

Operative Versus Non-Operative Treatment of Severely Shortened or Comminuted Clavicle Fractures in Older Adolescent Athletes: Results from A Prospective, Multicenter, Level 2 Cohort Study

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Disclosures

I (and my co-authors) do not have any relevant disclosures.



Adolescent Clavicle Fractures

- Common injury
- 80% occur in middle third
- Twice as common in adolescents than any other age group
- Most common mechanism is sports





History of Management

DEFICITS FOLLOWING NONOPERATIVE TREATMENT OF DISPLACED MIDSHAFT CLAVICULAR FRACTURES

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Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures

A Multicenter, Randomized Clinical Trial

By the Canadian Orthopaedic Trauma Society



History of Management



- Upward trend of surgical fixation
- Lack of evidence in adolescent patients
- Equipoise remains



History of Management

POSNA 2019 Annual Meeting: Best Clinical Paper

Two-Year Functional Outcomes of Operative vs. Non-Operative Treatment of Completely Displaced Midshaft Clavicle Fractures in Adolescents: Results from a Prospective, Multicenter, Level 2 Study

- 417 adolescent patients
- Non-op treatment had lower complications, similar satisfaction and functional outcomes.



Treatment questions

- Who are the best candidates for surgery?
- Does surgery allow for earlier return to sport?
- Do older adolescents have a higher non-union rate?
- Do patients most dependent on biomechanics report higher functional outcomes with surgery?



Study hypothesis:

Operatively treated clavicle fractures with the most severe patterns in an athletic population would have superior outcomes to those managed non-operatively.



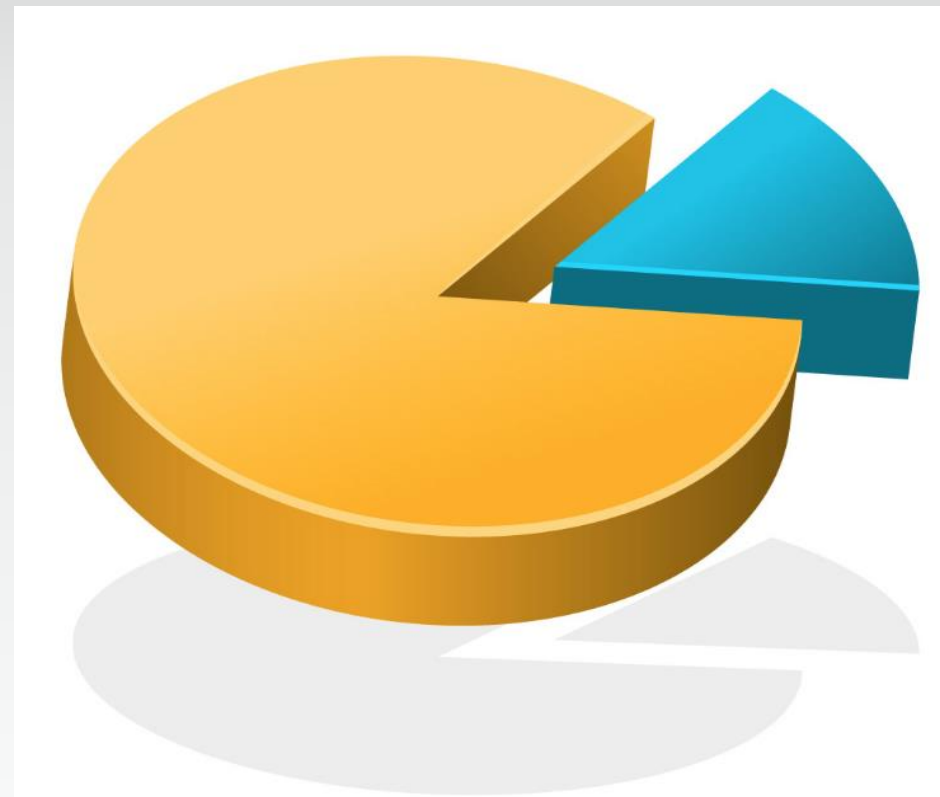
Methods

FACTS initial cohort

- 2013-2018
- 8 geographically diverse, tertiary pediatric orthopedic centers
- Ages 10-18
- All midshaft clavicle fractures

Current study

- Subset of initial cohort
- Ages 14-18
- **Comminuted** or **shortened > 25mm**
- Patients participating in sports





Study Design

- Patients enrolled **prospectively** across 8 pediatric centers
- Treatment decision and follow-up schedule were at the **discretion of the treating provider**
- Recommended follow-up schedules were **2 weeks, 6 weeks, 12 weeks**, and as needed
- **Standard radiographs** were obtained (upright AP and 15 to 30 degree AP-cephalad views)



Data Collection

Demographic Data

- Age
- Sex
- Athletic participation

Clinical data

- Mechanism
- Hand dominance
- Fracture laterality
- Exam findings

Radiographic data

- Shortening
- Comminution
- Angulation
- Displacement

Treatment

Surgical factors

Return to sport



Patient-Reported Outcomes

Obtained at 6, 12, and 24 months

American Shoulder and Elbow Surgeons score (ASES)

