The fetal cerebral aqueduct 2D measurements: improving diagnosis and counselling in cases of aqueductal stenosis

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Objective
Aqueductal stenosis (AS) is a frequent cause of prenatal severe ventriculomegaly and should be identified in the fetus once its outcome is better than ventricular dilation due to developmental or destructive anomalies. To date, AS is diagnosed by indirect sonographic findings. The aim of this study is to describe the technique for direct visualization and measurement of the cerebral aqueduct and to document its normal size range throughout gestation. We also show a series of cases of fetuses affected by AS.

Methods
This was a cross-sectional study of 207 morphologically normal fetuses in low-risk pregnancies undergoing routine ultrasound examination at 20–36 weeks gestation. Cerebral aqueduct was visualized transvaginally in a midsagittal plane and was seen as a tubular sonolucent structure that passes through the posterior inferior recess of the third ventricle, lying ventral to the midbrain tectum. A clip was stored digitally at this level. Measurements of the greatest diameter of the aqueduct (ampulla) were then taken independently in the US system (Voluson E10, 6-12 MHZ vaginal probe) by an expert and non-expert sonographer. These were compared to the aspect of aqueduct in fetuses affected by AS.

Results
Aqueductal measurements were obtained in 206 of 207 normal fetuses. Aqueductal growth occurred linearly with gestational age. Our method demonstrated good intraobserver repeatability and excellent interobserver reproducibility. Among the seven fetuses with AS, the aqueductal lumen could not be identified in six of them and had a funnelling aspect in one patient.

Conclusion
Our study demonstrates that it is possible to visualize and measure the cerebral aqueduct directly through a 2D ultrasound midsagittal plane. In fetuses with severe ventriculomegaly, the morphology and width of this structure could represent a relevant tool in improving AS diagnosis.