

Introduction

Traumatic head injury is the leading cause of death in pediatric non-accidental trauma, particularly in children younger than 2 years. Mixed density hematoma along with retinal hemorrhage and encephalopathy are considered to be indicative of non-accidental head injury in children. It is known that subdural hemorrhage in the infant has a different pattern from that seen in the older child and adult. Research has not been conclusive on the origin of the subdural hemorrhage in infants. Though the secondary membranes formed are noted to have increased vascularity on CD-31 and CD-34 stains, this does not correlate with bleeding clinically. In this paper, we consider an alternative hypothesis for SDH in infants. Anatomical and clinical observations indicate that vessels intrinsic to the dura and/or bridging veins may be a source of bleeding. The senior author has observed the presence of arterialized veins draining into superior sagittal sinus in infants undergoing craniotomy for evacuation of mixed density subdural hemorrhage, presumably for non-accidental trauma in 4 cases. These arterialized veins may be the source of both primary and recurrent SDH in infants. In order for such consideration, we examine the unique anatomy of the infant cranial venous system. We know through our understanding of the embryology of the cranial venous circulation that the evolution of the venous system during development continues into the post-natal period such that an infant may display sinuses or veins not usually seen in adults. Also, the vasculature of an infant is constantly in flux and ever-changing.

Methods

We operated on four infants with mixed density hematomas and a presumed diagnosis of NAT over the course of one year.

Results

We found arterialized veins draining into the superior sagittal sinus in all four patients.

Conclusions

We propose that arterialized draining veins in neonates and infants may rupture serially and present as mixed density subdural hemorrhage. As to whether this mixed density hematoma is the result of repeated non-accidental head injury remains unclear, but an important consideration given the importance of diagnostic criteria in supporting a diagnosis of NAT.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Understand basic embryology of the cranial venous circulation 2) Identify differences between infant and adult dura 3) Identify anatomical differences in infant and adult cranial venous system 5) Understand the difference in appearance of subdural hematoma in infants versus older children and adults 6) Evaluate the observed arterialized vein as a possible and alternative etiology of mixed density hematoma in infants.

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