

Prenatal Magnetic Resonance imaging of normal pituitary stalk

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Introduction

Congenital hypopituitarism can result in severe and unpredictable neonatal hypoglycaemic encephalopathy; moreover, early detection of pituitary dysfunction (in particular of growth hormone deficiency) may prompt early hormonal therapy after birth. Pituitary congenital dysfunction can be associated with anomalies as pituitary stalk (PS) interruption or absence (with frequently ectopic neurohypophysis). Imaging data about fetal PS are substantially lacking. Since direct analysis of the neurohypophysis by mean of high resolution T1-weighted imaging is not feasible in prenatal magnetic resonance (MR) imaging, we focused on the visualization of normal fetal PS using single-shot fast spin-echo (ss-FSE) T2-weighted images, aiming at two main goals: 1) To establish the detection rate of fetal PS at different gestational ages (GA); 2) To assess pituitary region normal anatomical changes during pregnancy progression.

Methods

Among about 800 hundred fetal MR imaging studies, performed at our Institution between 2000 and 2006, we retrospectively selected 73 fetal cases with the following characteristics: studies performed for suspected body lesions or brain malformations detected in previous pregnancies, normal brain resulting from prenatal MR imaging report, normal postnatal ultrasound or MR imaging examination. The GA ranged between 19 and 37 weeks. MR imaging studies were performed at 1.5 T, using surface abdominal coils. The scanning technique was based on multiplanar ss-FSE T2-weighted 4 mm thick images (TR/TE = 3000/180 ms, fov = 320 mm, matrix = 256 x 256). Coronal sections were positioned orthogonal to axial ones, which had been acquired parallel to the subcallosal plane. The PS was considered present when a linear isointense structure connecting the hypothalamic region with the floor of sella turcica was visible at least on a coronal or a sagittal section (figure 1).

Results

From 19 to 25 week GA, the PS was detectable in 30/42 cases (71.4%); from the 26 week on, the PS was detected in all 31 cases (100%). In the 39 cases (21 – 37 weeks GA), in which the PS was visible on the sagittal sections, the angle formed by the intersection of the PS and the sellar plane (SP) was measured (PS-SF angle) (figure 2). The PS-SP angle decreased significantly with GA, being below 90° in all cases after the 25 week of gestation (figure 3).

Conclusions

At current spatial resolution of clinical prenatal MR imaging the PS can be reliably detected after the 25 weeks GA, so in case of missing visualization, the strong suspicion of pituitary region anomaly could be raised. The PS-SP angle changes with GA could be explained by brain / skull base differences in relative growth. It remains to be evaluated if aberrant PS-SP angle values may help in identifying and better characterizing more general congenital brain anomalies in utero.

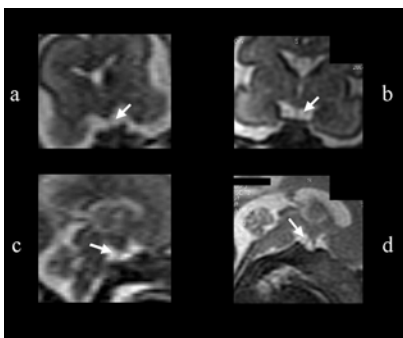


Figure 1
a, c) coronal and sagittal sections from 23 weeks fetus showing the PS (arrows).
b, d) 27 weeks GA example.

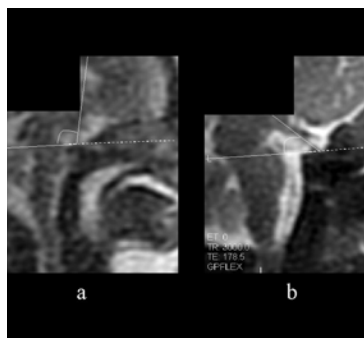


Figure 2
Sagittal sections from 21(a) and 37 (b) weeks GA fetuses showing PS-SP angle measurement

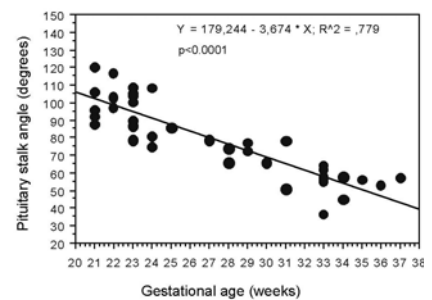


Figure 3
Graph of PS-SP angle changes with GA.