



Crossing the Line: Investigating the Impact of Routine Crossed Pin Placement on Ulnar Nerve Injury in Supracondylar Humerus Fracture Fixation

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Objectives

1. **Identify the rate** of ulnar nerve injury in supracondylar humerus fractures managed with medial pinning by a pediatric orthopaedic surgeon who routinely places medial pins
2. **Compare the rate** of ulnar nerve injury to the available literature
3. **Describe safe methods** for placing medial pins

Introduction

Anatomy

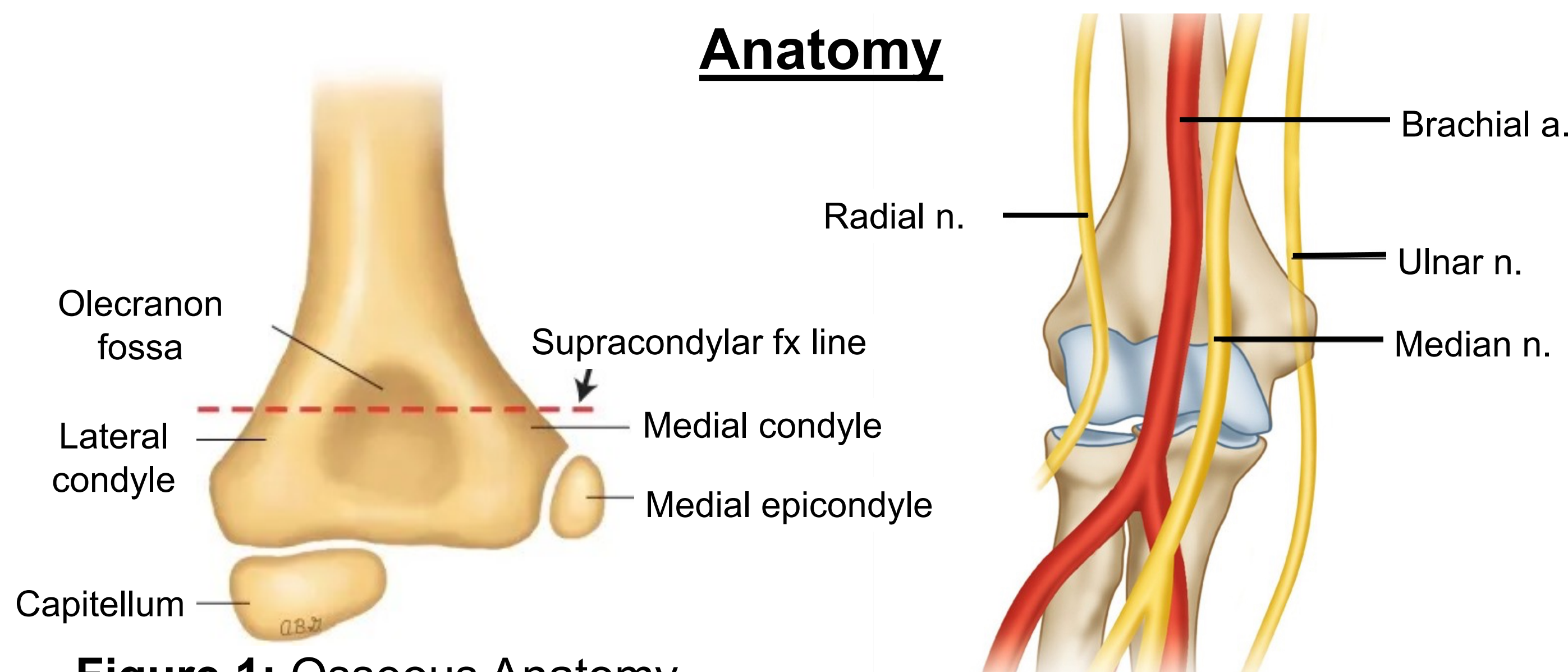


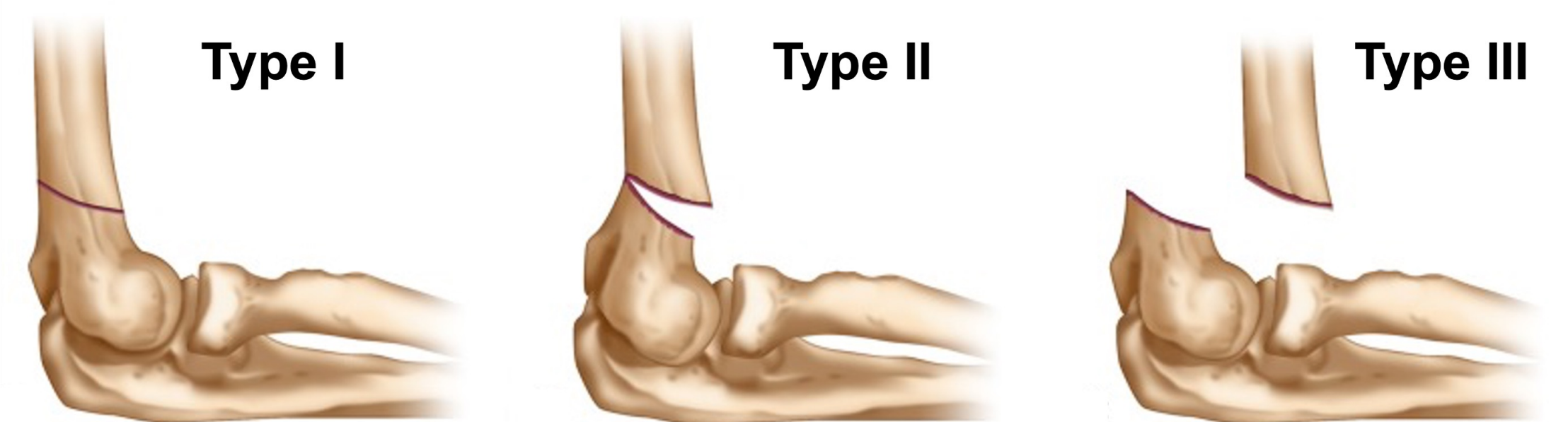
Figure 1: Osseous Anatomy

Figure 2: Elbow neurovasculature

Supracondylar Humerus Fractures

- One of the most common pediatric fractures (**16% of all; 50-70% of the elbow**)
- Most common between **5-7 years of age**
 - Due to bone remodeling in children of this age
- 95-98% due to **hyperextension** after a fall on an outstretched arm
 - Extension-type- **Median n.** neuropraxia
 - Flexion-type- **Ulnar n.** neuropraxia

Figure 3: Gartland Classification



Treatment

Type I: Long arm casting
Type II-III: Closed reduction and percutaneous pinning (CRPP)

- **Must engage:**
 - Proximal & distal cortex
 - Medial & lateral column
- **Two lateral pins**
- **Three lateral pins**
- **Crossed pins**
 - **Stronger** in stress
 - **Ulnar n.** injury risk

