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Prenatal detection of partial agenesis of the corpus callosum revealed by the “tear drop sign”: A case report

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Abstract

Introduction: Partial agenesis of the corpus callosum (ACC) is a rare congenital brain malformation that may remain undetected without detailed prenatal neuroimaging. The “tear drop sign” is a subtle indirect sonographic marker that can raise suspicion for callosal anomalies, even in the absence of other structural abnormalities.

Methods: A routine second-trimester obstetric ultrasound was performed on a 28-year-old pregnant woman at 23 weeks of gestation. The fetal brain showed an unusual configuration of the lateral ventricles, notably a tear drop appearance, prompting further evaluation with targeted neurosonography and color Doppler imaging.

Results: Neurosonographic assessment revealed absence of the posterior body and splenium of the corpus callosum, consistent with partial agenesis. Color Doppler imaging demonstrated an abnormal course of the pericallosal artery, reinforcing the diagnosis. No other intracranial or extracranial anomalies were identified.

Discussion: The tear drop sign represents posterior elongation of the lateral ventricles and is often associated with agenesis of the corpus callosum. In this case, it was the only prenatal clue leading to the diagnosis of partial ACC. Accurate identification of such indirect markers is essential in guiding further imaging, genetic evaluation, and perinatal counseling.

Conclusion: This case highlights the clinical importance of the tear drop sign as a subtle but valuable prenatal marker of partial ACC. Recognizing such signs during routine ultrasound can lead to early diagnosis, timely intervention, and informed parental counseling—even in cases without additional structural abnormalities.

Keywords: Partial agenesis, corpus callosum, tear drop sign, prenatal ultrasound, neurosonography, doppler imaging

Introduction

The corpus callosum is the largest commissural structure in the brain, responsible for interhemispheric communication. Agenesis of the corpus callosum (ACC) results from disruption of its normal embryological development and can be either complete or partial. While complete ACC often presents with overt ventricular and midline abnormalities, partial ACC may be more subtle and challenging to detect prenatally [1].

The “tear drop sign” is an indirect sonographic feature, typically characterized by posterior elongation and rounding of the lateral ventricles, mimicking a tear drop shape. Though often associated with complete callosal agenesis, this sign can also reveal partial forms. Its recognition during routine obstetric ultrasound should prompt further neurosonographic assessment [2].

Case Presentation

A 28-year-old woman, gravida 2 para 1, presented for a routine second-trimester ultrasound at 23 weeks of gestation. The fetus showed normal biometry and no extracranial malformations. However, on axial views of the fetal brain, a subtle alteration in the configuration of the lateral ventricles was noted. Specifically, the occipital horns appeared rounded and posteriorly displaced, creating a “tear drop” appearance.



Fig 1: Ultrasound image showing the “tear drop sign”

Suspicion of a callosal anomaly led to a targeted neurosonographic examination. The mid-sagittal view demonstrated absence of the posterior portion of the corpus callosum, including the posterior body and splenium, while the rostrum and genu were present. The cavum septi pellucidi was visualized, but narrowed.

Color Doppler imaging revealed an abnormal course of the pericallosal artery, which failed to follow the typical curved contour along the corpus callosum. This further supported the diagnosis of partial agenesis of the corpus callosum.



Fig 2: Doppler ultrasound demonstrating the absence of normal pericallosal artery flow pattern, suggestive of callosal agenesis

Fetal growth was within normal limits, and no other brain or systemic abnormalities were detected. Genetic counseling and fetal MRI were recommended for further evaluation and to assess for potential syndromic associations.

Discussion

The tear drop sign is a subtle but important prenatal sonographic marker associated with midline brain anomalies, particularly agenesis of the corpus callosum (ACC). This sign arises from the elongation and inferior displacement of the lateral ventricles due to the absence of callosal fibers, which normally provide structural support [1, 2]. While it is more commonly reported in complete ACC, its presence in partial ACC, as seen in this case, underscores its diagnostic utility even in less severe forms [3].

Partial agenesis of the corpus callosum (pACC) involves the variable absence of callosal segments, most frequently affecting the splenium and posterior body [4]. Unlike complete ACC, the

retention of some callosal fibers in pACC may result in less pronounced ventricular abnormalities, making prenatal detection more challenging [5]. Mid-sagittal imaging is crucial for visualizing callosal remnants, while Doppler evaluation of the pericallosal artery (PCA) can further support the diagnosis. An absent or aberrant PCA trajectory is highly suggestive of callosal dysgenesis, as the PCA typically follows the course of the corpus callosum [6, 7].

The prognosis of pACC varies significantly depending on whether the condition is isolated or syndromic. In isolated cases, neurodevelopmental outcomes may be normal or only mildly impaired, with some individuals exhibiting subtle cognitive or behavioral deficits [8, 9]. However, given the high association of ACC with additional CNS malformations (e.g., cortical migrational defects, interhemispheric cysts) and genetic syndromes (e.g., Aicardi syndrome, ARID1B mutations), comprehensive evaluation with fetal MRI and genetic testing (karyotype, chromosomal microarray, or exome sequencing) is strongly recommended [10, 11].

Conclusion

This case highlights the diagnostic value of the tear drop sign in the prenatal identification of partial agenesis of the corpus callosum. Even in the absence of other sonographic abnormalities, subtle indirect signs such as the tear drop appearance should raise suspicion and prompt further targeted imaging. Early detection allows for appropriate counseling, further investigations, and multidisciplinary planning for postnatal care.

Consent for publication

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Availability of supporting data

Not applicable.

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Ethical approval

Not applicable. Our institution requires no ethical approval for case reports.

Competing interests

All authors declare that they have no conflicts of interest.

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