H28 A Unique Type of Birth Trauma Mistaken for Abuse

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After attending this presentation, attendees will understand a unique type of birth trauma caused by vacuum-assisted delivery that may be mistaken for child abuse.

This presentation will impact the forensic science community by increasing awareness of birth-related trauma and its presentation in the postmortem examination of infants.

Trauma during birth is a known risk with incidence of approximately 0.2% for unassisted vaginal deliveries and 1.1% for cesarean deliveries.[1,2] The risk of injury increases in instrument-assisted deliveries to 1.85%.[1] A consideration of birth trauma in potential cases of child abuse is an important differential diagnosis that must be explored. This is a unique case of a two-week-old infant that presented to the pediatric intensive care unit unresponsive, hypoglycemic, and hypothermic. Imaging revealed bilateral calvarial fractures underlying areas of soft tissue inflammation, raising concerns for a non-accidental etiology of the fractures that resulted in traumatic brain injury and death of the infant within a day of admission.

Upon presentation at the postmortem examination, the infant had diffuse dark purple skin discoloration with multiple areas of skin slippage. This degree of postmortem change was surprising considering the infant's death was pronounced approximately six hours prior. External examination revealed no other abrasions or other evidence of injury. Internal examination of the head confirmed the presence of the cranial vault fractures detected on imaging. These bilateral circular comminuted fractures of the parietal bones were observed in association with collections of blood beneath the scalp and generalized subarachnoid hemorrhage. Gross, microscopic, and histologic examination of the fractured bones was completed and revealed evidence of early osteogenic healing, suggesting an antemortem rather than a peri-mortem cause to the defects.

Further investigation revealed a circular defect approximately 22mm by 20mm of the right parietal and a somewhat figure eight-shaped defect on the left parietal measuring 40mm by 20mm. Gross and microscopic examination of these cranial defects showed outbending of bone along the perimeter, absence of ectocranial bone within the fracture border, and smoothed fracture margins with subperiosteal new bone formation indicative of healing. Histological samples demonstrated both osteoclastic and osteoblastic activity and confirmed the absence of ectocranial surface within the fracture margins. Based on these observations, the traumatic lesions occurred more than ten days prior to death.

A review of birth records revealed the infant was delivered via vacuum assist and cesarean section. Fractures associated with vacuum extraction are reported in the literature but are described as linear fractures, usually associated with a cephalohematoma. The external deformation of the fracture margins and circular morphology of the defects in this case are consistent with the type of cup that is utilized during vacuum extractions. Thus, the fractures present at autopsy were incidental findings of past birth trauma. Based upon bacterial cultures and neuropathology consultation, it was determined the infant died of gram-negative sepsis and meningitis due to *Enterobacter cloaecae* infection.

This unique case demonstrates the importance of considering birth trauma in a differential diagnosis in the determination of the cause and manner of death of an infant. While the type of cranial fracture reported here is rare, other injuries such as soft-tissue injury, clavicle fracture, nerve palsies, intracranial hemorrhage, humerus fracture, and linear or depressed skull fractures are considered common birth injuries and should be considered in potential cases of child abuse.

Reference(s):

1. Demissie K., Rhoads G.G., Smulian J.C., Balasubramanian B.A., Gandhi K., Joseph K.S., Kramer M. 2004. Operative Vaginal Delivery and Neonatal and Infant Adverse Outcomes: Population Based Retrospective Analysis. BMJ 329:1-6.
2. Alexander J.M., Leveno K.J., Hauth J., Landon M.B., Thom E., Spong, C.Y., Varner M.W., Moawad A.H., Caritis S.N., Harper M., Wapner R.J., Sorokin Y., Miodovnik M., O'Sullivan M.J., Sibai B.M., Langer O., Gabbe S.G. 2006. Fetal Injury Associated with Cesarean Delivery. Obstetrics and Gynecology 108(4): 885-890.

Child Abuse, Birth Trauma, Fracture

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