



## Physical Anthropology Section – 2011

### H50 CPR Fractures in Infants: When Do They Occur?

Miriam E. Soto, MA\*, *The University of Tennessee, 250 South Stadium Hall, Knoxville, TN 37996*

After attending this presentation, attendees will be more aware of characteristics that may indicate which infants are more susceptible to CPR related rib fractures.

This presentation will impact the forensic science community by contributing information which may be helpful for differentiating between abuse and CPR related rib fractures.

The literature indicates that CPR related rib fractures in infants and children are rare, occurring in only 0-2% of studied samples. To test these findings, this study examined all autopsy records of infants and children, up to the age of two years, that came into the Harris County Institute of Forensic Sciences (HCIFS) office during a one year period (n=186). The purpose of this evaluation was to identify characteristics which may be contributory to CPR fractures. In addition, this study compared the bone quality of infants/children that had CPR fractures and those that received CPR but did not exhibit fractures. Since CPR fractures often occur in ribs 4-6, an effort was made to examine ribs from these positions; however, in a single case rib two had to be examined due to availability. There was no preference for side. The samples for this study were taken from the osteological material stored in the Anthropology Laboratory of the HCIFS. It is hypothesized that infants that were in poor health for extended periods of time will be more susceptible to rib fractures due to a lower quality of bone. Gross observations with and without a stereoscope of the ribs of infants with CPR fractures was used to assess bone quality.

Of the 186 infant/child cases that entered the HCIFS office in 2009, 162 received CPR. Only seven of these 162 cases had CPR related rib fractures. These results indicate that cases in which infants/children received CPR fractures are indeed rare, occurring in 4% of infant/child cases that received CPR.

Regarding the direct comparison of ribs for the evaluation of bone quality, the rib specimens of six infants aged two to five months that received CPR fractures were compared to the rib specimens of four infants aged two to four months that received CPR without receiving CPR fractures. All infants without CPR fractures were born at  $\geq 36$  weeks gestation while four out of the six infants with CPR fractures were born at  $< 36$  weeks gestation. Gross observation revealed that infants with CPR fractures had moderate to low bone quality and increased porosity in comparison to the infants that did not experience fractures during CPR. Five out of the six infants that had CPR fractures were also in a poor state of health for an extended period of time following birth. Prematurity was a contributing factor to the poor health of four of the five cases. In the fifth case, it was likely that the poor bone quality was a result of metabolic bone disease. Of the infants that did not get CPR fractures, three of four were reportedly healthy at birth and were in a good state of health prior to the circumstances causing death. Birth records were not available for one of the infants without CPR fractures, which was a premature (36 weeks gestation) twin birth.

In conclusion, this study found that CPR fractures may be rare, but that there are identifiable characteristics that may contribute to the susceptibility of infants to CPR fractures. Infants that are premature and/or have extended hospital stays due to serious illness are more susceptible to CPR fractures. Premature infants are likely to experience osteopenia of prematurity, causing brittle bones that are more susceptible to fractures. In addition, there is an increased likelihood that premature infants will experience an extended period of illness due to complications of prematurity.

**Forensic Anthropology, CPR, Rib Fractures**