

# The sonoanatomy of the posterior fossa from 11+3 to 13+6 weeks of pregnancy and the single line sign as marker for spina bifida



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## Objective

Technical improvements in sonography made it possible to visualize structures, which up to now have been assessed at the 20-weeks scan, already in the first trimester scan.

The aim of this study was to describe the sonoanatomy of the posterior fossa in the first trimester of pregnancy and to estimate the possible impact on the diagnosis of fetal diseases.

## Methods

Between May 2008 and August 2009 we examined 693 fetuses between 11+3 and 13+6 weeks of pregnancy at the University Hospital Innsbruck, Austria. The fourth ventricle, the cisterna magna and the early developing cerebellum were insonated from anterior through the anterior fontanelle.

The anterior-posterior diameter of the fourth ventricle (4V), the outer distance of the developing cerebellar hemispheres (TCD) and the anterior-posterior diameter of the cisterna magna (CM) were measured.

## Results

The anterior and posterior borders of the fourth ventricle appear as two transverse echogenic lines. The developing cerebellum forms the lateral and partly the posterior border of the fourth ventricle. The roof of the fourth ventricle and the os occipitale form the anterior and posterior borders of the cisterna magna.

There is a linear correlation between gestational age and the anterior-posterior diameter of the cisterna magna ( $CM = 0.627 \times GA - 5.83$ ), between gestational age and the outer borders of the developing cerebellum ( $TCD = 1.751 \times GA - 13.53$ ) and between the gestational age and the anterior-posterior diameter of the fourth ventricle ( $4V = 0.225 \times GA - 0.735$ ).

No correlation was found between BMI and TCD, CM and 4V. In three patients with a posterior fossa cyst the measurements of the cisterna magna were significantly above the 95<sup>th</sup> centile. In the only fetus with spina bifida the fourth ventricle could not be visualized and the cisterna magna was obliterated. Through this the second dorsal transverse echogenic line disappears and only one echogenic line remains visible (single line sign).

In 6,1 % we were unable to visualize the posterior fossa due to fetal position.

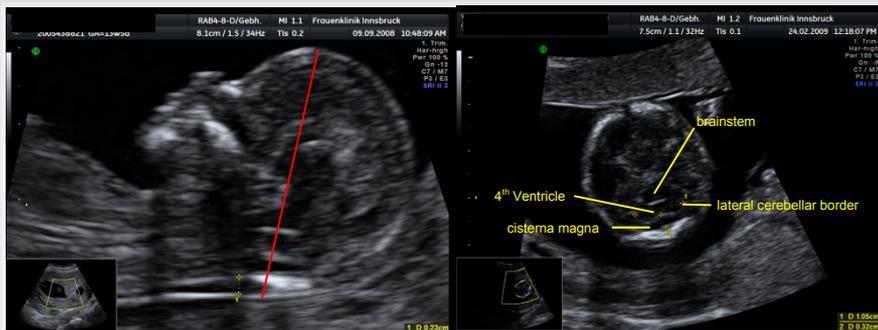


Fig. 1 and 2: Normal fetus: Mediosagittal and transverse section of the fossa posterior

## Conclusion

The sonographic visualization of the posterior fossa is possible in the majority of fetuses between 11+3 and 13+6 weeks of pregnancy.

The only spina bifida could be diagnosed with the single line sign. Despite early diagnosis of spina bifida has advantages, one should bear in mind, that it is not possible to make an accurate prognosis of the severity of the disease, which is mainly dependent on the location of the defect.



Fig 3+4: Fetus with spina bifida at 13 weeks of pregnancy. Obliterated fourth ventricle and single line sign



Fig 5: Fossa posterior cyst at 13+0 weeks

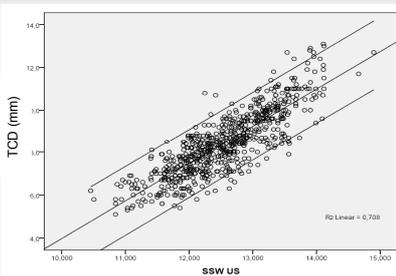


Fig 6: TCD

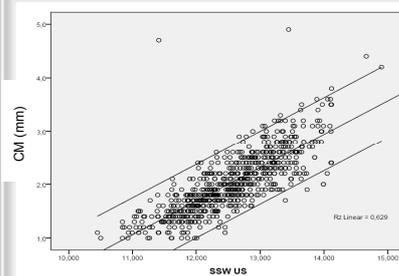


Fig 7: CM

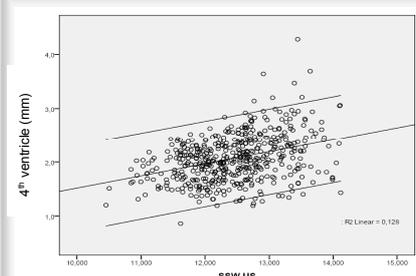


Fig 8: 4<sup>th</sup> ventricle