Short Communication

Received: January 16, 1989

Accepted: February 21, 1989

Gynecol Obstet Invest 1989;28:111-112

Ultrasonographic Measurement of the Fetal Transverse Cerebellum in utero

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Key Words

Ultrasound
Fetal cerebellar measurement
Gestational age

Abstract

Ultrasonographic examinations, done to measure the fetal transverse cerebellar diameter (FCD), were performed in 116 women with regular menstrual cycles, at 17–40 weeks of gestation. FCD correlated well with gestational age ($r = 0.96$, $p < 0.001$). The 95 % confidence interval of the linear regression was also given. FCD may be a more useful indicator of the accurate gestational age in case of dolichocephaly or brachycephaly, and facilitate antenatal detection of congenital disorders.

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Introduction

Ultrasonic visualization of the fetus facilitates monitoring of growth, and biometry has established normal values for the fetal head [1] and measurement of the long bones [2]. Although the cerebellum is located in an area of the brain that can be easily visualized by ultrasonography, little information is available on measurement of the cerebellum, in utero [3]. We have made such measurements in normal fetuses and the significance of our findings is discussed.

Patients and Methods

Ultrasonographic examinations were made on 116 pregnant Japanese subjects with regular menstrual cycles and free from complications. Permission for examination was obtained from each mother and the gestational age ranged from 17 to 40 weeks. Data related to factors or menstruation corresponded to physical events and ultrasound estimation of gestational age through measurement of biparietal diameter [1] and fetal femur length [2].

The plane at the level of the thalamus, cavum septum pellucidum and third ventricle was imaged, then the transducer was slightly rotated below the thalamic plane and the fetal cerebellum was imaged as a butterfly-like figure in the posterior fossa (fig. 1) [3].

Fig. 1. Ultrasonogram of the fetal cerebellum. Use of two electronic aids in detecting borders of diameter of the fetal transverse cerebellum.

The fetal transverse cerebellar diameter (FCD) was measured using electronic calipers. The data were computer stored and subsequently analyzed.

The ultrasonographic equipment used in this study was Aloka SSD-650 (3.5 MHz).

112

Hata/Hata/Senoh/Makihara/Aoki/Takamiya/Kitao

Fig. 2. Correlation between FCD and gestational age. The 95% confidence interval of the linear regression is shown.

Results and Discussion

A linear correlation was observed between FCD and gestational age ($r = 0.96$, $p < 0.001$; fig. 2). FCD was 21.3 mm at 20 weeks of gestation and 49.9 mm at term. The 95% confidence interval of the linear regression is also given (fig. 2).

The cerebellum develops from symmetrical thickenings of dorsal parts of the alar plates of the metencephalon. The cerebellum swellings first project as small bulges into the fourth ventricle and as these swellings enlarge and fuse in the midline, they soon overgrow the rostral half of the fourth ventricle and overlap the pons and medulla by the 17th week of gestation [4]. Therefore, the fetal cerebellum can be visualized at its proper site after the 17th week of gestation.

In cases of a breech presentation, oligohydramnios, or more than one fetus, biparietal diameter often shows a small value due to distortion of the fetal head as a result of compression or crowding [5]. The cerebellum lies in the posterior fossa and is surrounded laterally by a dense petrous ridge and inferiorly by the occipital bone, which is aligned perpendicular to the plane of the maximum extrinsic compression. Thus, the fetal cerebellum is fairly well protected to withstand deformation by extrinsic pressure [3]. It seems that FCD is independent of the shape of the fetal head and is a more useful indicator of the accurate gestational age in cases of dolichocephaly or brachycephaly.

Hypoplasia of the cerebellum can occur in fetuses and children with Arnold-Chiari malformation [6] or Dandy-

Walker syndrome [7]. Therefore, measurement of FCD facilitates antenatal detection of congenital disorders affecting the cerebellum.

Acknowledgement

We thank M. Ohara for pertinent comments.

References

- Nakazawa T: Studies on assessment of fetal growth by ultrasound fetal cephalometry. *Acta Obstet Gynaecol Jap* 1973;25: 873–882.
- Tsuzaki T, Iwamoto K, Maeda K: Significance in ultrasono-graphic measurements of fetal limb bones. *Acta Obstet Gynaecol Jap* 1982;34:315–320.
- McLeary RD, Kuhns LR, Barr M Jr: Ultrasonography of the fetal cerebellum. *Radiology* 1984;151:439–442.
- Moore KL: *The Developing Human*, ed 3. Philadelphia, Saunders, 1982.
- Kasby CB, Poll V: The breech head and its ultrasound significance. *Br J Obstet Gynaecol* 1982;89:106–110.
- Carmel P: Management of the Chiari malformations in childhood. *Clin Neurosurg* 1983;30:385–406.
- Dempsey PJ, Kock HJ: In utero diagnosis of the Dandy-Walker syndrome differentiation for extra-axial posterior fossa cyst. *J Clin Ultrasound* 1983;9:403–405.