H99 Intraosseous Puncture-Induced Bone Fractures Mimicking Child Abuse: A Case Report

Xin Zhang, MD, Indiana University, Department of Pathology, Indianapolis, IN 46202; Matthew Wanner, MD, Indiana University, Indianapolis, IN 46202; Dominique Battles, Marion County Coroner's Office, Indianapolis, IN 46225; Christopher Poulos, MD, Marion County Coroner's Office, Indianapolis, IN 46225*

Learning Overview: After attending this presentation, attendees will be aware of the possibility of Intraosseous (IO) puncture-induced fractures mimicking child abuse and be familiar with its associated radiological and autopsy findings.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by promoting appropriate case investigation and improving wound interpretation in IO puncture-induced bone fractures, especially in decedents with congenital or acquired conditions that affect bone formation, thus avoiding misinterpreting these wounds as child abuse-associated injuries.

Introduction: IO puncture is frequently used to rapidly establish vascular access in critically ill patients when venous routes are not available. In generally healthy adults, the procedure typically only causes minor local puncture injury. However, in some cases, more severe injuries may occur, especially in patients who have congenital or acquired conditions that affect bone formation. In pediatric decedents, the skeletal fractures induced by medical interventions such as IO puncture may occasionally become so severe that they may radiographically simulate child abuse and cause diagnostic difficulty.

Methods: A case of a teenage decedent whose antemortem IO punctures is reported; it caused extensive bilateral long bone fractures that raised initial concerns for child abuse.

Results: A 15-year-old male with a history of Duchenne muscular dystrophy underwent autopsy. He had only relatively vague complaints prior to death. Antemortem radiographs showed bilateral humeral neck fractures with slipped epiphyses of indeterminate age, which raised concerns for child abuse related injuries. The bones appeared demineralized and gracile. External examination demonstrated symmetrical atrophy and external rotation of bilateral lower extremities as well as foot deformity, compatible with the decedent's reported Duchenne muscular dystrophy history. Multiple minor abrasions, contusions, areas of erythema, and needle punctures were present on the limbs. Bilateral IO lines were present in the humeral heads, with abundant associated hemorrhage and underlying fractures, which corresponded to the antemortem radiological findings. Autopsy examination also demonstrated subtle bilateral lower lung lobe consolidation and left ventricular cardiac discoloration. Microscopic examination revealed myocardial changes consistent with Duchenne muscular dystrophy and histologic evidence of lobar pneumonia. Bone marrow emboli were present in the pulmonary vasculature, which was consistent with being due to resuscitation-related fractures. The decedent's medical records were carefully reviewed. The decedent received extensive resuscitation efforts, including IO punctures, prior to death. Taking the pattern of the injury and the decedent's medical history into consideration, the case was ruled as being due to complications of Duchenne muscular dystrophy including pneumonia. The manner of death was categorized as "natural."

Conclusions: Medical interventions, such as IO puncture, occasionally cause more severe and extensive bone damage in people who have disorders that affect bone formation. Duchenne muscular dystrophy is a genetic disorder that causes progressive muscle weakness, which leads to frequent falls, immobility, and eventually, death. It is associated with increased bone fragility due to lack of use and side effects of prolonged glucocorticoid therapy. In the pediatric population, such injuries may raise concerns for child abuse-related injuries. Thorough autopsy examination with careful medical history review is essential for the appropriate interpretation of these injuries, so they are not misinterpreted as abusive trauma.

Intraosseous Puncture, Mimic, Child Abuse