

Does Race Effect Outcomes in Operatively Treated Tibia Fractures?

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**Orthopaedic Surgery
& Sports Medicine**

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Disclosures

- None



Background

- Does race effect outcomes?
 - Recent review of the literature JBJS
 - Worse outcome scores (pain, subjective)
 - Longer LOS
 - Minorities undergoing total knee and hip arthroplasty when compared to whites
- While true in elective TJA, does it apply in trauma?



Background

- Tibia fractures
 - Most common long bone fracture (500,000 fractures/year in US)
 - Infection in ~1% of closed fractures and 5-15% of open fractures
 - Depends on Gustilo classification



Background

- Epidemiologic studies of tibia fractures in the literature
 - Homogenous populations (Sweden and Scotland)
 - Most common mechanism of injury was sports (soccer 1/3 of injuries in one series)
 - Gunshot wounds extremely rare
 - Majority of patients white
- Injuries seen in urban American trauma centers much different



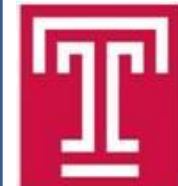
Purposes

- To determine if there is a difference in the rate of complications for the operative treatment of tibia fractures in regards to race
- Null hypothesis
 - There is no difference in the rate of complications for operatively treated tibia fractures between white and minority patients.
- Secondary objectives
 - Define the most common mechanism of tibia fractures in an urban setting
 - Determine infection rate and complication rates for operatively treated tibia fractures



Materials and Methods

- Retrospective chart review (Jan 1, 2005 – Dec 31, 2009)
- IRB approved
- ICD-9 code 823 to identify all tibia fractures



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Materials and Methods

- Inclusion criteria
 - Age 18-89
 - Fracture of tibia
 - Fracture underwent operative treatment
 - Race/ethnicity documented in chart
- Exclusion criteria
 - Tibial plafond fractures
 - Fracture due to tumor or metabolic bone disease
 - Patient expired prior to Orthopaedic intervention



Materials and Methods

- Principle variable of interest
 - Race/ethnicity
 - Other independent variables
 - Age
 - Comorbidities (DM, IVDA)
 - Presence of open fracture
 - Initial and definitive procedures
 - Primary Outcome Measures
 - Infection
 - Length of stay
 - DVT/PE
- Tobacco use
 - Fracture location
 - Mechanism of injury
 - 30 day mortality
 - Reoperation



- 302 tibia fractures
- Minority patients younger
- No difference in demographics
- Mechanism of injury
 - GSW more common in minorities

	White	Minority	p
Number of Patients	64	238	
Mean age (years)	48.5 ± 17.3	39.3 ± 13.3	0.001
Gender - Male	41 (64%)	163 (68%)	0.5
DM	5 (8%)	19 (8%)	1.0
Smoker	14 (22%)	59 (28%)	0.6
Fall	27 (42%)	73 (31%)	0.08
GSW	0 (0%)	40 (17%)	0.004
MVA	14 (22%)	50 (21%)	0.9
Auto vs PED	14 (22%)	48 (20%)	0.8
Direct Blow/Blunt	6 (9%)	21 (9%)	0.9
Open Fx	12 (19%)	94 (41%)	0.002
Infection	5 (8%)	22 (9%)	1.0
Compartment Syndrome	10 (16%)	13 (5%)	0.01
Reoperation	6 (9%)	22 (9%)	1.0
DVT	3 (5%)	9 (4%)	0.7
PE	0 (0%)	2 (0.1%)	1.0
Mortality (30 days)	1 (1%)	0 (0%)	0.2
Mean LOS (days)	8.9 (±8.1)	9.6 (±7.8)	0.5



- Minority Open Fracture more common
- No difference in rate of infection
 - Odds Ratio 1.20 (0.44 – 3.31)
- Compartment syndrome more common in whites
 - Odds Ratio 3.21 (1.33 – 7.70)
- No difference in other outcome measurements

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	White Plateau	Minority Plateau	p	White Shaft	Minority Shaft	p
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Mean age (years)	49.8 ± 16.2	42.8 ± 12.3	0.02	46.5 ± 19.0	36.4 ± 13.2	0.01
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Fall	19 (49%)	36 (35%)	0.12	8 (32%)	34 (28%)	0.8
GSW	0 (0%)	12 (12%)	0.04	0 (0%)	26 (21%)	0.007
MVA	5 (13%)	19 (18%)	0.6	9 (36%)	27 (23%)	0.2
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- Minority patients younger ($p < 0.05$) for both plateau and shaft fractures



