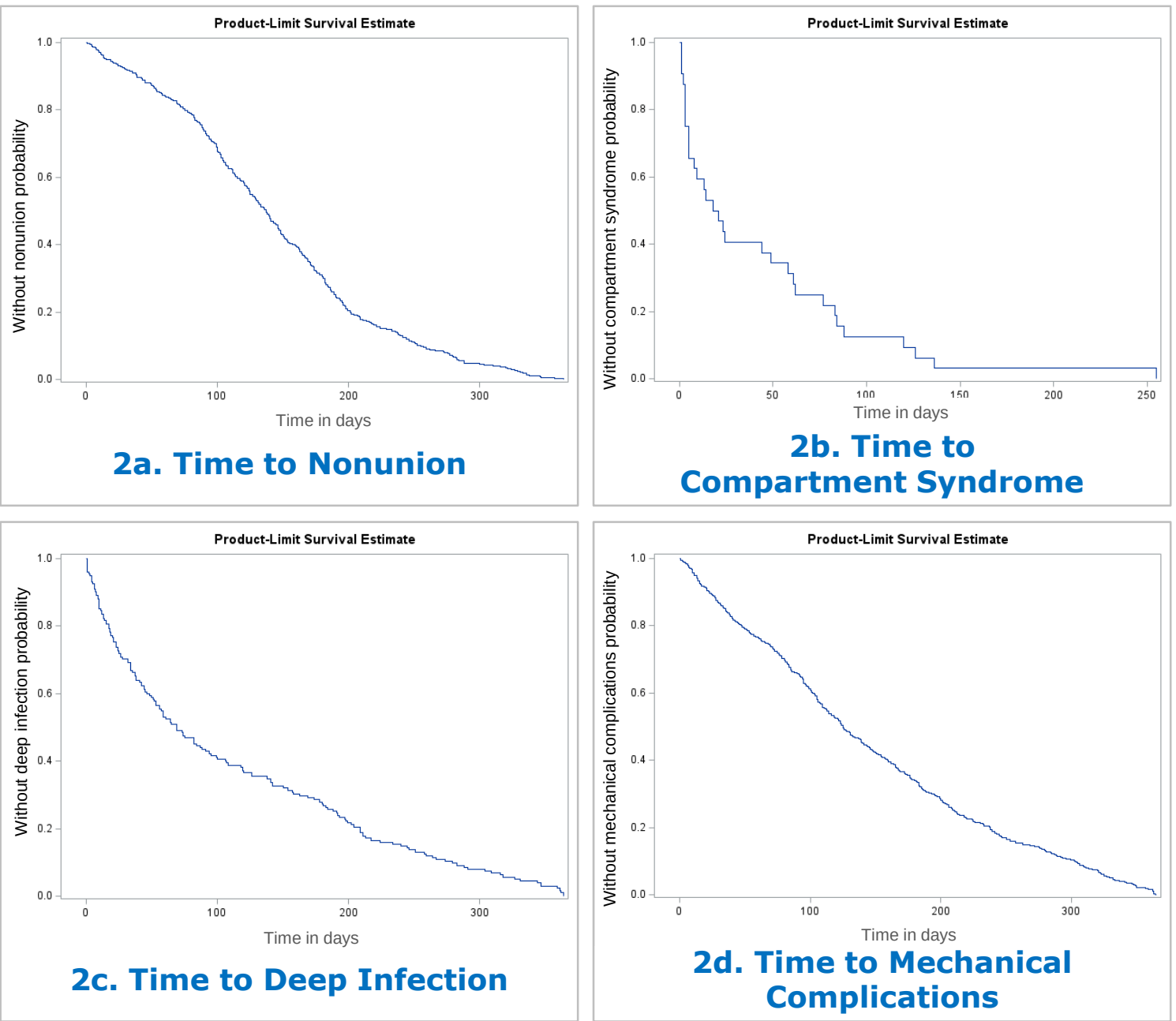
- Among patients with continuous enrollment for 365 days, crude rates over 365 days for CS, DI, nonunion and MC rates reached 0.2% (95% confidence interval (CI): 0.1%-0.3%), 1.4% (95% CI: 1.1%-1.7%), 5.9% (95% CI: 5.4%-6.4%), 6.7% (95% CI: 6.1%-7.3%) respectively (**Figure 1**)

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



- Among patients that had a complication within 365 days, the median time to CS was 20 days, DI was 69 days, MC was 125 days and nonunion was 137 days, (**Figure 2**)

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



- Age, chronic pulmonary disease, open fractures and shaft fractures were significantly associated with nonunion. Gender, chronic pulmonary disease, depression and open fractures were associated with DI and age, gender, chronic pulmonary disease, rheumatoid arthritis, shaft fractures and lower end 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	1.02	1.01	1.03	<0.0001
Chronic pulmonary disease vs Not	1.30	1.05	1.63	0.019
Open fracture vs Not	1.68	1.38	2.04	<0.0001
Shaft fracture vs Not	1.71	1.36	2.143	<0.0001
For DI				
Female vs Male	0.68	0.49	0.95	0.0246
Chronic pulmonary disease vs Not	1.78	1.21	2.62	0.0036
Depression vs Not	1.561	1.022	2.386	0.0395
Open fracture vs Not	2.408	1.662	3.489	<0.0001
For Mechanical Complications				
Age	0.99	0.98	0.99	<0.0001
Female vs Male	1.25	1.07	1.47	0.0057
Chronic pulmonary disease vs Not	1.44	1.14	1.82	0.0022
Rheumatoid arthritis vs Not	1.54	1.05	2.26	0.0263
Shaft Fractures vs Not	1.26	1.00	1.58	0.0469
Lower end fractures vs Not	1.31	1.07	1.61	0.0097

CONCLUSION

- Nonunion and mechanical complications were the most frequent complications following fracture treatment with IMN
- Certain patient characteristics and type of fractures present at time of index surgery were associated with increased risks for complications