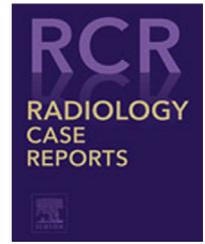


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Case report

MRI imaging of prenatal-postnatal brain malformations [☆]

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ABSTRACT

A fetus with suspicion for holoprosencephaly and various brain malformations were seen on ultrasound and sent for magnetic resonance imaging (MRI). Immediately after the birth of the female patient ultrasound and MRI was made which confirmed lobar holoprosencephaly. Fetal MRI stands out as a powerful diagnostic tool for detecting anomalies and other disorders. By developing new sequences and raising image quality will enable visualization of small details.

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Introduction

Brain malformations are the most common cause for termination of pregnancy because of a poor long-term outcome [1]. They appear in 2-3 out of 1000 pregnancies [2]. There is an extensive span of pathoneurological changes that can occur of which many are associated with morbidity. Previous studies have shown that prenatal ultrasound is essential in distinguishing congenital anomalies with an im-

mense rate of accuracy for brain anomalies of almost 75%-80% [3–5]. Due to recent technology development of ultra-fast MRI sequences, fetal MRI has become more accessible. It is described that the accuracy of the fetal brain ultrasound reports can be improved up to 16% by using MRI [6,7].

In this case report, we present various fetal brain malformations that were confirmed on postpartum brain MRI and showing an accuracy of MRI in diagnosing different brain conditions.

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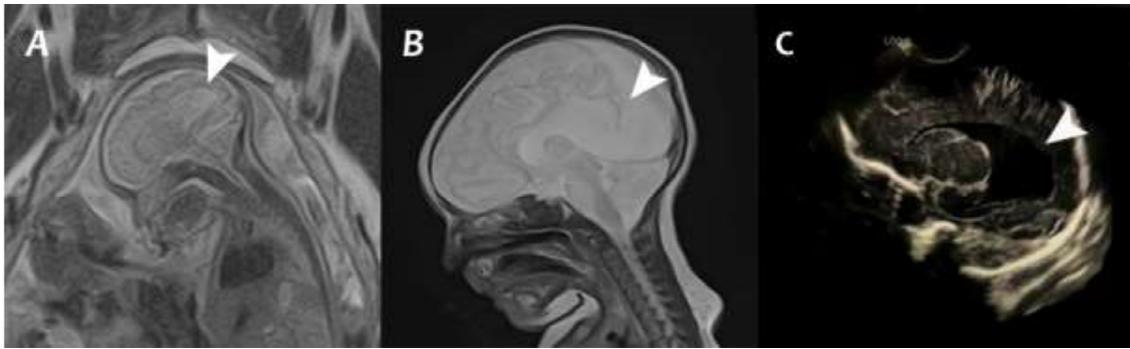


Fig. 1 – White arrow showing dysgenesis of corpus callosum, agenesis of septum pellucidum as well as an absence of occipital lobes due to extensive fusion of occipital horns of lateral ventricles on foetal (A) and postpartum MRI (B), and Ultrasound (C).

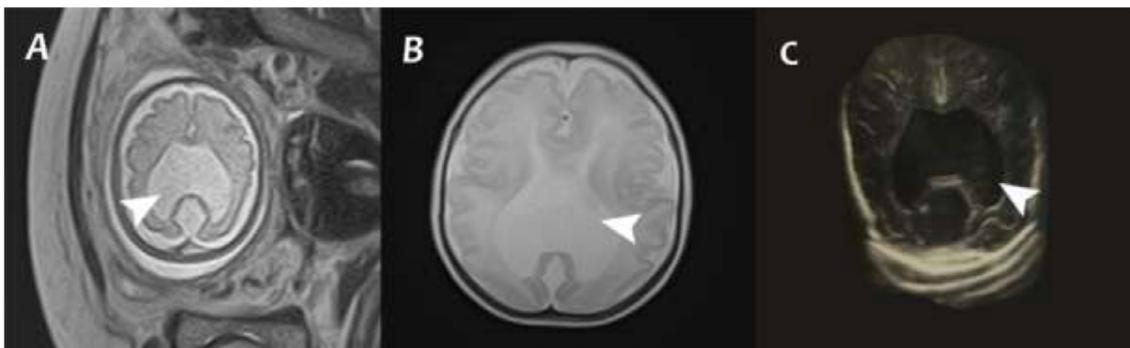


Fig. 2 – White arrow showing a mild variant of lobar holoprosencephaly and septo-optic dysplasia on foetal (A) and postpartum MRI (B) and Ultrasound (C).

