Does Shorter Time to Treatment of Pediatric Supracondylar Humerus Fractures Impact Clinical Outcomes?

Brian Wahlig, MD*; Mikaela H. Sullivan, MD; Samuel E. Broida, MD; Noelle Larson, MD; William J. Shaughnessy, MD; Anthony A. Stans, MD; Emmanouil Grigoriou, MD; Brandon J. Yuan, MD; Todd A. Milbrandt, MD*

Purpose: Treatment of supracondylar humerus (SCH) fractures within 18 hours of presentation is a tracked metric for ranking of pediatric orthopaedic hospitals by US NEWS. This is in contrast with literature that shows time to treatment does not impact outcomes in SCH fractures. We aim to determine whether an 18-hour cut-off for pediatric supracondylar humerus fractures is clinically significant for hospitals by comparing the complication risks of patients on either side of this time point. Our hypothesis is that there will be no statistically significant clinical differences based on time of treatment.

Methods: A retrospective chart review of clinical outcomes was performed for 472 pediatric patients who underwent surgical management of isolated SCH fractures between 1997 and 2022 at a single Level I pediatric trauma hospital. The cohort was then split based on the time to surgery (within 18 hours or greater than 18 hours from emergency department [ED] admission).

Results: Definitive fracture treatment occurred within 18 hours of arrival in 435 patients (92.2%) and after 18 hours in 37 patients (7.8%). Mean age in the cohort was 5.6 ± 2.2 years and 51.5% of patients were female. Gartland fracture classification was either type II (n = 152 [32.2%]), type III (n = 284 [60.2%]), type IV (n = 13 [2.8%]), or flexion-type (n = 18 [3.8%]). There were no differences in demographic characteristics or fracture classification between the 2 cohorts. Fractures in the ≥18-h cohort were treated more commonly with 2 pins (62.2% vs 38.5%, P = 0.04). There were no statistically significant differences in open vs closed reduction, utilization of medial pins, or postoperative immobilization between the 2 cohorts. We were unable to detect any differences in postoperative complications, including nonunion, delayed union, stiffness, malunion, loss of reduction, iatrogenic nerve injury, or infection. This remained true when all type II fractures were excluded. When time was used as a continuous variable, complications were highest in those patients who underwent SCH pinning in <6 hours.

Conclusion: Using an arbitrary time cut-off of <18 hours does not influence clinical outcomes in the surgical treatment of SCH fractures. This held true when type II fractures were excluded. National quality metrics that truly impact clinical outcomes should be utilized to rank hospitals and more importantly improve patient care for this common fracture.

	Time from Arrival to OR		
	<18 hours (n=435)	≥ 18 hours (n=37)	p-value
Demographics			
Age, years	5.5 ± 2.2	5.8 ± 2.3	0.57
Sex			0.99
Female	224 (51.5%)	19 (51.4%)	
Male	211 (48.5%)	18 (48.6%)	
Race			0.82
Caucasian	355 (81.6%)	29 (7.8%)	
Hispanic/Latino	17 (3.9%)	2 (5.4%)	
African American	15 (3.4%)	1 (2.7%)	
Asian	16 (3.7%)	0	
Other	32 (7.4%)	5 (13.5%)	
Insurance			0.08
Government	61 (39.9%)	5 (31.3%)	
Private	87 (56.9%)	9 (68.7%)	
Uninsured	5 (3.3%)	0	
Gartland Classification			0.77
Type 2	137 (31.9%)	15 (40.5%)	
Type 3	263 (61.2%)	21 (56.8%)	
Type 4	13 (3.0%)	0	
Flexion	17 (4.0%)	1 (2.7%)	
Treatment			
Reduction			0.82
Open	415 (95.4%)	35 (94.6%)	
Closed	20 (4.6%)	2 (5.4%)	
Number of Pins Used			**0.01**
2	167 (38.5%)	23 (62.2%)	
3	236 (54.4%)	12 (32.4%)	
4	31 (7.1%)	2 (5.4%)	
Pin Construct			0.4
Lateral only	153 (35.4%)	12 (33.3%)	
Lateral & medial	279 (64.6%)	24 (66.7%)	
Post-Op Immobilization			0.10
Cast	280 (64.4%)	18 (48.6)	
Splint	5 (1.1%)	0	
Splint followed by cast	149 (34.3%)	19 (51.4%)	
Outcomes			
Non-Union	0	0	1.00
Delayed Healing	6 (1.5%)	0	0.48
Decreased ROM	25 (6.1%)	3 (8.6%)	0.56
Malunion/Deformity	5 (1.2%)	0	0.51
Loss of Reduction	13 (3.0%)	0	0.29
Iatrogenic Nerve Injury	16 (3.7%)	3 (4.3%)	0.19
Infection	8 (1.8%)	2 (5.4%)	0.15
Any Complication	64 (14.7%)	7 (18.9%)	0.49