



Pathology Biology Section – 2011

G97 Child Abuse vs. Cachexia: Do Healing and Acute Rib Fractures Trump a Diagnosis of Probable Cardiac Dysrhythmia Due to Electrolyte Abnormalities

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After attending this presentation, attendees will gain an awareness of potential differential diagnoses between forensic anthropologists and medical examiners/coroners on child deaths becomes evident.

This presentation will impact the forensic science community by informing attendees of the difficulties that accompany medical/anthropological diagnoses of child abuse, and the complications that arise when specialists attempt to contribute to cause and manner of death in infants.

One of the most difficult tasks confronted by forensic pathologists is the determination of cause and manner of death in suspected child abuse cases. In the last 15 years, forensic anthropology has demonstrated a potential for contributing to the cause of death, by systematically examining questionable skeletal areas after processing the skeletal elements free of soft tissue for a close look. Certainly, an accurate analysis of acute and healing fractures contributes immensely to a final diagnosis of infant's deaths. But do the two professions, with different approaches and diverse responsibilities, ever conflict in diagnoses? Of course they do. Below is a case where such a conflict arises.

An unembalmed body of a well developed, poorly-nourished female was examined and autopsied. The body appears younger than the reported three-months. Inanition is evidenced. The pale skin shows no acute injuries, or scars, nor were there any indications of trauma from the external exam. A V-shaped incision was performed previously by a tissue harvest team to remove the heart and proximal aorta. The clavicle and first rib on the right side were sectioned for this procedure. The first indication of skeletal injuries is first discovered during the internal examination of the ribs, where hemorrhage, acute, and possible healing rib fractures are visible.

Pathologic diagnoses documents small body size, where height and weight are diagnosed as in the 3rd percentile for age. Morgue examination weight is 7 lbs 6 oz, where birth weight was 6 lbs 3 oz. This presents neglect or failure to thrive. Also noticed is documented dehydration and small organ weights. Finally, blunt force skeletal injuries are present, with acute, chronic, and acute-on-chronic rib fractures. History indicates that aunt called 911 at 15:30 after last seeing the child alive at 8:30 that morning. The aunt is the legal guardian.

The anthropologist was called in at the first recognition of skeletal trauma. At that point it was decided to remove all ribs, both clavicles, and vertebrae C-7 through L-4 after extensive photographic documentation. These were processed free of obvious soft tissue, but preserved in anatomical position to give a better idea of three dimensional relationships of the complicated trauma to bone.

Dry bone examination combined with faxitron radiographs indicate numerous rib fractures as listed in Table 1

RIB FRACTURES				
<u>Acute</u>	<u>Chronic</u>	<u>Stable Chronic</u>	<u>Acute On Chronic</u>	<u>Other Procedure</u>
15*	6	10 (3 questionable)	2	1 (tissue bank)

*All rib head apex tears

Table 1. Summary of rib fractures in 3-month-old infant.

As one would guess, the anthropological report documents and describes the 33 insults to bone that clearly point to non-accidental trauma, with the history as reported. However, from a medical examiner point of view, this case was everything but a clear case of child abuse.

It is ruled the death of this 3-month-old as attributed to probable cardiac dysrhythmia due to electrolyte abnormalities. Postmortem testing for calcium and vitreous sodium yielded abnormally low levels. Multiple blunt force injuries in the form of acute and chronic rib fractures were also noted at autopsy. No external signs of trauma are seen on the body. Differential diagnoses of the infant's abnormalities include natural and non-natural causes. Neglect and child abuse cannot be ruled out, however, nor can a natural cause such as a metabolic disorder be eliminated. To complicate issues, the infant had been taken to the pediatrician regularly and they were treating the low body weight. The last physician visit was 16 days before death. In view of these issues, the manner of death is best certified as "Undetermined."

Maybe the question in this case should be formulated, "Do diagnoses of probable cardiac dysrhythmia due to electrolyte abnormalities *trump* healing and acute rib fractures?" To the anthropologist perspective, this is an unsettling thought. To the medical examiner/coroner, while still unsettling, their responsibilities are medical interpretations of cause and manner of death, not simply biomechanic interpretations of bone



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fracture. The repercussions of a homicide ruling without a traumatic cause of death are immense. Thus, the debate goes on.

Child Abuse, Cachexia, Healing Rib Fractures