Short-form version of the Disabilities of the Arm, Shoulder, and Hand score (QuickDASH)

Marx Shoulder Activity Score

Global Health (EQ-VAS)

Quality of Life (EQ-5D)

Five scale General Satisfaction





Results

137 patients (70 Non-op: 67 op)

No difference in:

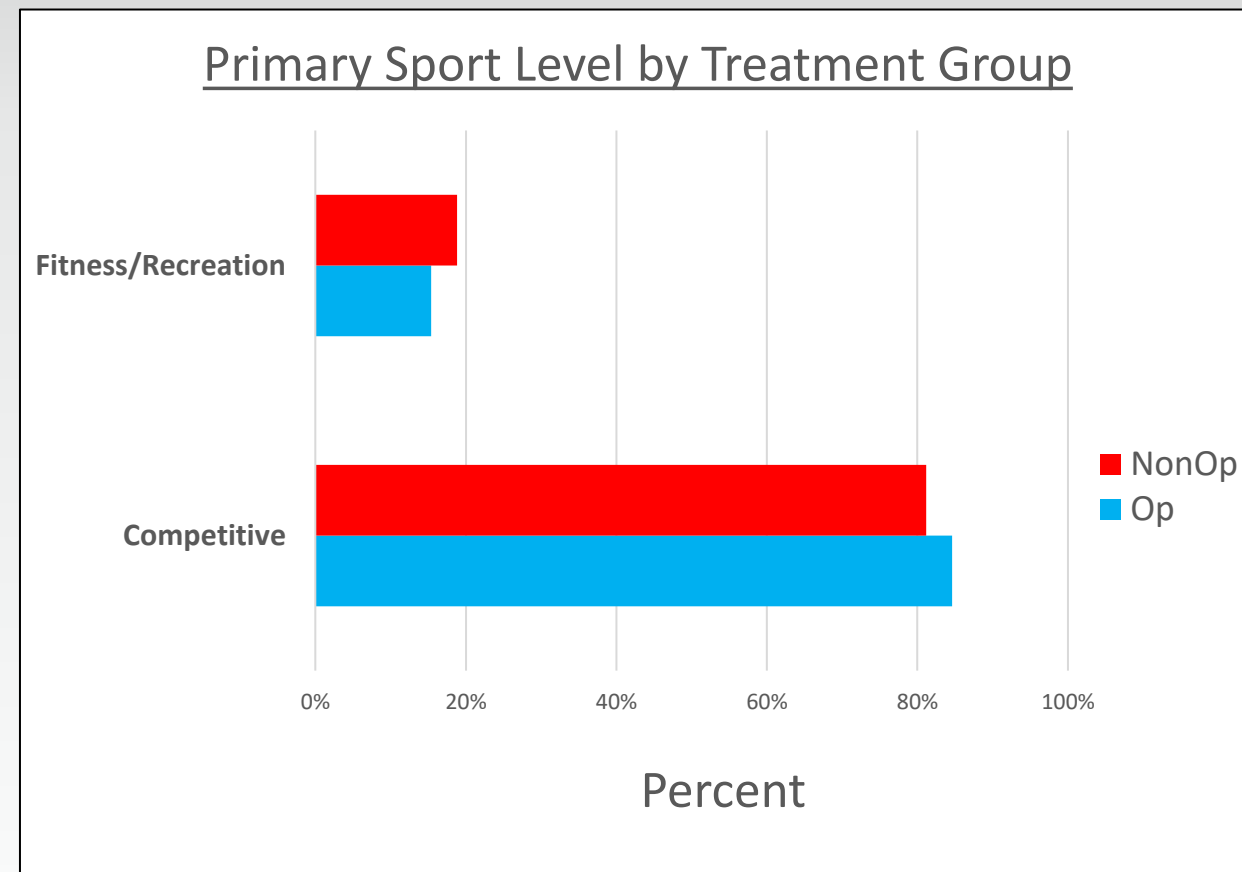
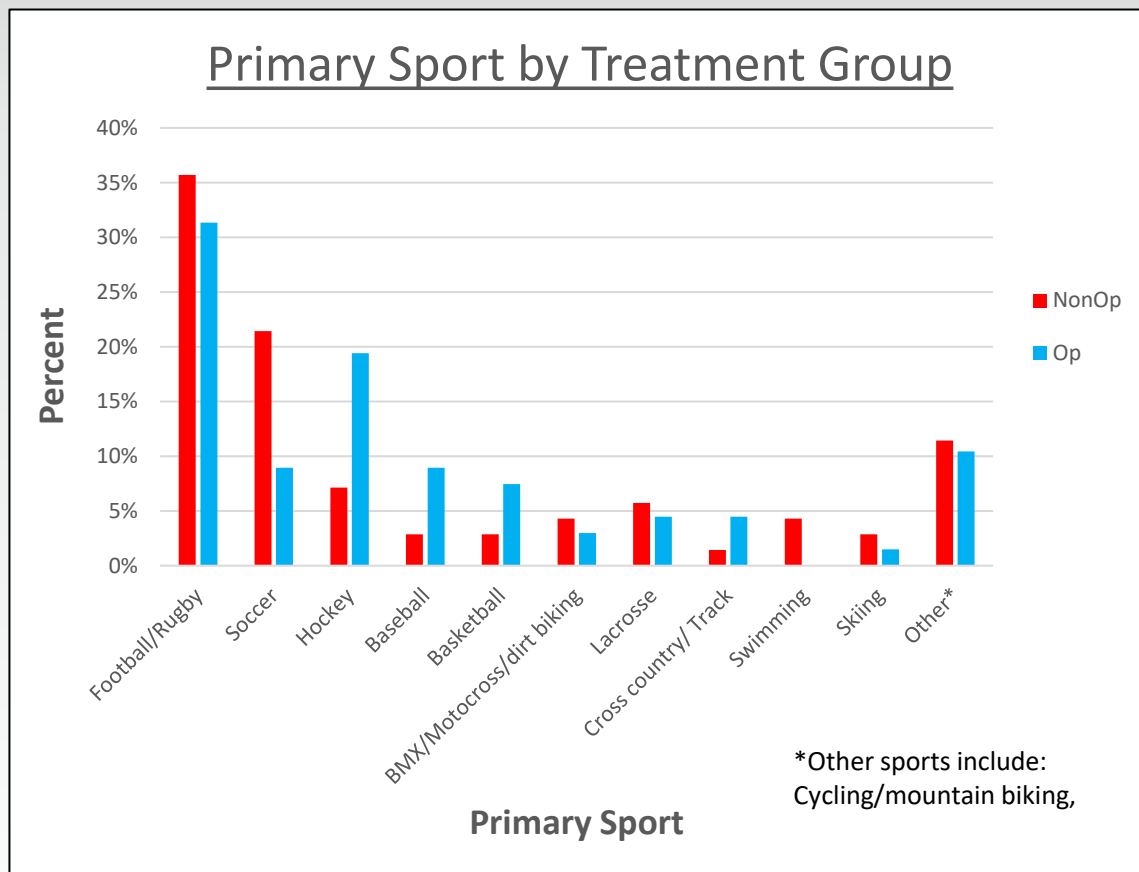
- Age
- Sex
- Hand dominance
- Fracture shortening
- Fracture comminution