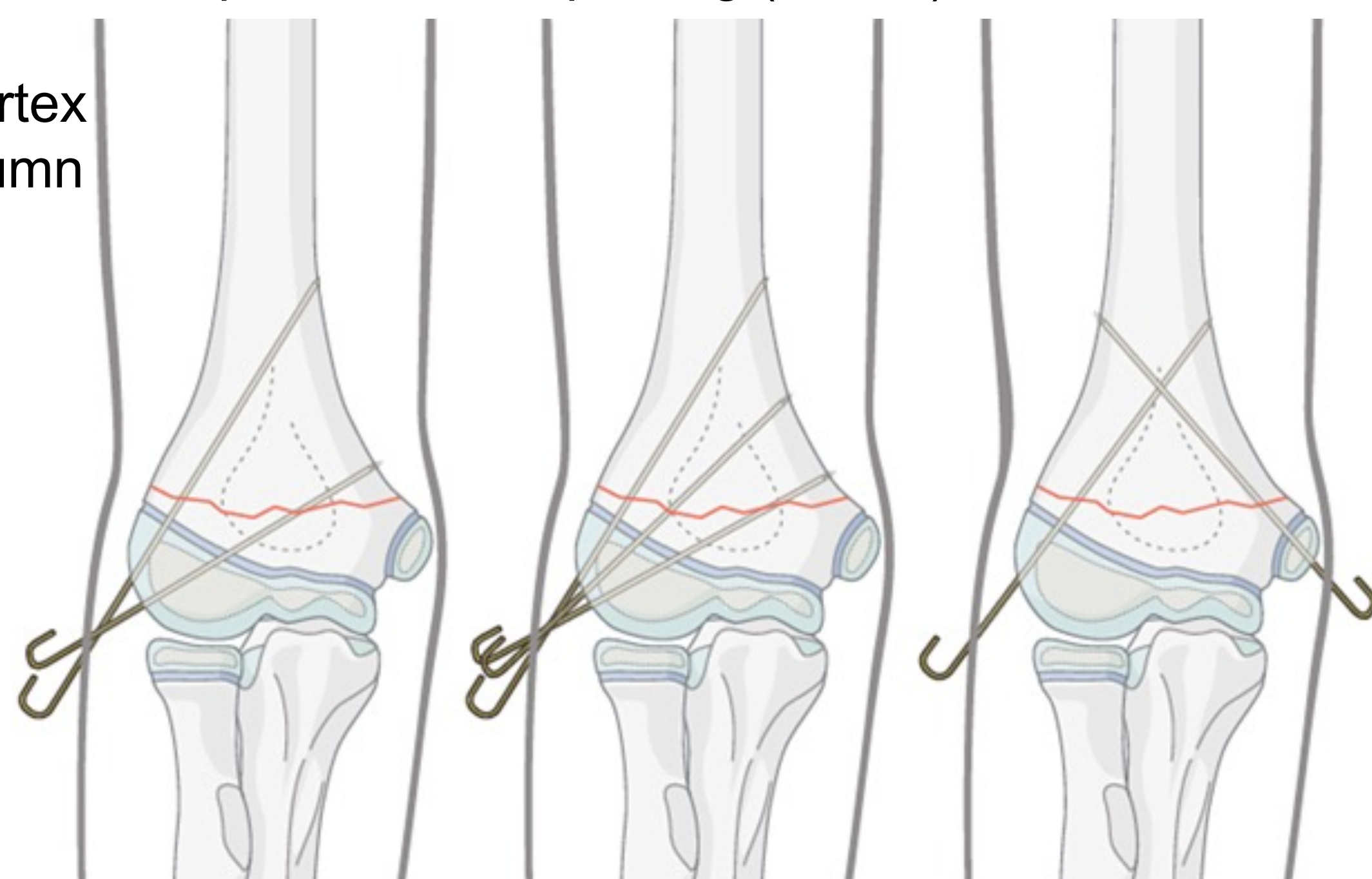


Figure 4: CRPP configurations

Methods

- **Retrospective chart review** of all children with supracondylar humerus fracture receiving a medial pin from one provider between 2006-2020 with a post-op neurovascular exam
- **Identified** any ulnar nerve neuropraxia
- **Compared** our rate of ulnar nerve injury to previous literature
- **Described** our method of safe medial pin placement

Results

- **155 total patients**
- **2 patients (1.29%)** with ulnar nerve neuropraxia post-op
- Both resolved at three months post-op

