

BREAKAGE OF INTRAMEDULLARY NAILING IN TROCHANTERIC AND SUBTROCHANTERIC FEMUR FRACTURES

A. Chitnis, MPharm, PhD¹; J. Ruppenkamp, MS¹; M. Vanderkarr, MS²; C. Holy, PhD¹; C. Sparks, MD³

¹ Johnson & Johnson, Medical Devices Epidemiology, Real World Data Sciences, New Brunswick, NJ, USA

² Health Economics and Market Access, DePuy Synthes, West Chester, PA, USA

³ Medical Affairs, DePuy Synthes, West Chester, PA, USA

INTRODUCTION

- Intramedullary nailing (IMN) is considered one of the state of the art methods for femoral fractures
- The goal of this treatment method is to achieve a stable osteosynthesis, a precise sitting position and weight-bearing
- The breakage of the intramedullary nail is a rare but a devastating complication

OBJECTIVES

To evaluate the rates of breakage of IMN and factors associated with breakage over two years following IMN for trochanteric, intertrochanteric and subtrochanteric femur fractures

METHODS

Study Design: Retrospective, observational cohort study

Data Source: Healthcare claims from the IBM® Marketscan® Medicare Supplemental database

Study population:

- Patients 65 years or older with femur fractures, either trochanteric or subtrochanteric, during an inpatient admission with surgery requiring IMN between 2007-2019 were identified based on International Classification of Disease (ICD) diagnostic and common procedural terminology (CPT) codes
- 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:

Rates of breakage for trochanteric and subtrochanteric femoral fractures were reported at 2 years post discharge

Statistical Analysis:

- Means and standard deviations were provided for continuous variables
- Proportions were provided for categorical variables
- Kaplan Meier analysis was conducted to calculate the rates of breakage at 2 years post discharge
- Median time to breakage among patients who had a diagnosis for breakage was reported
- Multivariable Cox regression was conducted to identify independent factors to predict the risk for breakage after adjusting for demographic and clinical factors

RESULTS

- The study included 17,675 patients with IMN for trochanteric or subtrochanteric femoral fractures
- The mean (standard deviation (SD)) age of the cohort at the index was 83.3 (7.9) and the majority of patients were females - 72.4% (**Table 1**)
- The top three comorbid condition among these patients were hypertension (53.1%), osteoarthritis (26.7%) and cardiac arrhythmia (22.9%)
- There were 81.0% patients with an Elixhauser score of 1 or greater
- The mean (standard deviation (SD)) length of stay for the IMN procedure was 6.2 (5.2) days

Table 1. Demographic information of patients included in the study

	Overall (n=17,675)
Gender	
Female	72.4%
Male	27.6%
Age	
Mean (SD)	83.3 (7.9)
Elixhauser Score	
Mean (SD)	2.5 (2.2)
Elixhauser Score Category	
0	19.0%
1-2	39.3%
3-4	25.0%
5+	16.7%
Region	
Northeast	29.6%
North Central	18.9%
South	34.5%
West	16.4%
Unknown	0.7%
Year of Procedure	
2007	4.2%
2008	4.4%
2009	5.6%

