

Subarachnoid space measurements in fetuses using magnetic resonance imaging

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Objective

The fetal subarachnoid space (SAS) size serves as an indicator for normal brain development. SAS is commonly measured by an ultrasound examination. Introduction of magnetic resonance imaging (MRI) for fetal brain evaluation enables standardization of MRI-driven SAS parameters for a more accurate evaluation. This study aimed to determine the normal range of MRI-derived SAS size in fetuses according to gestational age (GA).

Methods

Cross-sectional study based on retrospective assessment of randomly selected apparently normal fetal brain-MRI scans performed between 2012 and 2020 at one tertiary large medical center was performed. Demographic data was collected from mothers' medical records. SAS size was measured at 10 reference points using axial and coronal planes. Only MRI scans performed between weeks 28 to 37 of pregnancy were included. Scans with low quality images, multiple pregnancy and cases with intra-cranial pathological finding were excluded.

Results

Overall, 214 apparently normal fetuses were included (mean maternal age was 31.2 years, SD 5.4). Good inter-observer and intra-observer agreements were observed (intraclass correlation coefficient > 0.75 for all but one parameters). For each gestational week, the 3rd, 15th, 50th, 85th and 97th percentiles of each SAS measurement were described.

Conclusion

MRI-derived SAS values at specific GA provide reproducible measurements probably due to the MRI's high resolution and adherence to the true radiological planes. Normal values for brain MRI could provide a valuable reference information for assessing brain development thus being an important tool in decision-making process of both clinicians and parents.