Case report

A 34-year-old woman was referred to the Department of Radiology, Clinical Center of the University of Sarajevo, for fetal MRI examination after ultrasound examination suggestive for holoprosencephaly at 28 weeks of pregnancy. Fetal brain MRI has been performed with a standard protocol with the use of tri-planar single-shot fast spin-echo (SSFSE) T2-weighted imaging. Acquired MRI images had confirmed referral diagnosis and additionally showed dysgenesis corpus callosum, agenesis of septum pellucidum as well as an absence of occipital lobes due to extensive fusion of occipital horns of lateral ventricles (Fig. 1).

At the 33rd week of pregnancy spontaneous delivery had occurred and premature born baby did not require any resuscitation measures. Immediately after delivery, a baby was transferred to a neonatal intensive care unit. After performing an ultrasound of the brain the indication for MRI examination has been set. Performed postpartum MRI scans confirmed agenesis of septum pellucidum. The corpus callosum was detected only in its ventral part which proved dysgenesis. In the supratentorial region, a fusion of third and lateral ventricles was found. All abnormalities were indicative for the diagnosis of a mild variant of lobar holoprosencephaly and septo-optic

dysplasia (Fig. 2). After a few months in intensive care unit patient died due to heart failure.

Discussion

This case report emphasizes the value of fetal MRI in pregnancies regarding brain anomalies and other disorders. Holoprosencephaly is not lethal as in generally thought. More than 50% affected children with lobar holoprosencephaly experience age where they walked with assistance and spoke single words [8]. Initial postpartum MRI confirmed all fetal MRI diagnoses. One of the crucial advantages of fetal MRI in comparison with postpartum is the fact that fetal sedation or transport is not required. It is necessary to mention that motion artifacts from fetal movements can be minimized with the use of ultrafast MRI imaging techniques of less than 1 second per image [9]. In this case report, we tried to answer whether fetal MRI is sufficient to replace early postpartum MRI in terms of image quality comparability and could brain anomalies be altered by the birth. All anatomical details and structures can be analyzed even if there are no standard MRI sequences suitable for prenatal imaging due to the duration of their time of acquisition. Because there is no use of ionizing radiation and

no clear evidence of disadvantages, MRI is considered an appropriate imaging modality during the pregnancy [10]. With gestational age diagnostic accuracy of MRI increases [11]. Additional analysis is needed to investigate when fetal MRI fails to bring sufficient information about anatomy and diagnosis.

Information regarding brain development is mandatory for analysis of fetal brain and early postnatal MRI, primarily in preterm newborn infants. Several MRI studies concerning the development of the cortical surface during the last trimester of gestation examined fetuses and newborn infants soon after birth [12–14]. These understandings have led to constant growth in diagnostic accuracy. With the introduction of 3-dimensional MRI in fetal brain imaging, there is a clear depiction of all anatomic structures either in sense of their morphology or in terms of their inter-relation [15].

The use of fetal MRI has shown a steady rise in sense of its support to the prognosis of neurological conditions. Still, the problem with spatial resolution while performing fetal MRI is present, although postnatal MRI is also affected by the same problem to some extent. Nevertheless, those images had a lower spatial resolution in comparison to those produced at postpartum MRI.

Conclusion

The clear benefit of postpartum MRI imaging is that a baby has already been born and is not a small fetus in a mother's body. This enhances image quality and provides an opportunity to visualize small, details of anatomy, as well as pathological lesions. In most presented cases, including the one presented by us, there was no clear additional advantage of postpartum MRI in comparison to fetal MRI imaging. Those small advantages are displayed, in details that required the administration of contrast agents. MRI should be considered to be a safe and reliable method for visualization of fetal brain malformation and is shown to help establish a final diagnosis, treatment and prognosis.

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