Transphyseal Humeral Separations: What Can We Learn?

Arun Hariharan MD; Christine Ann Ho MD; Andrea Sesko Bauer MD; Charles T Mehlman DO; Nathan N O’Hara; Paul D Sponseller MD; Joshua M Abzug MD
Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, Maryland

INTRODUCTION

• Transphyseal Humeral Separations (TPHS) are rare injuries with only case reports and small series reported in the literature.
• TPHS typically occurs in children younger than 3 years of age.
• TPHS are often misdiagnosed due to difficulty of the diagnosis on plain radiographs.
• Mechanisms of Injury: vaginal delivery, cesarean section, fall on an outstretched hand and non-accidental trauma.
• The purpose of this study was to assess the various injury patterns, treatments performed, outcomes, and complications in a large series encompassing multiple institutions.

RESULTS

• Study Population: 79 patients identified, ages 0-46 months (x̅:17.6 months).
• Mechanism of Injury: Accidental trauma (62%), Non-accidental trauma (27%), Cesarean section (7%), Vaginal delivery (4%).
• Child Protective Services: Consulted in 49%. Additional injuries were noted in 19 patients; most commonly with additional fractures of the humerus, ribs, and skull.
• Time to Surgery: Greater than 24 hours in 62% of patients (n=49).
• Treatment Performed: Intra-operatively, 87% of patients underwent an arthrogram (n=69), 78% of patients had lateral pins only (n=62), 80% had two pins for fixation (n=63), and two patients underwent an open reduction.
• Complications: Ten noted → cubitus varus/valgus (n=6), decreased range of motion (n=4). No cases of avascular necrosis or physeal arrest were noted. No loss of reductions occurred.

METHODS

• Study Design: Retrospective review of five pediatric institutions, patients 0-3 years of age from 1991-2016.
• Variables of Interest: Patient demographics, mechanism of injury, Child Protective Services involvement, diagnostic modality, time to surgery, pin configuration, and complications.

CONCLUSIONS

• Transphyseal humeral separations have excellent outcomes in the vast majority of patients.
• High suspicion for non-accidental trauma with transphyseal humeral separations is needed, as Child Protective Services involvement was required in over half of the non-birth related injuries.
• The most common complication of TPHS is distal humeral deformity; patients should be followed beyond pin removal to evaluate for residual deformity.

Figure 1: AP and lateral radiographic views of a transphyseal humeral separation.