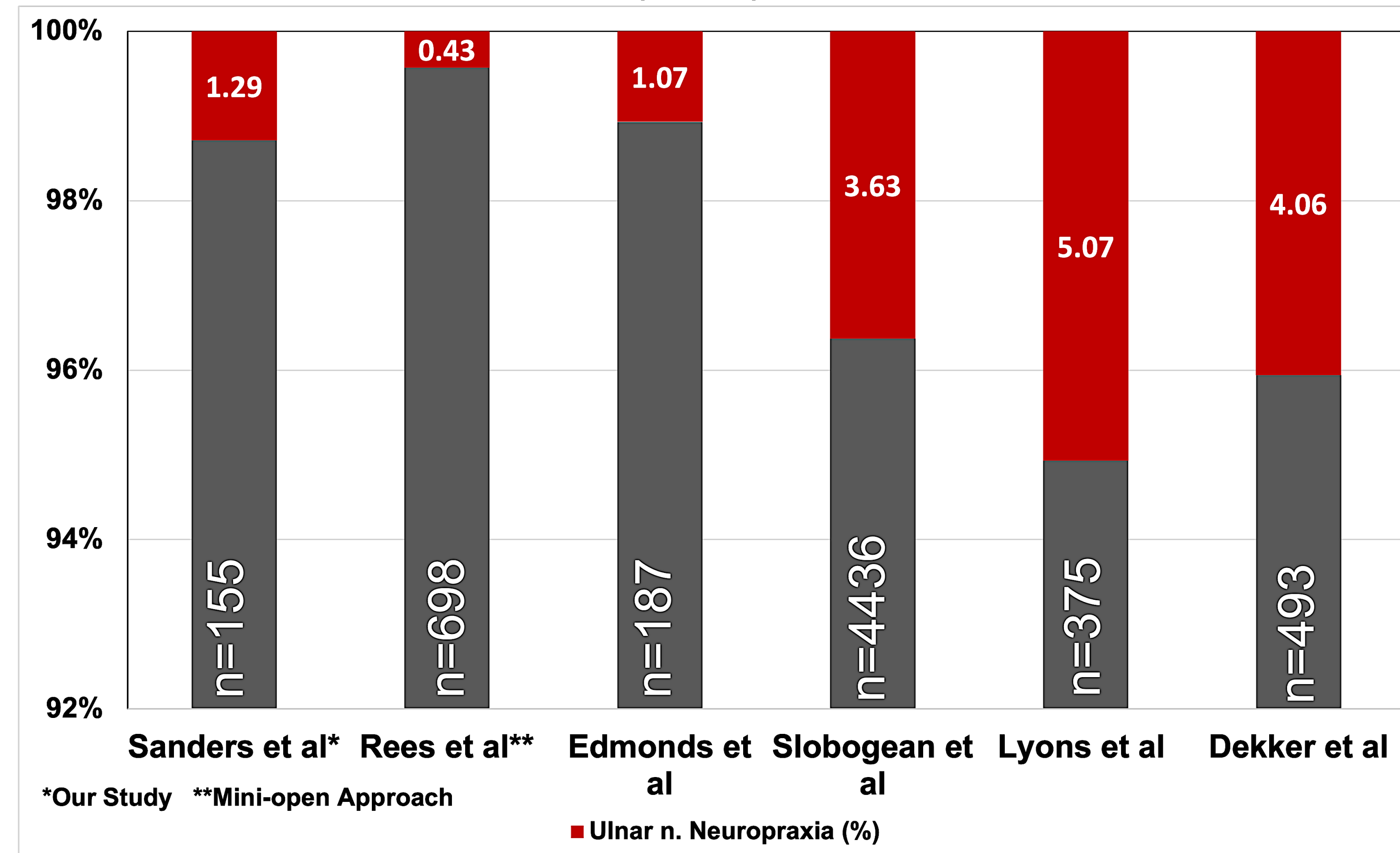


Table 1: Ulnar Nerve Neuropraxia Literature Comparison

Hypothesized prevalence	Expected cases	Observed cases	p-value
0.50%	0.76	2	0.1749
1.00%	1.51	2	0.6656
1.50%	2.27	2	1.0000
2.00%	3.02	2	0.7737
2.50%	3.78	2	0.5960
3.00%	4.53	2	0.3359

Table 2: Binomial Test of the Significance of Ulnar Nerve Neuropraxia Rate Compared to a Hypothesized Prevalence



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Results cont.