16 mm vs 13 mm of superior displacement
in operative group ($p=0.03$)





Results





Outcomes

	Non-operative	Operative
Nonunion	0	0
Delayed Union	2%	2%
Symptomatic Malunion	2%	0
Re-fracture	0	2%
Clinically significant complication	4%	13%

Patient-Reported Outcomes

100 patients \geq 2 years

52 non-op

48 op

Mean values and dichotomized PRO scores were no different even with regression analysis.

Variable	Non-Operative (n=52)	Operative (n= 48)	p-value
ASES Score			
Patients (%) with Suboptimal (<90) Score	4 (8.0 %)	3 (6.2 %)	1.0
Mean Score (SD)*	97.5 (7.5)	97.1 (7.7)	
QuickDASH Score			
Patients (%) with Suboptimal (>10) Score	3 (5.9%)	3 (6.4%)	1.0
Mean (SD)*	2.1(7.7)	2.7 (7.4)	
EQ-VAS Score			
Patients (%) with Suboptimal (<80) Score	2 (3.9%)	1 (2.1%)	1.0
Mean (SD)*	93.4 (6.6)	94.5 (6.9)	
EQ-5D Score			
Patients (%) with Suboptimal (<0.80) Score	3 (5.9%)	2 (4.3%)	1.0
Mean (SD)*	0.98 (0.06)	0.97 (0.08)	
Overall Satisfaction Score			
Patients (%) with Suboptimal (>2) Score	7 (13.7%)	3 (6.4%)	0.32
Mean (SD)*	1.4 (0.8)	1.3 (0.8)	
MARX Shoulder Activity			
Patients (%) with Suboptimal (\leq 7) Score	6 (11.5%)	5 (10.4%)	1.0
Mean (SD)*	12.6 (5.2)	14.6 (5.05)	





Outcomes: Return to Sport

Time to return to sport was **3.1 weeks faster** in operative group (10.4 vs 13.5 weeks)

At 2 years, **NO DIFFERENCE** was detected between final reported return to sport or level of performance. (75% nonop:79% op; 61% nonop: 57% op respectively)



Conclusions

In this prospective, multicenter study of comminuted or severely shortened (>25mm) midshaft clavicle fractures in older adolescent athletes treated non-operative or operatively, there was:

- No difference in complications
- No difference in PROs
- No difference in rate or level of return to sports
- Timing of return to sports was 3.1 weeks faster with surgery

Questions?



