

The Advantages of Multiple View Cranial Ultrasonography in Detecting Extra-cerebral Intracranial Hemorrhages in Neonates and Infants of the First Months of Life

E. B. Olkhova¹, N. M. Dubasova²

¹ Moscow State University of Medicine and Dentistry named after A. I. Evdokimov

² Irkutsk Ivano-Matreninskaiy Children Clinical Hospital

Abstract

Traditional cranial ultrasonography (CUS) using the anterior fontanelle as an acoustic window has diagnostic limitations in detecting extra-cerebral intracranial hemorrhages (ECIH). However, use of additional acoustic windows as well as high frequency transducer types can improve diagnostic accuracy of CUS significantly. The aim of the study was to define the possibilities of mvCUS in diagnostics of different types of ECIH in neonates and infants. From 2013 to 2014 1600 patients were examined using mvCUS. The age of the patients was from 8 days to 7 months. This article describes the technique of multiple view cranial ultrasonography (mvCUS) in neonates and presents ultrasonographic features of ECIH. Ultrasonographic signs of ECIH were found in 34 patients (2 %). In 4 patients (12 %) extradural haemorrhage was revealed. 30 patients (88 %) had subdural haemorrhage or subdural haemorrhage in association with subarachnoid haemorrhage. In order to verify the CUS findings CT scan was performed in 30 patients with abnormal CUS (88 %), 11 patients (32 %) underwent MRI. In 12 cases (35 %) the US findings were verified during cranial surgery, in 1 case (3 %) in autopsy. CUS plays a significant role in early diagnostics of ECIH in neonates and allows to define the indications for further CT and MRI procedures.

Key words: Newborn, Neurosonography, Extra-cerebral Intracranial Hemorrhages.

References

1. Volodin N. N., Kornushin M. A., Medvedev M. I. Optimization of diagnostics of extra-cerebral intracranial hemorrhages in neonates and infants. *New Technologies in Perinatology. Materials of Annual Congress. M., 2006. P. 17–18.*
2. Krukova I. A., Lazebnik T. A., Kashtanova N. S., Poteshkina O. V., Iova A. S. Neuroscreening improvement in modern neonatal neurology and neurosurgery. *J. Pediatric Neurosurgery and Neurology. 2012. No. 1 (31). P. 13–20.*
3. Olkhova E. B. Ultrasound diagnostics of massive subarachnoid hemorrhages in neonates. *J. Medical Visualization. 2006. No. 1. P. 115–122.*
4. Olkhova E. B. Sub- and epidural hemorrhages in neonates and infants of first months. *J. Medical Visualization. 2006. No. 3. P. 101–111.*
5. Olkhova E. B., Kirsanov A. S., Zlygareva N. V. Asymptomatic posterior fossa hemorrhage in a newborn (Case report and literature review). *Radiology – practice. 2012. No. 1. P. 37–55.*
6. Blauwblomme T., Garnett M., Vergnaud E., Boddaert N., Bourgeois M., DiRocco F., Zerah M., Sainte-Rose C., Puget S. The management of birth-related posterior fossa hematomas in neonates. *Neurosurgery. 2013. V. 72. P. 755–762.*
7. Duran C., Riego J., Rovira A. Sonographic imaging of the posterior fossa utilizing the foramen magnum. *Pediatr. Radiol. 2011. V. 41. No. 6. P. 792–793.*

8. *Hou D., Shetty U., Phillips M., Gray P. H.* Cerebellar haemorrhage in the extremely preterm infant. *J. Paediatr. Child. Health.* 2012. V. 48. No. 4. P. 350–355.
 9. *Malec L. M., Sidonio R. F. Jr., Smith K. J., Cooper J. D.* Three cost-utility analyses of screening for intracranial hemorrhage in neonates with hemophilia. *J. Pediatr. Hematol. Oncol.* 2014. V. 36. No. 6. P. 474–479.
 10. *Raets M. M., Sol J. J., Govaert P., Lequin M. H., Reiss I. K., Kroon A. A., Appel I. M., Dudink J.* Serial cranial US for detection of cerebral sinovenous thrombosis in preterm infants. *Radiology.* 2013. V. 269. No. 3. P. 879–886.
 11. *Sirgiovanni I., Avignone S., Groppo M., Bassi L., Passera S., Schiavolin P., Lista G., Cimmante C., Triulzi F., Fumagalli M., Mosca F.* Intracranial haemorrhage: an incidental finding at magnetic resonance imaging in a cohort of late preterm and term infants. *Pediatr. Radiol.* 2014. V. 44. No. 3. P. 289–296.
 12. *Soudack M., Jacobson J., Raviv-Zilka L., Ben-Shlush A., Kuint J.* Cerebellar hemorrhage in very low birth weight premature infants: the advantage of the posterolateral fontanelle view. *J. Clin. Ultrasound.* 2013. V. 41. No. 7. P. 395–401.
 13. *Steggerda S. J., de Bruïne F. T., Smits-Wintjens V. E., Walther F. J., van Wezel-Meijler G.* Ultrasound detection of posterior fossa abnormalities in full-term neonates. *Early Hum. Dev.* 2012. V. 88. No. 4. P. 233–239.
-

Authors

Olkhova Elena Borisovna, M. D. Med., Moscow State Medical University of Medicine and Dentistry named after A. I. Evdokoimov, Ministry of Healthcare of Russia, Radiology Department.
Address: 9a, Vucheticha ul., Moscow, 127206, Russia.
Phone number: +7 (495) 611-01-77. E-mail: elena-olchova@bk.ru

Dubasova Natalia Mihajlovna, Radiologist, Irkutsk Ivano-Matreninskaiy Children Clinical Hospital.
Address: 57, Sovetskaia ul., Irkutsk, 664009, Russia.
Phone number: +7 (3952) 21-89-48. E-mail: dnatasha58@gmail.com