

## Complications Following Intramedullary Nailing of Proximal Humerus and Humeral Shaft Fractures – A Systematic Review

Kiera Lunn BS<sup>2</sup>, Eoghan T. Hurley MB, MCh, PhD<sup>1</sup>, Kwabena Adu-Kwarteng BA<sup>2</sup>, Jessica Welch BS<sup>2</sup>, Jay Levin MD, MBA<sup>1</sup>, Oke Anakwenze MD, MBA<sup>1</sup>, Yaw Boachie-Adjei MD<sup>1</sup>, Christopher S. Klifto MD<sup>1</sup>

<sup>1</sup>Department of Orthopaedic Surgery, Duke University, Durham NC, USA

<sup>2</sup>School of Medicine, Duke University, Durham NC, USA

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**BACKGROUND:** The purpose of this study was to systematically review complications arising from intramedullary nailing (IMN) of proximal and humeral shaft fractures. This study hypothesized that there would be a low rate of complications and revision among patients treated with IMN for humerus fractures.

**METHODS:** Two independent reviewers performed a literature search in the PubMed database based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Studies were included if they reported on outcomes following the use of intramedullary nails for proximal humerus fractures or humeral shaft fractures. Variables that were collected included complications, Visual Analogue Scale (VAS) pain scores, and revision operations.

**RESULTS:** Overall, 179 studies met the inclusion criteria, with 7984 shoulders. The average age of patients in this study was 55.2 years and 60.7% of patients were female. The mean follow-up was 16.6 months. The overall complication rate for all fractures treated with intramedullary nails was 18.9%, and the overall revision rate was 6.8%. Among the causes of complication were fracture complications (7.5%), hardware complications (7.2%), soft tissue complications (1.8%), neurovascular complications (1.6%), and infection (0.8%). 4-part proximal humerus fractures (52.9%) and open fractures (36.7%) had the highest rates of complication. Among the causes of revision were hardware removal or replacement (5.0%), conversion to arthroplasty (0.6%), and other (1.2%). The mean VAS pain score at last follow up was 1.6.

**CONCLUSION:** Overall, there was a moderate rate of complications but low rate of revision following IMN of humerus fractures. Open fractures and 4-part proximal humerus fractures had the highest complication rates.