A Comparison of 3 Treatments for Fractures of the Humeral Shaft

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Above all else, we are committed to the care and improvement of human life.

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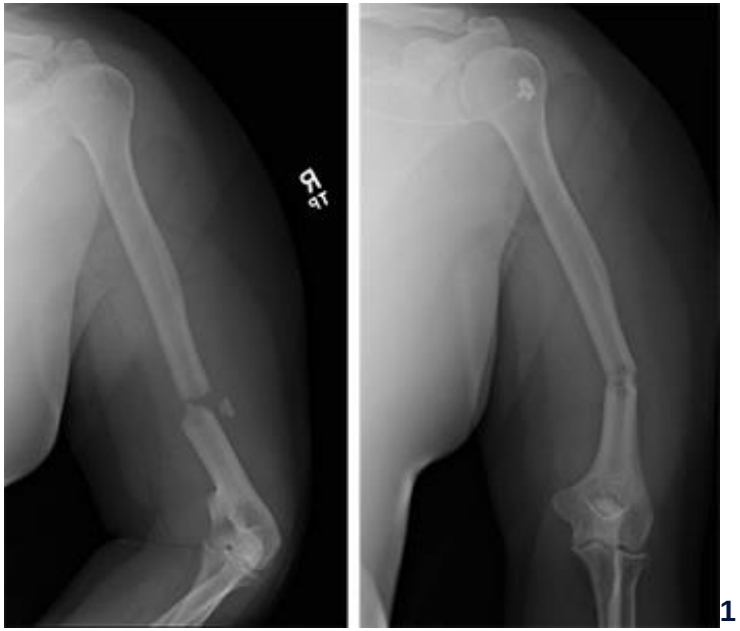
Introduction

- Humeral shaft fractures comprise 3% of all fractures, at a rate of 13/100,000[1,2]
- Prevalence increasing with an again population[3]
- Non-surgical treatment has largely been considered the standard since Sarmiento's studies in the 1970s[4,5,6]
- Surgical intervention has become common as non-union has been found to be high in non-surgically treated patients[6,7]



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Introduction

- The method of treatment has been a topic of debate
- Open reduction internal fixation (ORIF), intramedullary nail (IMN), and non-surgical treatment (NS)

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Introduction

- Purpose of this study was to evaluate complication rates with different treatments for humeral shaft fractures
- To our knowledge, DVT in humeral shaft fractures has not been studied previously
- Nerve injury, infection, DVT, and non-union were the specific complications under investigation

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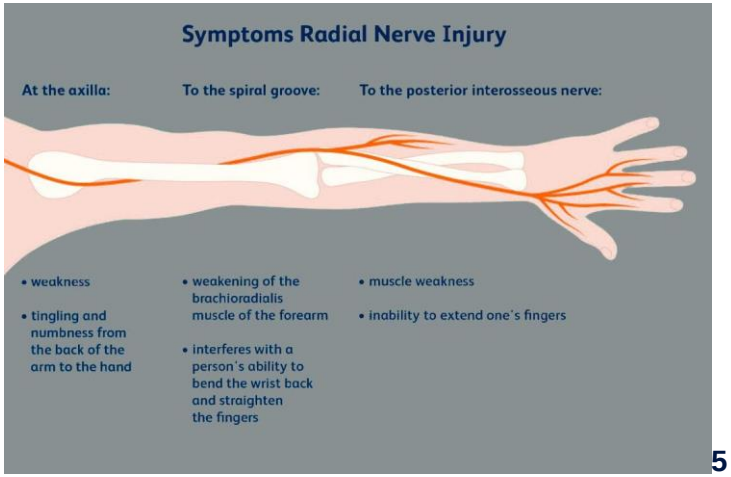

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Methods

- Retrospective database review from 2014 to 2020
- Data was gathered from pertinent CPT and ICD-9/ICD-10 codes
- Inclusion criteria:
  - patients between the ages of 18 and 89
  - Patients with humerus shaft fractures
- Exclusion criteria:
  - incomplete or incorrect records in the database for data points used in the regression analysis
  - patients that had CPT codes for more than one of the treatment groups under study
  - diagnosis of cancer
  - coagulation disorder
  - DVT or nerve injury at the time of initial admission/treatment
  - patients who were pregnant at the time of fracture

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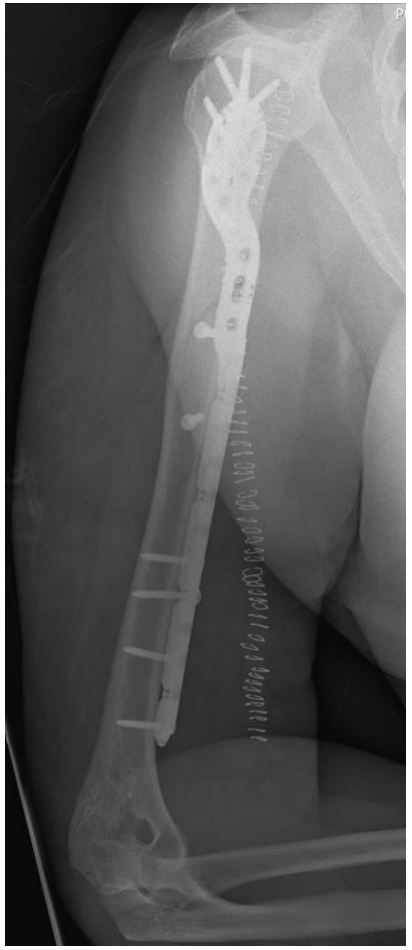
Methods

