



Physical Anthropology Section – 2009

H40 Callus Treatment: Collaboration Between Forensic Anthropology and Forensic Pathology to Improve the Recognition and Elucidation of Skeletal Fractures in Infants and Children

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After attending this presentation, attendees will gain an appreciation of the significance of cooperation between disciplines in the medicolegal arena and how this cooperation can improve the quality and scope of investigations into child death. When forensic anthropologists and pathologists combine their skills and expertise, the result is a more thorough and complete investigation.

This presentation will impact the forensic community by demonstrating that increased cooperation between disciplines results in a better understanding of complex forensic cases, in particular those involving suspected child abuse cases.

The syndrome of child abuse (first defined and its causes identified by Kempe in 1962) refers to cases in which children are beaten, burned, shaken, thrown, hit, or dropped. These actions may result in the child's death. Without physical abuse, fractures in infants and young children are rare. When children become active in school and sports, around the age of five, they develop greater risks for accidental skeletal fractures. Most skeletal fractures related to child abuse occur in children younger than 18 months. Repeated fractures in varying stages of healing may be present in the same infant; when this occurs, the term "battered child syndrome" is applied. In these cases, a complete understanding of the fracture pattern, timing, and stage of healing for each fracture is critical. Collaboration between the pathologist and the anthropologist can enhance this understanding as demonstrated by the cases discussed below.

On January 30, 2008, a three-month-old male child was admitted to the hospital after sustaining injuries due to suspected child abuse. He was transported from a county in Northern Arizona to a regional trauma center in Phoenix, Arizona where radiographs and blood tests were obtained. The infant subsequently died from his injuries. An autopsy was performed at the Maricopa County Office of the Medical Examiner. The antemortem radiographs were obtained and they revealed the presence of multiple fractures, including comminuted, healing fractures of the left humerus and multiple ribs. The humerus and exemplars of the ribs were removed at autopsy for maceration and examination by the anthropologist. After a subsequent consultation and further examination, the pathologist and anthropologist removed the right innominate and the remainder of the rib-cage, all of which were macerated.

After maceration, additional radiographs were obtained to assist further examination. These radiographs, as well as those obtained prior to the autopsy, were used to place the ribs into anatomical order so that the injuries could be enumerated by joint effort of the pathologist and the anthropologist. The findings of osseous traumata were as follows: the right ribs had 14 well-established calluses, 3 acute, re-fractured calluses, 1 traumatized callus, 1 acute, non-healing fracture, and elaboration of bone on the sternal end of the first rib. On the left ribs there were 13 well-established calluses, 5 acute re-fractured calluses, and elaboration of bone on the sternal end of the first rib. The left humerus had a well-established callus, which encompassed nearly three-quarters of the distal shaft, with two complete fractures of the shaft; one fracture was grossly visible and the other was embedded in the callus. The superior ramus of the right *os coxa* exhibited one less well-established callus and one acute injury immediately lateral to the callus with associated hemorrhage. Additional fractures were noted on the radiographs.

Several other complex cases involving acute, healing, and healed fractures of the ribs and long bones in infants under the age of one year also resulted in maceration and examination of the injured bone by both the anthropologist and pathologist. In all cases, maceration allowed for better follow-up radiography and examination with a dissecting microscope to enhance understanding of the injuries. These cases will be used to demonstrate that collaboration between the forensic pathologist and forensic anthropologist can lead to a higher degree of understanding for complex cases involving suspected abuse of children.

Interdisciplinary Collaboration, Skeletal Traumata, Suspected Child Abuse