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Transition of Biparietal Diameters at Antenatal and Postnatal Periods

(ultrasonics/biparietal diameter/fetal moulding)

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The antenatal ultrasonic and postnatal caliper measurements for biparietal diameters were carried out in 44 spontaneous vaginal deliveries (24 primiparas and 20 multiparas) and 12 deliveries by caesarean sections, in an attempt to assess the accuracy of ultrasonic cephalometry and recovery of the fetal moulding. Biparietal diameter determined ultrasonic measurement within 24 hours before labor was smaller than that of neonates by the caliper measurement within one hour after labor, by an average of 1.83 mm in cases of caesarean sections, and each biparietal diameter in primiparas, multiparas, and caesarean sections showed a different transition.

Campbell and Newman (1) reported the normal range of biparietal diameter (BPD) values for each week of pregnancy and the variation in growth rate during normal pregnancy. The ultrasonic measurements of BPD has been widely used to assess the fetal maturity in obstetrics (2—4). However, as data on the transition of BPDs at antenatal and postnatal periods are few, we evaluated the accuracy of ultrasonic cephalometry, and investigated the recovery of fetal moulding.

MATERIALS AND METHODS

The antenatal ultrasonic and postnatal caliper measurements for BPDs were examined in 44 spontaneous vaginal deliveries (24 primiparas and 20 multiparas) and 12 caesarean sections at Shimane Medical University Hospital. The measurements were performed by one examiner (T. H.), to minimize errors.

The antenatal ultrasonic measurement was performed in all patients within 24 hours of delivery. The ultrasonic technique enabled measurement of the maximum length from the proximal outer table to the distal inner table of the fetal scalp at the cross section where the midline-echo and lateral ventricles were seen, coinciding with the length from the midline-echo to bilateral parietal bones (Fig. 1).

The first postnatal caliper measurement was performed within one hour of

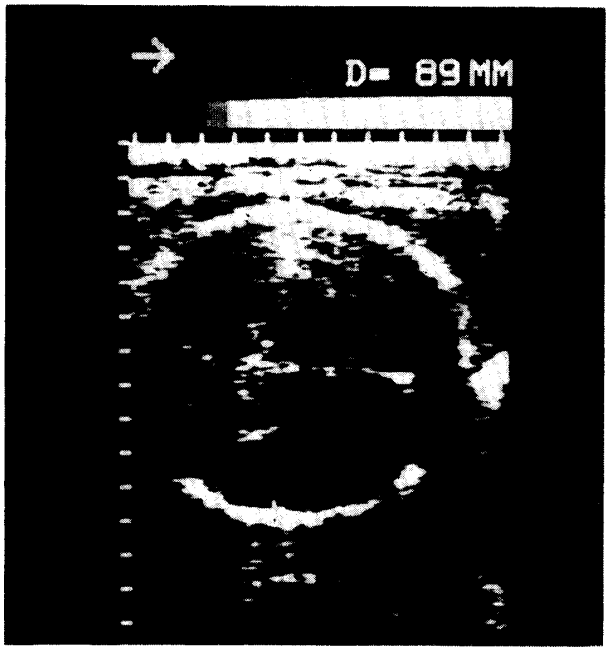


Fig. 1. Ultrasonic cephalometry at antenatal period.

delivery, and serial measurements were made from the 1st to the 5th postnatal day. The caliper technique was used to measure the maximum length between the bilateral parietal bones.

The ultrasonic equipment used was Sonovista P Model MEU 1572 with 3.5 MHz transducer.

RESULTS

First, the value of BPD within one hour of labor was made to become zero point on the graph.

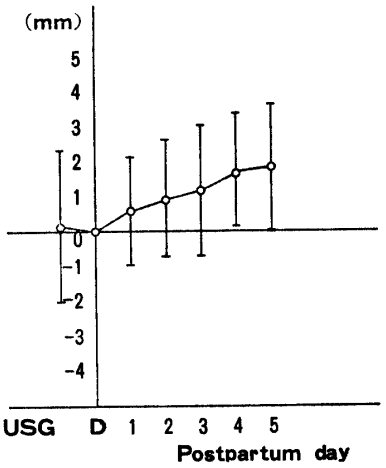
In 44 spontaneous vaginal deliveries, the mean differences were 0.18 mm at the antenatal period, 0.57 mm on the 1st postnatal day, 0.93 mm on the 2nd day, 1.16 mm on the 3rd day, 1.75 mm on the 4th day, and 1.83 mm on the 5th day (Fig. 2a).

In 24 primiparas, the mean differences were 0.9 mm in the antenatal period, 0.75 mm on the 1st postnatal day, 1.31 mm on the 2nd day, 1.54 mm on the 3rd day, 2.02 mm on the 4th day, and 2.25 mm on the 5th day (Fig. 2b).

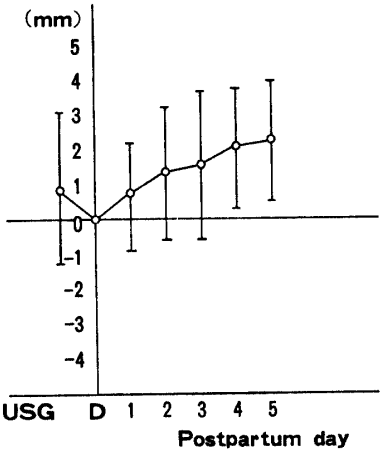
In 20 multiparas, the mean differences were −0.68 mm at the antenatal period, 0.35 mm on the 1st postnatal day, 0.48 mm on the 2nd day, 0.70 mm on the 3rd day, 1.18 mm on the 4th day, and 1.33 mm on the 5th day (Fig. 2c).