- associated injuries, medical comorbidities, gender, age, injury mechanism, and type of treatment were reviewed
- Presence or absence of complications including infection, DVT, nerve injury, or nonunion within 2 years of injury were compiled
- 4,425 patients identified, final population of 3,892 after exclusions
- Statistical analysis:
  - SAS 9.4 (Cary, NC).
  - Chi-square and Fisher's exact tests were used to examine associations between categorical variables
  - Logistical regression
  - Significance level of 0.05



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Results

- 59.5% of patients were female
- Elixhauser comorbidity index (ECI) insignificant between groups
- 825/3,892 patients (21.20%) were current smokers
- 93.88% of fractures were closed, 162/190 (85.3%) were in the ORIF cohort
  - Accounted for in our regression analysis

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Results

Category	Total Patients	Non-surgical	ORIF	IMN	
Fracture Category **Closed** **Open** **Unknown**	3,654 (93.88%) 190 (4.88%) 48 (1.23%)	524 (98.68%) 7 (1.32%) 0 (0.00%)	2,563 (92.73%) 162 (5.86%) 39 (1.41%)	567 (94.97%) 21 (3.52%) 9 (1.51%)	<.0001 Chi square
24 month complication	269 (6.91%)	24 (4.52%)	208 (7.53%)	37 (6.20%)	0.0332 Chi square
24 month DVT	29 (0.75%)	2 (0.38%)	22 (0.80%)	5 (0.84%)	0.5816 Fisher's exact
24 Month Nerve Injury	55 (1.41%)	5 (0.94%)	47 (1.70%)	3 (0.50%)	0.0488 Chi square
24 Month Nonunion	78 (2.00%)	9 (1.69%)	57 (2.06%)	12 (2.01%)	0.8581 Chi square
24 Month Infection	93 (2.39%)	6 (1.13%)	82 (2.97%)	5 (0.84%)	0.0010 Chi square

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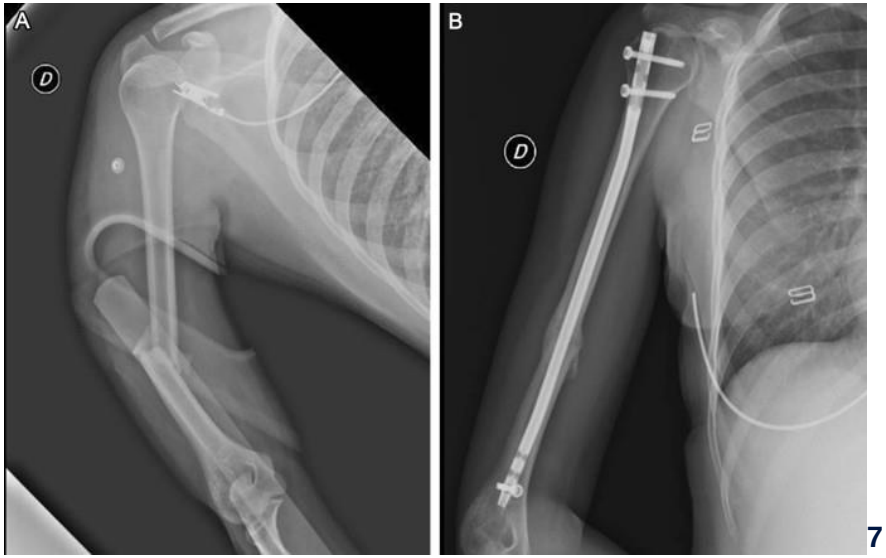
Results

- OR 1.67 (CI 1.073 – 2.599) for adverse outcome in ORIF group compared to NS treatment
- Other comparisons found to be insignificant



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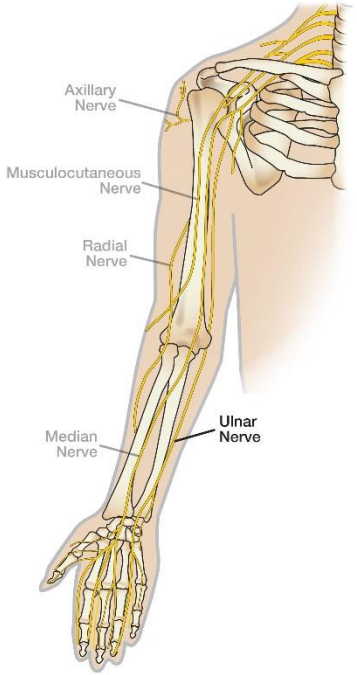
Discussion



ASSH

- Conflicting data in the literature in the difference of non-union, radial nerve injury, and infection between the 3 treatment groups
- Our regression analysis suggests that ORIF is an independent risk factor for infection and radial nerve injury compared to IMN and NS
- Our study found no statistical difference in DVT

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Limitations

- Retrospective database
- Scope of analysis did not include mal-union, delayed union, or treatment conversion
- Two year follow up may be too great of a time period for DVT measure

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Conclusions

- IMN, ORIF, and NS are all safe treatments for humeral shaft fractures
- No increased incidence in complications with IMN compared to ORIF
  - Possibly reduced risk of radial nerve injury and infection
  - IMN minimally invasive
- DVT rates very low in humeral shaft fracture
- Treatment should be individualized to patients

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