What is Amiss? Neurosonogram in a 36-week-old Late Preterm Neonate

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Section 2 – Answer

Case Description

A 36-week outborn, late preterm neonate, was admitted to the neonatal intensive care unit. The child had a history of delayed cry at birth and was born to a 28-year-old primigravida.

The mother had only one antenatal visit with no documented antenatal sonograms available. Her folic acid and iron supplementation was adequate throughout pregnancy, had no history of antepartum diabetes or eclampsia, or any other peripartum complications. The baby was delivered in a nursing home and referred to our center for neonatal care. A neurosonogram was requested on day 8 of admission to look for evidence of hypoxic–ischemic encephalopathy. Clinically, the baby was active, tolerating feeds well with adequate urine output. Neurological examination was unremarkable with no history of seizures. Family history was significant for partial callosal agenesis in the mother which was documented on a magnetic resonance imaging (MRI) scan done in her childhood, who otherwise had no neurological deficits.

Transcranial ultrasound revealed parallel orientation of disproportionately dilated occipital horns of lateral ventricle [Figure 1] with narrowed, elongated frontal horns, a high riding third ventricle [Figure 2] on coronal images. Midsagittal sections demonstrated perpendicular orientation of sulci [Figure 3] with absent pericallosal artery [Figure 4]. There was no evidence of periventricular flare, caudothalamic groove hemorrhage, or intraventricular hemorrhage.

Interpretation

This is a case of a newborn with complete corpus callosum agenesis with no other evident anomaly on ultrasound. Screening abdominal ultrasound and echocardiogram were also unremarkable.

On neurosonogram, we can appreciate the classical findings of corpus callosum agenesis: colpocephaly [Figure 1] or teardrop appearance of disproportionately dilated and parallel occipital horns of the lateral ventricle.[1,2] On the coronal image, anteriorly, the frontal horns appear elongated and narrow with a prominent, a high riding third ventricle in between [Figure 2]. The falx can be seen reaching up to the third ventricle.[3] On the midsagittal scan, the sulci are perpendicularly oriented giving a "sun-burst'" appearance [Figure 3].[4] On color Doppler study, the pericallosal artery is missing which is a pointer for the early diagnosis of callosal agenesis [Figure 4].

Discussion

Complete corpus callosum agenesis is uncommon with complete agenesis being rarer. Corpus callosum is one of the main commissural pathways for the communication of information between the two cerebral hemispheres. The development of corpus callosum begins from the genu with the body, isthmus, and splenium forming at a later stage in the same order with the rostrum being the last part to develop. It attains its final shape by 18–20 weeks of gestation and continues to enlarge up till later gestation.[3,5]

Callosal abnormalities range from complete agenesis to hypoplasia or aplasia with agenesis being either complete or partial, isolated, or associated with other anomalies. The normal corpus callosum is seen on ultrasound as a thin anechoic (antenatal scan) or hypoechoic (neonatal scan) space bounded both superiorly and inferiorly by thin echogenic lines with the pericallosal artery outlining it. The use of 3D and 4D ultrasound add to the diagnostic confidence.[6]

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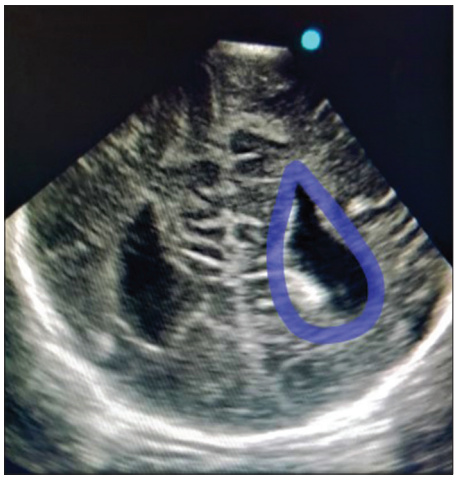

Figure 1: Coronal grayscale image depicting the teardrop appearance of parallelly oriented, disproportionately dilated occipital horns of lateral ventricles

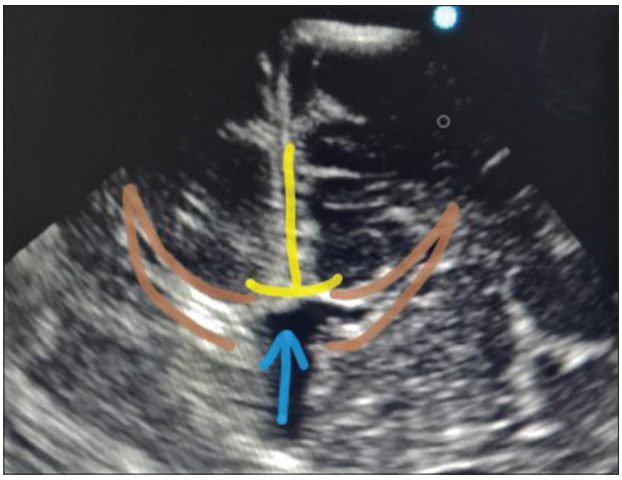

Figure 2: Viking horn appearance of elongated and narrowed frontal horns (brown outline) with high riding third ventricle (blue arrow) and interhemispheric fissure reaching up to the roof of the third ventricle (yellow outline) as seen on coronal grey-scale image

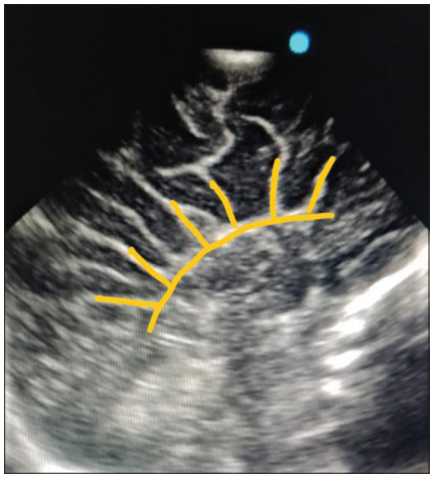

Figure 3: Sunburst pattern of the arrangement of sulci (orange outline) on midsagittal grayscale image

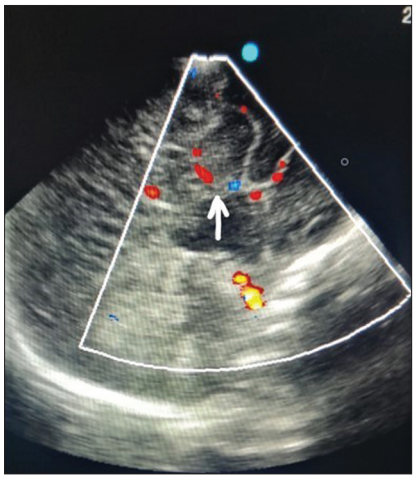

Figure 4: Absent pericallosal artery (white arrow) on color Doppler study

Isolated corpus callosum agenesis is rare and is less commonly associated with neurodevelopment disorders. It tends to have a better prognosis than callosal agenesis with syndromic associations. Neurodevelopmental outcomes tend to be normal in up to 70% of cases with isolated callosal agenesis.[7]

Sonographic diagnosis of callosal agenesis is possible, reliable, and helps in genetic counseling of parents. MRI is required to rule out any associated abnormalities before labeling callosal agenesis to be "isolated." It is important to be aware about the typical findings of corpus callosal agenesis as seen in this case for timely diagnosis and appropriate management.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given consent for the images and other clinical information to be reported in the journal. The legal guardian understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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