

## Management of the Pulseless Pediatric Supracondylar Humerus Fracture

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## Disclosures

- Depuy-Synthes Spine



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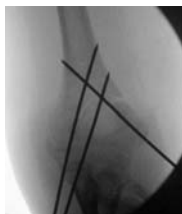
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## Background

- Supracondylar humerus fractures
  - 60-70% pediatric elbow fractures
  - 3% all pediatric fractures
- Most common pediatric elbow injury requiring reduction and fixation
- Neurologic Injury
  - 10-20%
- Vascular Injury
  - 2-20%



Badkoobehi et al, 2015



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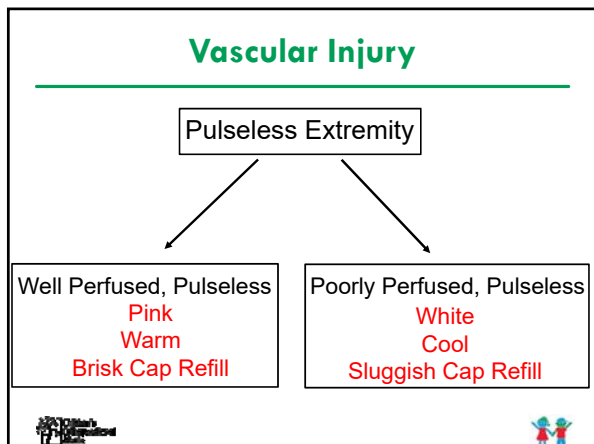
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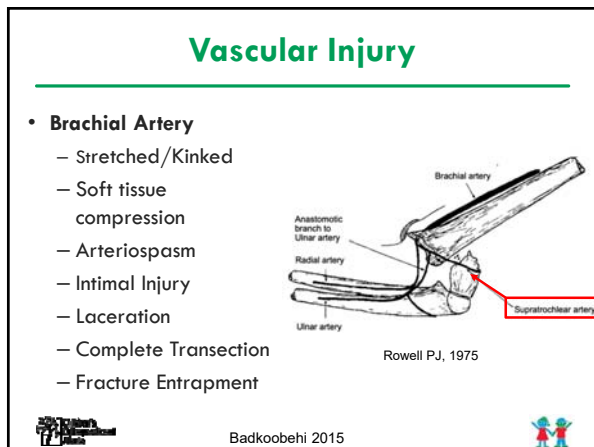
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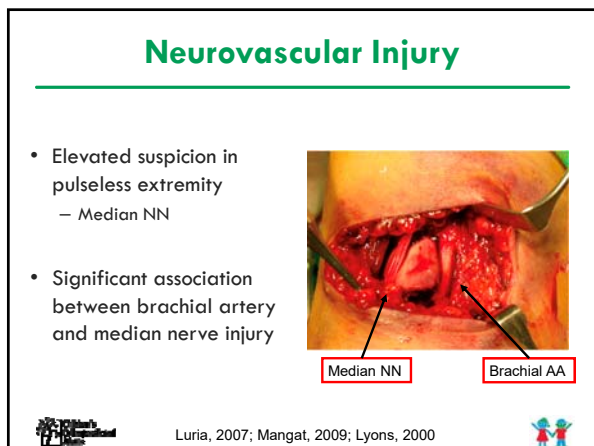
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## Examination

- Initial Exam
  - Pulse, Color, Temperature, Capillary Refill
  - Severe Swelling, Ecchymosis, Skin Puckering
  - Compare to contralateral extremity if uncertain
- Continued Serial Exams
  - Evolving Ischemia or Compartment Syndrome
  - Increasing anxiety, agitation, increased need for pain medication
  - Neurologic injury may mask compartment syndrome
    - Median NN



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## Diagnostic Studies

- Angiography
  - Not Recommended Pre-op
  - Post-reduction data is limited
  - AAOS AUC: Post-op angiogram if pre-op pulseless extrem
  - Shaw, 1990; Griffin, 2008; Copley, 1996; Sanders, 2016
- Post-reduction Pulse Oximetry
  - Soh et al, 2013



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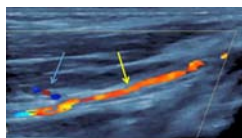
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## Diagnostic Studies

- Doppler Ultrasound
- AAOS AUC Post-op Vascularity Restored
  - (+) Dopplerable Pulse
    - Observation
    - Vascular Consult
    - Angiogram
  - (-) Dopplerable Pulse
    - Observation
    - Angiogram
    - Vascular Consult
    - Pharmacologic Anticoagulation



Scannell et al, 2013; Weller et al, 2013; Sanders, 2016



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### Poorly Perfused (White), Pulseless Extremity

- **Emergent** reduction and stabilization
  - Often leads to perfusion restoration
- If no improvement, immediate exploration
  - Brachial AA injury up to 82%
  - Vascular, Microsurgery, or general surgery service



White, 2010; Choi, 2010; Badkoobei 2015



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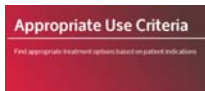
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### Well Perfused (Pink), Pulseless Extremity

- AAOS Appropriate Use Criteria (2016)
  - Paucity of high level evidence
  - Expert Opinion
- Two schools of thought
  - Immediate Open Exploration
  - Close Observation



- Both proponents agree with **Urgent Reduction**



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### Well Perfused (Pink), Pulseless Extremity

- **Immediate Open Exploration**
  - **Urgent** Reduction and Fixation
- Immediate Exploration and/or Vascular Reconstruction
  - High incidence of vascular injury with favorable clinical outcomes
  - Possible ischemic fibrosis, growth disturbance, cold intolerance, exercise-induced ischemia, late compartment syndrome, LLD, or contracture
- Long term patency rates following brachial artery reconstruction are largely unknown

White, 2010; Blakey, 2009; Sabharwal, 1997; Konstantiniuk, 2011



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### Well Perfused (Pink), Pulseless Extremity

- **Conservative Approach**

- **Urgent** Operative Reduction and Fixation

- +/- Doppler Ultrasound Intra-op

- Inpatient Serial Exams 24- 48 hours

- Analgesics
    - Anxiety
    - Agitation

} **Compartment Syndrome  
Vascular Decompensation**

- Low Threshold to return to the OR

- Compartment release, exploration, possible reconstruction



Weller, 2013; Scannell, 2013; Badkoobehi, 2015



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### Conclusion

- **Management is based on perfusion**

- **Median NN Injury**

- Compartment Syndrome Risk
  - May predict brachial artery injury

- **AAOS Appropriate Use Criteria**

- Pediatric Supracondylar Humerus Fractures Treatment
  - Pediatric Supracondylar Humerus Fractures with Vascular Injury
  - www.AAOS.com/AUC



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### THANK YOU

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