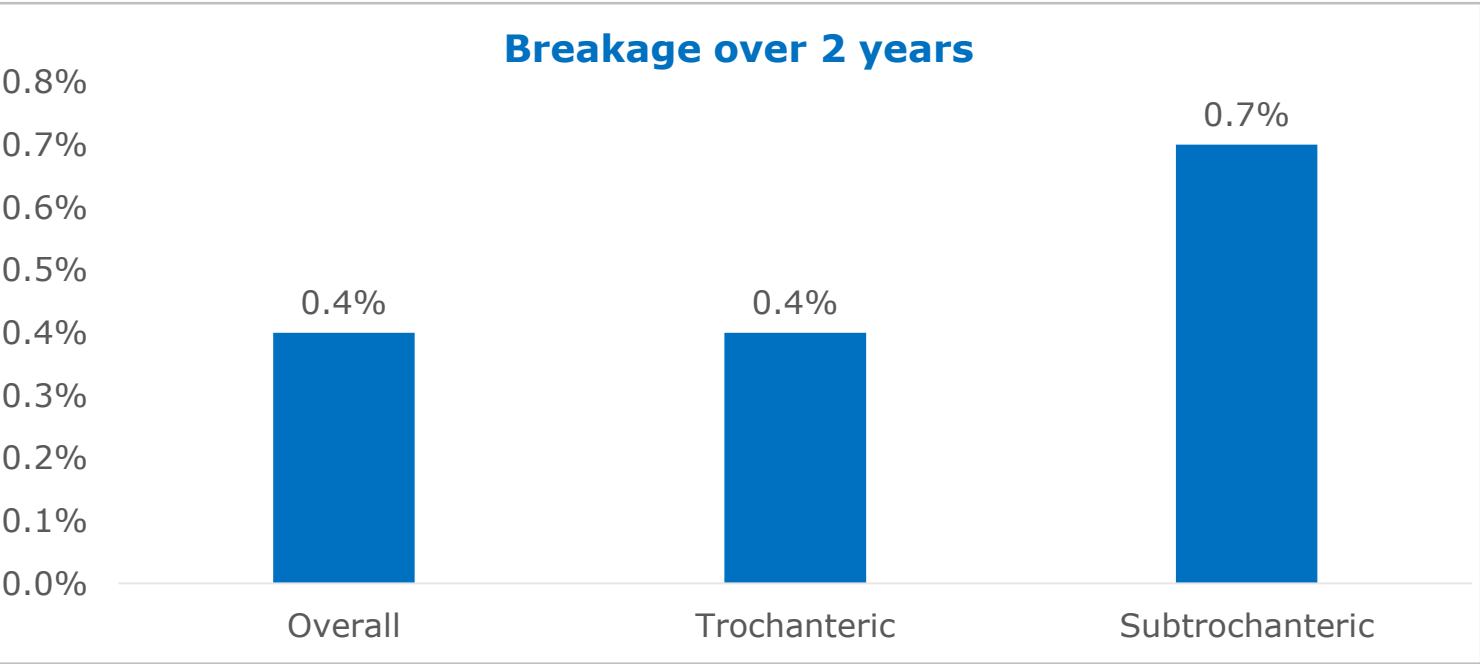
RESULTS

Table 1. Demographic information of patients included in the study

	Overall (n=17,675)
2010	6.7%
2011	8.6%
2012	7.9%
2013	7.8%
2014	6.8%
2015	7.3%
2016	16.6%
2017	12.2%
2018	9.9%
2019	2.0%
Fracture Type	
Subtrochanteric	17.7%
Trochanteric	94.0%
Comorbidities	
Hypertension	53.1%
Osteoporosis	26.7%
Cardiac Arrhythmia	22.9%
Diabetes	17.7%
Chronic Pulmonary Disease	17.3%
Peripheral Vascular Disorders	15.4%
Hypothyroidism	14.5%
Congestive Heart Failure	12.8%
Osteoporosis	11.5%
Depression	11.3%