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- LOS less in white patients with plateau fractures
- LOS more in white patients with shaft fractures



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- No differences in comorbidities



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- Most common mechanisms
 - Plateau: fall (white 49%, minority 35%)
 - Shaft: white MVA (36%) vs minority fall (28%)



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- GSW

- Not a single white patient had a GSW fracture
- 12-21% of minority fractures caused by GSW



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- Open Fracture

- Despite high incidence of GSW in minority patients, no statistical difference in rate of open fracture for shaft fractures, but plateau fractures was significant (p=0.04)



	White Plateau	Minority Plateau	p	Odds Ratio	White Shaft	Minority Shaft	p	Odds Ratio
Infection within 30 days	3 (8%)	11 (11%)	0.8	1.42 (0.4 - 5.4)	2 (8%)	9 (8%)	1.0	0.95 (0.19-4.73)
Compartment Syndrome	5 (13%)	7 (7%)	0.3	0.49 (0.14 – 1.65)	5(20%)	3 (3%)	0.005	0.1 (0.02-0.48)
Symptomatic DVT 30 days	1 (3%)	5 (5%)	1.0	1.91 (0.22 – 17.0)	2 (8%)	4 (3%)	0.3	0.4 (0.07-2.4)
Pulmonary Embolism	0 (0%)	2 (2%)	1.0	1.92 (0.09 – 41)	0	0	N/A	N/A
Re-operation within 30 days	4 (10%)	10 (10%)	1	1.03 (0.31-3.47)	2 (8%)	10 (8%)	1.0	1.07 (0.22-5.23)
30-day Mortality	0	0	1	N/A	1 (4%)	0 (0%)	0.02	0.07 (0.02-1.75)

- No difference in rate of infection
 - Plateau fracture OR 1.42 (0.4-5.4)
 - Shaft fracture OR 0.95 (0.19-4.73)



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- Compartment Syndrome

- 20% of white shaft fractures and only 3% of minority shaft fractures (p=0.005)
- Odds Ratio 0.1 (0.02-0.48)



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- No difference in rate or DVT, PE, or reoperation



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- Mortality
 - No deaths in the plateau group
 - 1 death in the shaft group (MI post-op)

Limitations

- Retrospective study
 - Lack of standardized protocol for when to start antibiotics for suspected infection
- Single institution, our population not necessarily representative of most institutions
- Unable to evaluate based on severity of musculoskeletal injury (due to retrospective nature)
- Relatively small sample size (300 fractures)
- Adverse outcomes may have been due to a non-orthopaedic injury (lung injury requiring prolonged ICU stay, abdominal GSW, traumatic brain injury)



Discussion

- Proved the null hypothesis correct
 - No difference in complications for operatively treated tibia fractures in regard to ethnicity (except maybe compartment syndrome)
- Why have studies found worse outcomes in total joint arthroplasty but we didn't find it in trauma?
 - Access to healthcare an issue for elective TJA, but not trauma?
 - We didn't review pain scores or subjective outcome scores



Discussion

- Compartment syndrome
 - Unclear association
 - Small numbers, hard to draw meaningful conclusions
 - Likely more related to mechanism than race
- Open fractures
 - 52% of all tibia fractures were open
 - 61% of minority shaft fractures were open
 - Mostly due to difference in mechanism (GSW), but 44% of white shaft fractures open



Discussion

- GSW have become increasingly prevalent in minority patients
 - 11% of plateau and 21% of shaft fractures
 - No GSW fractures in white patients
- Despite higher incidence of open fractures in minority patients (more GSW), overall infection rate and complication rate was not different
- Mechanism of Injury
 - Much different than published series



Discussion

- Overall infection rates (somewhat higher than published rates)
 - 13% for open plateau fractures, 10% for closed plateau fractures
 - 11% for open shaft fractures, 8% for closed shaft fracture
- Length of stay
 - Longer for minority patients with plateau fractures
 - Could be related to higher rate of open fracture in this group



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