

Postoperative Complications after Prophylactic Fixation of Impending Pathologic Femur Fractures Using Reamer-Irrigator-Aspirator System

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Introduction

- Prophylactic fixation of impending pathologic femur fractures involves intramedullary nailing, reducing morbidity and maintaining patient mobility¹
- However, standard reaming techniques can produce fat and tumor emboli,² hypothesized to result in perioperative lung injury and additional sites of metastatic disease³
- In addition, venous thromboembolism (VTE) have a disproportionate occurrence in cancer patients undergoing intramedullary nailing
- Recent data suggest higher rates of VTE in patients treated with prophylactic intramedullary nailing for impending femur fractures compared to those who undergo nailing for completed fractures⁴
- The reamer-irrigator-aspirator (RIA) system (Synthes, West Chester, PA) creates a negative pressure environment, theoretically decreasing microemboli and fat extravasation⁵
- There is a paucity of literature comparing the RIA system to standard reaming techniques for prophylactic fixation of impending pathologic fractures

Aims

- We hypothesized that utilization of RIA system in a one-pass reaming method would decrease thromboembolic events in patients treated with prophylactic intramedullary nailing for impending pathologic femur fractures secondary to metastatic disease
- Aim 1: Determine rate of thromboembolic events (DVT/PE) in patients treated with RIA versus conventional reaming method for prophylactic intramedullary femoral nailing
- Aim 2: Compare incidence of perioperative complications as well as survival in patients treated with RIA versus conventional reaming method

Methods

- Retrospective chart review for consecutive patients undergoing prophylactic intramedullary fixation of impending pathologic femur fractures secondary to metastatic disease from January 2010 to July 2019
- Patients were treated by two fellowship-trained orthopedic oncologists at an academic tertiary referral center
- Reaming method, patient demographics, and treatment-related data were obtained from medical records
- DVT/PE, perioperative complications, supplemental oxygen, mechanical ventilator requirement, blood transfusion, and need for revision surgery were recorded
- Operative duration, length of stay, and survival data were compared between groups

Statistical Analysis

- Chi-squared and two-sample independent t tests were used to compare categorical data and linear variables respectively. Multivariate analysis was used to adjust for potential confounding variables
- A *p*-value of <0.05 was considered to represent a statistically significant difference

Results

- 204 total patients were included in the final cohort (79 RIA, 125 conventional reaming)
- No statistically significant difference was observed between the group's DVT/PE rate, revision rate, complication rate, 30-day/90-day/1-year mortality, post-operative transfusion requirement, or length of stay
- Patients undergoing RIA had significantly shorter operative times (mean 83 min, sd 4.02) compared to standard reaming (mean 108 min, sd 4.27) (P<0.0001)

Demographics and Outcomes

Table 1. Demographic Data

	Conventional Reaming (n=125)	RIA (n=79)	
Mean age at surgery (yrs)	61.5	62	<i>p</i> =0.864
Mean ASA	3	3	<i>p</i> =0.595
Prior chemotherapy (n)	69	53	<i>p</i> =0.080
Prior radiation therapy to operative extremity (n)	17	15	<i>p</i> =0.223
Preoperative supplemental oxygen requirement (n)	7	8	<i>p</i> =0.251
Post operative radiation therapy (n)	57	43	<i>p</i> =0.374

*ASA: American Society of Anesthesiologists physical status calclassification system

Table 2. Patient Outcomes

	Conventional Reaming (n=125)	RIA (n=79)	
DVT/PE within 30 days of surgery (n)	2	1	<i>p</i> =0.563
Postoperative transfusion requirement (n)	20	13	<i>p</i> =0.962
Revision (n)	6	2	<i>p</i> =0.421
Mean length of stay (days)	5.5	6.6	<i>p</i> =0.195
Mean operative duration (min)	108	83	<i>p</i> =0.0001
Postoperative complications (n)	18	9	<i>p</i> =0.530
Postoperative complication rate (%)	14.4	11.4	<i>p</i> =0.529
Rate of survival at 1 year (%)	52.20	49.30	<i>p</i> =0.766

*DVT: deep vein thrombosis

† PE: pulmonary embolism

Conclusions

- Treatment of impending pathologic femur fractures secondary to metastatic disease presents unique challenges due to the increased perioperative risk for cardiopulmonary complications and thromboembolic events
- The present study demonstrates shorter operative duration with single-pass RIA versus conventional reaming for prophylactic femur intramedullary nailing
- Shorter operative duration and less time under anesthesia are relevant considerations in this high-risk population
- No significant difference in rates of perioperative complications or thromboembolic disease was observed
- This may be in part due to an insufficient sample size and the rare incidence of cardiopulmonary complications and thromboembolic events observed in our cohort
- A high-powered, multi-institutional study is likely required to capture the small, but potentially clinically significant difference between these reaming techniques

References

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Disclosures

- All authors disclosed no financial or other conflicts of interest.