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Dip area in fetal heart rate and its relationship to acid-base-observations of fetus and mother during labor

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The decrease in fetal heart rate which is seen occasionally in late pregnancy and especially during labor is usually related to uterine contractions. Since the fall in heart rate is associated with fetal hypoxia [2, 5] an attempt was made to use the dip area (DA) for predicting fetal condition. Dip area was related to the pH in the umbilical vein [9] and to one scalp blood sample taken after measuring DA [8]. Neither the pH in the umbilical vein gives a reliable index for fetal condition nor one scalp blood sample can indicate the changes in pH and BE which are expected during the presence of deceleration. This can only be a vague approximation describing the relationship of DA and acid base observations. Maternal P_{CO_2} and blood lactate transfer from mother to the fetus and reverse as shown by KASTENDIECK and MOLL [4] in animal experiments can influence the fetal pH and base excess. Maternal acid base observations were never studied in connection with DA. In previous experiments [3] we have already undertaken an attempt to quantify the relationship between dip area measured by planimetry and the decrease in base excess i.e. the difference in base excess of the scalp blood and the umbilical arterial blood measured during the respective time.

The present experiments are concerned with the relationship of the fall in fetal base excess and dip area during the first stage of labor and the influence of the change of maternal base excess upon fetal base excess.

The present results reveal a relationship between the dip area of fetal heart rate and the decrease in base excess for the first stage of labor which is similar to that of the second stage of labor, if the same dip-area is measured. The metabolic parameters in the maternal blood seem to influence the base excess of the fetal blood.

1 Patient material and methods

The study comprises 39 women during labor. The gestational age was 40.4 weeks (SD 1.1) and the time of labor 7.7 hours (SD 4.7). The babies were delivered 37 times by spontanous delivery and in one case a vacuum extraction and in one case a caesarean section was performed. In 35 cases the APGAR score was 8 and more, in 3 cases 7 and in one case 6. The weight of the babies was 3450 gr (SD 460) and the weight of the placenta was 530 gr (SD 123). Scalp blood was sampled and analyzed for pH, P_{CO_2} and BE as previously described by WULF, KÜNZEL and LEHMANN [10]. The pH was measured with a commercial pH-meter (RADIOMETER Copenhagen) and the SIGGAARD–ANDERSON-Nomogram (1962) was used for base-excess (BE) and P_{CO_2} determination. Blood was collected simultanously from the hyperemized earlobe of the mother using FINALGON® and analyzed for the same parameters. In both no attempt could be made to correct the BE values according to the actual oxygen saturation because no oxygen