

Non-Accidental Trauma in Pediatric Elbow Fractures— Beware of Non-Ambulatory Elbow Fractures

Vaibhav Tadepalli, BS¹; Stephanie N. Moore-Lotridge, PhD²; Jonathan G. Schoenecker, MD, PhD²; Andrew B. Rees, BS¹; Jacob Schultz, BA¹; Lucas Wollenman, BS¹

¹Vanderbilt University School of Medicine, Nashville, TN; ²Vanderbilt University Medical Center, Nashville, TN



Recipient: Vaibhav Tadepalli, BS

Background/Purpose: Non-accidental trauma (NAT) remains a major cause of morbidity and mortality in childhood, with fractures serving as the second most common presenting sign of abuse. Conventionally, elbow fractures are more frequently associated with accidental trauma than NAT. We hypothesized that elbow fractures in non-early ambulatory children are at risk of a NAT mechanism.

Methods: Patients were identified using an institutional database of pediatric elbow fractures at a large, tertiary pediatric hospital between 2007 and 2017. A diagnosis of NAT was established if a physician specializing in Child Abuse Pediatrics confirmed that the trauma was the result of NAT by their clinical judgement, if custody of the child was altered as a result of the case, or if legal documentation of criminal investigation secondary to the case was found.

Results: Of 4,608 elbow fractures in the database, 21 were confirmed to be caused by NAT. Fifteen (71%) of

the patients were male with a median age of 0.7 years old and a range between 0.1 and 10.4 years (Table 1). Of the 21 elbow fractures associated with NAT, there were 11 supracondylar (further subclassified as 3 Gartland I, 3 Gartland II, 1 Gartland IIIa, 1 Metaphyseal-Diaphyseal Junction fracture and 3 unspecified), 5 lateral condyle, 4 humeral shaft fractures involving the elbow and 1 radial head fracture. Of the 21 patients identified, 12 (57%) were found to have bruising inconsistent with the mechanism given or unrelated to the injury, while 11 (52%) had additional fractures or healing fractures identified. Seventeen (81%) injuries were determined to be inconsistent with mechanism of injury described or did not specify mechanism. Among all the patients presenting with an elbow fracture under the age of 1 over a 10-year span, 33% were determined to have suffered NAT (12/36). Patients between 1 and 2 and older than 2 presenting with elbow fractures had injuries caused by NAT 1% (3/221) and 0.1% (6/4350) of the time respectively (Figure 1).

Conclusion: While elbow fractures are rarely considered a result of NAT in most age groups, a high degree of clinical suspicion should be maintained for elbow fractures in children under one. For comparison, in children under one year presenting with femur fractures, widely considered to be pathognomonic of child abuse, 16-35% are the result of NAT. An overwhelming majority of patients with elbow fractures resulting from NAT presented with additional bruising and injuries. However, a minority did not, and suspicion is only raised as a result of the mechanism provided. Thus, it is

imperative that medical personal who encounter pediatric injuries understand the natural history of these injuries and vigilantly evaluate for their common signs in order to identify possible NAT.

The Mission of the AAP Section on Orthopedics is to foster the health of children through the AAP by mentorship,

education, advocacy, and research. The AAP Section on Orthopedics has also collaborated with POSNA in joint leadership meetings creating shared strategic plans. Through these shared visions and collaborations our organizations have collectively partnered with the 50,000 pediatricians within the AAP to advocate for injured and ill children throughout the world.

Demographics

N	21
Male, n (%) / Female, n (%)	15 (71%) / 6 (29%)
Age in years (Median, Range)	0.7, (0.1 -10.4)
Race	
Caucasian, n (%)	10 (48%)
African American, n (%)	6 (29%)
Hispanic, n (%)	3 (14%)
Asian, n (%)	1 (5%)
Other, n (%)	1 (5%)

Table 1. Demographic information of children presenting for elbow injuries that were determined to have been caused by NAT.

Percentage of Elbow Fractures by Age at Presentation Determined to be Caused by NAT

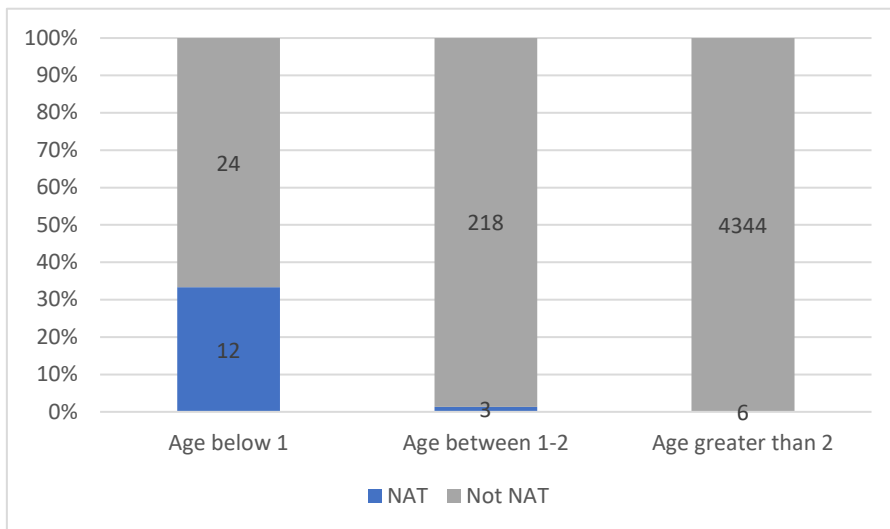


Figure 1. Elbow fractures determined to be caused by NAT compared to elbow fractures not caused by NAT separated by age at presentation. Numbers within bar segments indicate n.