In 12 caesarean sections, the mean differences were −1.83 mm in the antenatal period, −1.33 mm on the 1st postnatal day, −1.63 mm on the 2nd day, −1.79 mm on the 3rd day, −1.17 mm on the 4th day, and −0.75 mm on the 5th day (Fig. 2d).

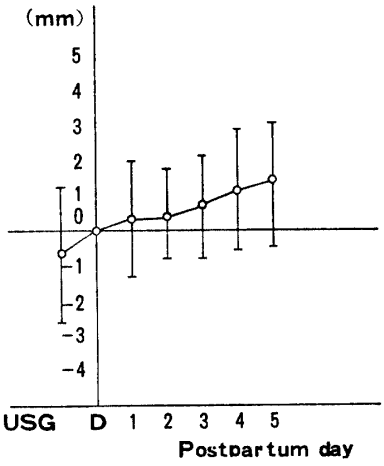
Fig. 2e shows the different transition of BPDs in the three groups.



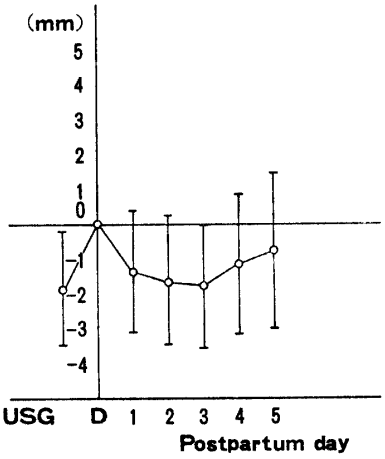
a. Normal vaginal delivery, n=44.



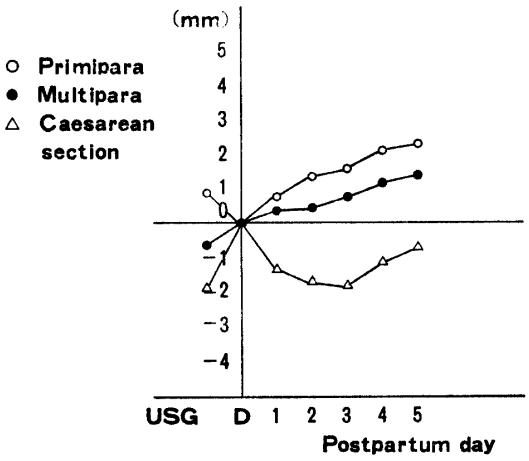
b. Normal vaginal delivery, primipara, n=24.



c. Normal vaginal delivery, multipara, n=20.



d. Cesarean section, n=12.



e. Transition of biparietal diameters in three groups.

Fig. 2. Transition of biparietal diameter in baby.
D : delivery, USG : ultrasonogram.

DISCUSSION

In ultrasonic cephalometry, the most controversial point is to what extent it differs from the true value. Durkan and Russo (5) found a discrepancy between the antenatal ultrasonic and postnatal caliper measurement of the BPD to be 0.5 cm or more in 36 per cent of their cases, and over 1 cm in 5 per cent. Hellman *et. al.* (6) reported that differences between A-, B-scans value and caliper measurements were 1.8 mm and 2.3 mm, respectively. Campbell (7—8) reported that the difference between the ultrasonic and caliper value was less than 2 mm in 94 per cent, less than 1 mm in 66 per cent, the average error between the ultrasonic and caliper measurements was 0.8 mm, the difference between the ultrasonic and caliper value was less than 2 mm in 90 per cent, less than 1 mm in 58 per cent, and the mean error was 0.9 mm in second trimester fetuses delivered at the time of hysterectomy. They used A-mode and conventional B-mode scans for ultrasonic measurements. Hughey and Sabbagha (9) used real-time imaging and found that BPDs measured from the outer to the inner cephalic points were smaller than the true BPDs of neonates by an average of 3.8 mm. Using the real-time scanner, we found the difference to 1.83 mm, on the average.

Values of ultrasonic cephalometry in primipara and multipara were quite the opposite, that is positive in primiparas, and negative in multiparas. Thus, when the real difference (1.83 mm) was added to each value, both became positive. For example, the BPD of 0.90 mm in primiparas plus 1.83 mm is 2.73 mm, and −0.68 mm in multipara plus 1.83 mm is 1.15 mm. Therefore, the corrected values of 2.73 mm in primiparas, and 1.15 mm in multiparas seem to indicate the values of BPD shortened by the function of fetal moulding. The value of 1.15 mm in primipara is significantly smaller than that of 2.73 mm in multipara ($0.01<P<0.02$). Thus, the fetal head compression during labor in primiparas is more severe than in multiparas. In multiparas, the corrected difference of 1.15 mm is in agreement with the value of 1.18 mm on the 4th postnatal day, and such may indicate that metamorphosis of the head by the moulding is roughly repaired around the 4th postnatal day. In primiparas, the corrected difference of 2.73 mm is larger than that on the 5th postnatal day, and suggests that any metamorphosis in the head by the moulding is not repaired with 5 days after the birth.

Transition of BPDs in caesarean section at the postnatal period showed various changes. It is of interest that the pattern is much like that of the physiologic loss of weight in the neonate.

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