

## Pulseless Supracondylar Humerus Fracture with AIN or Median Nerve Injury – An Absolute Indication for Open Reduction?

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**Purpose:** Management of the pulseless supracondylar humerus fracture remains controversial. In particular, the combination of pulseless supracondylar humerus fracture and anterior interosseous nerve (AIN) or median nerve injury may have increased overall risk. The purpose of this study was to assess the necessity for open versus closed surgical management of pulseless supracondylar humerus fractures with concomitant AIN or median nerve injury in children.

**Methods:** A retrospective review was performed at three pediatric trauma hospitals on all children age 5-15 years who sustained a Gartland type III or type IV supracondylar humerus fracture (OTA 13-M/3 1.III, 13-M/3 2.III, 13-M/3 1.IV, 13-M/3 2.IV) with the combination of absent distal palpable pulses and AIN or median nerve injury between 2000 and 2014. In addition to choice of treatment, details regarding preoperative and postoperative examination findings, follow-up course, and outcome were also recorded.

**Results:** 78 patients with displaced Gartland type III or type IV supracondylar humerus fractures presented with the combination of absent distal pulses and AIN or median nerve injury and met inclusion criteria. 21 of 78 cases (26.9%) underwent open reduction, antecubital fossa exploration (OR) versus 57 (73.1%) that were treated with closed reduction and percutaneous fixation (CR). Indications for opening included concern for artery entrapment (n = 11), inadequate closed reduction (n = 9), and concern for nerve entrapment (n = 6). The risk of compartment syndrome was higher in open cases (5/20, 25.0%) than closed cases (1/57, 1.8%) (P = 0.001). The incidence of reoperation was also higher with open cases (4/20, 20%) than closed cases (2/57, 3.5%) (P = 0.018). Open reduction was also significantly associated with increased time to surgery (18.7 hours  $\pm$ 31.1 vs 9.0 hours  $\pm$ 4.7, P = 0.024) and length

**Table 1 – Clinical course outcome measures by treatment type**

	CRPP (n=55)	ORIF (n=21)	P-Value
<b>Average time from injury to surgery (hours)</b>	9.0 $\pm$ 4.7	18.7 $\pm$ 31.1	0.024
<b>Patients initially seen at outside hospital (%)</b>	73.7% (42/57)	90.5% (19/21)	0.111
<b>Duration of Hospital Stay (days)</b>	2.0 $\pm$ 1.6	4.0 $\pm$ 4.2	0.004
<b>Mean pin duration (days)</b>	26.9 $\pm$ 5.1	25.6 $\pm$ 5.5	0.337
<b>Mean cast duration (days)</b>	27.8 $\pm$ 6.6	29.8 $\pm$ 11.3	0.347
<b>Patients requiring reoperation (%)</b>	3.5% (2/57)	20.0% (4/20)	0.018
<b>Compartment Syndrome</b>	1.8% (1/57)	25.0% (5/20)	0.001
<b>Infection rate (%)</b>	5.3% (3/57)	10.0% (2/20)	0.460
<b>Patients with resolution of nerve palsy (%)</b>	91.2% (50/57)	95.2% (20/21)	0.538

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

of hospitalization (4.0 days  $\pm$ 4.2 vs 2.0 days  $\pm$ 1.6,  $P = 0.004$ ) compared to closed reduction. Overall, all but six (of 78, 7.7%) patients ultimately had complete resolution of preoperative nerve palsy with no significant difference in rate of clinical nerve recovery between the treatment groups (20/21 [95.2%] in OR, 52/57 [91.2%] in CR) ( $P = 0.538$ ).

**Conclusion:** Outcomes following open and closed surgical management of pulseless grade III or IV supracondylar humerus fracture with AIN or median nerve injury are ultimately both favorable and may suggest that open reduction is not always necessary.