Case Report

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A newborn case of split choroid plexus supposed to have intraventricular hemorrhage by bedside cranial ultrasound

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ABSTRACT

Cranial ultrasound is a valuable bedside technique and procedure of choice to image the intraventricular hemorrhage (IVH). Moreover, anatomical variants of the neonatal brain should be known to avoid of misinterpretation. The term of split choroid plexus was described as a cleft in the choroid plexus, which could be partial or complete in the anterior portion, giving a lobular appearance. We presented the case of split choroid plexus in a late premature infant and we aimed draw attention to the fact that it can be confused with IVH.

Keywords: Intraventricular hemorrhage, prematurity, split choroid plexus, cranial ultrasound

INTRODUCTION

Intraventricular hemorrhage (IVH) is primarily seen in premature infants, and the risk is greater with increasing immaturity. However, IVH can be seen in late preterm and term babies, it is extremely rare in that population and associated with birth injury or asphyxia (1).

Cranial ultrasound (CUS) is a valuable bedside technique and procedure of choice to image the IVH (2). With ultrasonography largely available in neonatal units, routine ultrasonography is performed mostly by neonatologists to the high-risk infants during hospitalization (3). On the other hand, anatomical variants of the neonatal brain should be known to avoid of misinterpretation (4).

The patterns of the choroid plexus (CP) are described as lobular choroid, drumstick-shaped choroid and choroid cysts (2,4,5). The term of split CP was indicated as a cleft in the CP, which can be complete or partial in the anterior portion, giving a lobular appearance by Enriquez et al (2). Although variations in CP shape are known, there is no published case or case series on split CP mimicking IVH in the English literature. Here, we presented the case of split CP in a late premature infant and we aimed draw attention to the fact that it can be confused with IVH.

CASE

A 2010 g female newborn was delivered via cesarean section due to preeclampsia to a 25 years old mother from first pregnancy at 34 weeks and 4 days of gestation with no respiratory problems and discharged on the postnatal day two. On the postnatal 8th day of life, she was admitted to newborn follow up clinic with jaundice and poor sucking. Her vital signs along with the physical and neurological examination were all unremarkable, except for jaundice and purulent, foul-smelling drainage from the umbilical cord. Complete blood count, [white blood cells=7.170 /μL (lymphocytes ratio=18.7%, neutrophil ratio: 74.4%), hemoglobin=16.9 g/L, hematocrit=51.8%, platelet count=268.000/uL)]. C-reactive protein was 16.1 mg/dl (reference range: 0-5 mg/L). Total and direct bilirubin levels were 17 and 1.2 mg/dl respectively. Cranial ultrasound was performed due to prematurity and sepsis, about 19x5 mm echogenic image in the mildly dilated left lateral ventricle was found, suggesting grade 3 IVH. Left and right lateral ventricle atrial widths were 5 and 2.8 mm respectively.

The patient was admitted to our neonatal unit with a diagnosis of indirect hyperbilirubinemia, omphalitis and grade III IVH. Vitamin K was given via intramuscularly. Prothrombin time, partial thromboplastin time and international normalized ratio were in normal ranges

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according to gestational age. After pus culture from umbilicus and peripheral blood culture were obtained, antibiotic therapy and phototherapy were started. Upon further discussion with neuroradiology, CUS was performed again before discharge. It was determined that what was seen as possible IVH, was in fact split CP in the left lateral ventricle (**Figure**). Indirect hyperbilirubinemia and omphalitis resolved within 1 week. The patient was discharged home without any sign and symptoms. After a month, CUS was checked and split CP confirmed. Her growth and development were appropriate for her postnatal age during 4 months of follow.

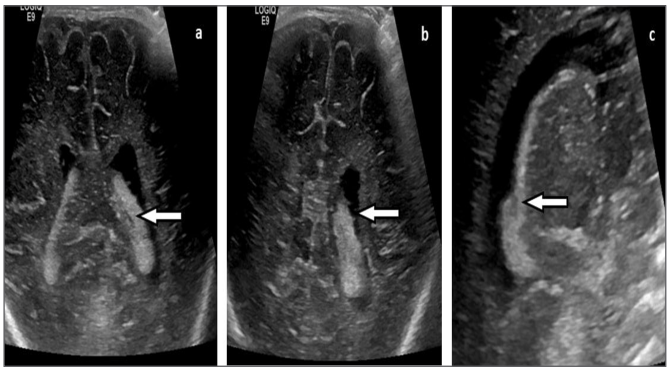

Figure. (a) Hypoechoic line (arrow) dividing the left choroid plexus in two, was seen in axial transfontanel ultrasonography section. (b) Thickening of the left choroid plexus and choroid plexus cyst (arrow) were observed in axial transfontanel ultrasonography section. (c) Lobulation in the left choroid plexus (arrow) was seen in sagittal transfontanel ultrasonography section.