Technique



Figure 5: Step 1- Patient Prone

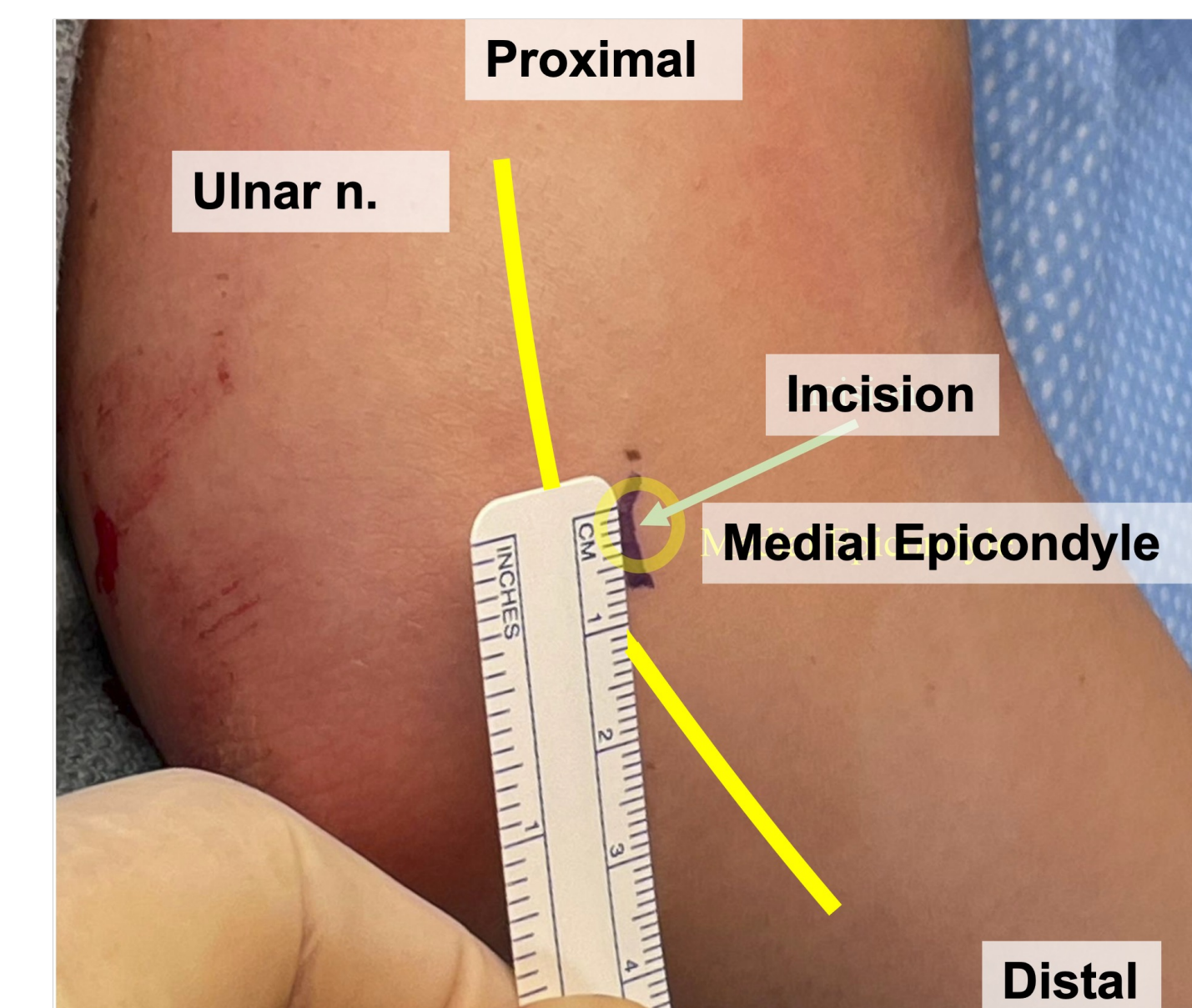


Figure 6: Step 2- Mini-open incision



Figure 7: Step 3- Place medial pin with elbow extended. Lateral pin with the elbow flexed

Discussion

- Based on our sample of patients, there was no statistical significance between nationally quoted rates of iatrogenic nerve injury compared to our provider, who routinely places a medial pin.
- Providers should understand the proper placement technique and feel assured that medially pins can be placed safely when indicated.

Conclusions

- The placement of a medial pin in supracondylar fractures increases the biomechanical stability of fixation
- Unstable fractures, medial comminution, or high exit point medially may lend themselves to a medial pin
- A mini-open approach and placement in extension decreases the rate of iatrogenic nerve injury
- Based on our study, routine placement of a medial pin did not decrease the rate of iatrogenic nerve injury

References

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