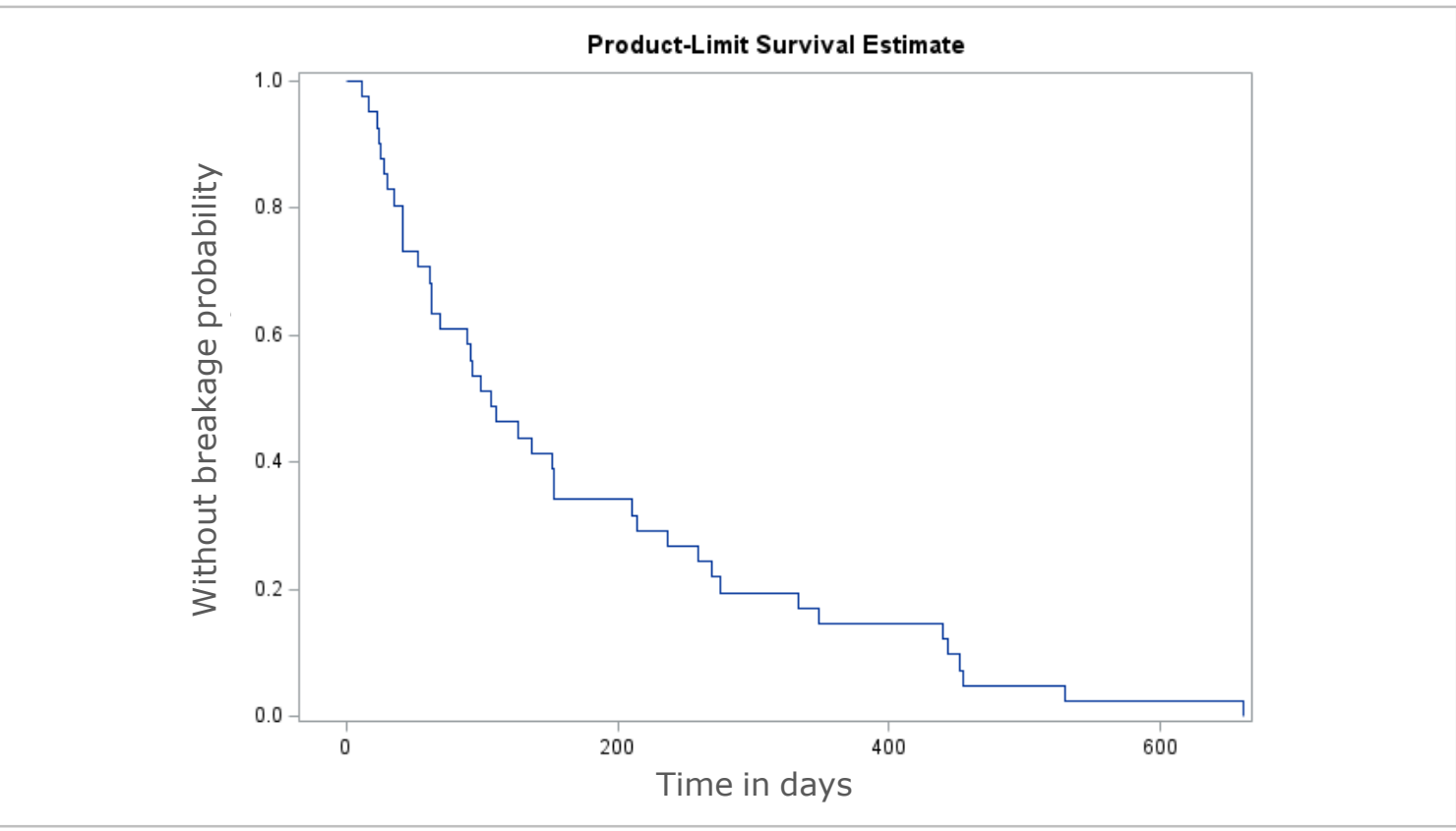
- The Kaplan Meier analysis showed that the crude rates of breakage at 2 years post discharge for trochanteric fractures was 0.4% while that for subtrochanteric fracture was 0.7% (**Figure 1**)
- The overall rate of breakage was 0.4% (**Figure 1**)

Figure 1. Breakage of intramedullary nailing by type of femur fracture over 2 years period



- Among patients that had a breakage of IMN over the 2 years post discharge, the Kaplan Meier analysis showed that the median time to breakage was about 103 days (**Figure 2**)

Figure 2. Kaplan Meier curve for time to breakage over 2 years period



- After adjusting for demographic and clinical factors the multivariable Cox model found the presence of any subtrochanteric fracture and diabetes was statistically significantly associated with the risk of breakage (**Table 2**)
- No other variables were found to be statistically significant

Table 2. Multivariable Cox model to assess factors associated with the risk of breakage

Factors	Hazards Ratio	95% Confidence Interval	p-value
Any subtrochanteric fractures vs Not	3.1	1.6-6.1	0.001
Diabetes vs Not	3.0	1.1-8.5	0.040

CONCLUSION

- Femoral fractures treated by IMN had an overall breakage rate of 0.4% over 2 years after surgery with the implant
- In this study population, the results indicate treatment of femoral fractures with IMN is associated with low rates of breakage two years after surgery with the implant