DISCUSSION

Intraventricular hemorrhage is classically due to the rupture of micro-vessels in germinal matrix, but less commonly, it may also originate from the CP (3,6). According to the Papile grading system, IVH ranges in severity from grade I to grade IV. Grades III or IV IVH considered to have a robust correlation with worse neurodevelopmental prognosis (7,8). Therefore, monitoring of cranial bleeding by CUS is crucial for the neonatologists.

Cranial ultrasound is the most common used technique for imaging the intraventricular and parenchymal brain pathologies for neonatal brain because of low cost, accessibility, and safety (9). Congenital or acquired anomalies of the neonatal brain and the frequently occurring patterns of brain injury are detected by CUS in both preterm and full-term neonates. (2,3). However, evaluation of parenchymal, subarachnoid and subdural abnormalities are limited on sonographic examination. In addition, quality of imaging depends on the abilities and experience of the radiologists (10,11). In our unit, CUS was routinely performed in preterm infants ≤$34^{6/7}$ weeks of gestation with/without unexplained hyperbilirubinemia, sepsis and hemodynamic instability etc.

The CP is highly echogenic and has a smooth, sharply defined contour. In the sagittal view, it assumes a semicircular form around the thalamus and thickens at the ventricular atrium to form the glomus (12). It is found along the roof of the third ventricle and extends through the foramen Monro into the lateral ventricles (4,9). The CP does not extend from the caudothalamic grooves to the frontal horns or from the ventricular atrium to the occipital horns (4). Echogenic material anterior to the caudothalamic groove or in the dependent portions of the occipital horns suggests germinal matrix and intraventricular hemorrhage, respectively (4). Correa et al. (3) found that, posterior fontanelle sonography provided greater certainty in detecting IVH in the neonatal brain and it showed size, contours and echogenicity of choroid plexus more accurately. In addition, posterior fontanelle sonography was applicable for more accurate detection of intraventricular content and to assess marked lateral ventricle asymmetry (3). If the clues were used that mentioned in the above statements for our case, a clarifying of diagnosis could be made during the first CUS. Additional imaging methods, such as magnetic resonance of brain or cranial tomography, were not recommended by division of neuroradiology because CUS was sufficient if performed by experienced radiologists (2).

CONCLUSION

As in our case, cranial ultrasonographic evaluation should be repeated by more experienced ultrasonographers to avoid inappropriate management, especially for unexpected cases of IVH. In conclusion, neonatologists should be aware of variations in choroid plexus shape because it can mimic intraventricular hemorrhage.

ETHICAL DECLARATIONS

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version

REFERENCES

1. Wu YW, Hamrick SE, Miller SP, et al. Intraventricular hemorrhage in term neonates caused by sinovenous thrombosis. Ann Neurol 2003; 54: 123–26.
2. Enriquez G, Flavia C, Lucaya J, et al. Potential pitfalls in cranial sonography. Pediatr Radiol 2003; 33: 110–7.
3. Correa F, Enriquez G, Rossello J, et al. Posterior fontanelle sonography: an acoustic window into the neonatal brain. AJNR Am J Neuroradiol 2004; 25: 1274–82.
4. Lowe LH, Bailey Z. State-of-the-Art Cranial Sonography: Part 2, Pitfallsand Variants AJR 2011; 196: 1034–40.
5. Di Salvo DN. A New View of the Neonatal Brain: Clinical Utility of Supplemental Neurologic US Imaging Windows. RadioGraphics 2001; 21: 943–55.
6. Allan WC, Volpe JJ. Periventricular–intraventricular hemorrhage. Pediatrics. 1989; 84: 913-5.
7. Papile LA, Burstein J, Burstein R, et al. Incidence and evolution of subependymal and intraventricular hemorrhage: a study of infants with birth weights less than 1,500 gm. J. Pediatr 1978; 92: 529–34.
8. Mccrea, HJ, Ment LR. The Diagnosis, management, and postnatal prevention of intraventricular hemorrhage in the preterm neonate. Clin. Perinatol 2008; 35: 777–92.
9. Gupta P, Sodhi KS, Saxena AK, et al. Neonatal cranial sonography: A concise review for clinicians. J Pediatr Neurosci 2016; 11: 7-13.
10. Leijser LM, de Vries LS, Cowan FM. Using cerebral ultrasound effectively in the newborn infant, Early Hum Dev 2006; 82: 827-35.
11. Steggerda SJ, Leijser LM, Walther FJ et al. Neonatal cranial ultrasonography: how to optimize its performance, Early Hum Dev 2009; 85: 93-9.
12. Fiske CE, Filly RA, Callen PW. The normal choroid plexus: ultrasonographic appearance of the neonatal head. Radiology 1981; 141: 467–71.