Intra-uterine Temperature Measurements during Fetal Tachycardia

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SUMMARY

Intra-uterine and oral temperatures were recorded in 23 patients with fetal tachycardia during labour, as well as in 22 patients without fetal tachycardia. In the tachycardia group, the mean intra-uterine temperature was 38,83°C, against 37,44°C in the control group. The oral temperatures were 38,05°C and 36,98°C respectively. Furthermore, a high incidence of neonatal infections occurred in the tachycardia group — 11 against 1 in the control group. To distinguish infection from other causes of fetal tachycardia, intra-uterine temperature measurements could be applied as a diagnostic aid.

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Intra-uterine infection during labour remains an important cause of maternal and neonatal morbidity and even mortality. Early diagnosis is therefore crucial in treating these patients. However, the usual clinical signs of maternal pyrexia and tachycardia, foul discharge and lower abdominal tenderness are relatively late signs. Beard *et al.*[1] described the association between fetal tachycardia and intra-uterine infection. A local rise in temperature is one of the classic signs of acute infection. This study was done to investigate the possibility that intra-uterine temperature measurements could be used as a diagnostic aid in the early diagnosis of intra-uterine infection.

PATIENTS, MATERIAL AND METHODS

Twenty-three patients with fetal tachycardia during the first stage of labour were studied. The criterion for fetal tachycardia was a fetal heart rate of more than 160 beats per minute for more than 20 minutes. In addition, 22 patients without fetal tachycardia were studied as a control group.

Temperature was measured aseptically with a Braun temperature recorder by inserting the probe transcervically into the uterus. No technical problems were encountered. The apparatus was regularly calibrated against an ordinary mercury thermometer in a hot water bath to ensure accuracy.

After parturition, the mothers and newborns were observed for signs and symptoms of infection.

RESULTS

The mean age, gravidity and duration of pregnancy in the two groups did not differ significantly. In the study group, the mean maternal age was 24,6 years, the gravidity

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2,1 and the duration of pregnancy 39,4 weeks. In the control group the mean figures were 23,2 years, 2,1 and 39,6 weeks respectively.

During the first stage of labour, before the temperature measurements, a mean of 3,6 vaginal examinations were done in the study group, against 2,5 in the control group ($P<0,05$). At the time of the temperature measurements, the mean duration of rupture of the membranes in the study group was 17,1 hours, against 5,5 hours in the control group ($P<0,01$). The mean cervical dilatation was 4,4 cm in the study group and 3,9 cm in the control group.
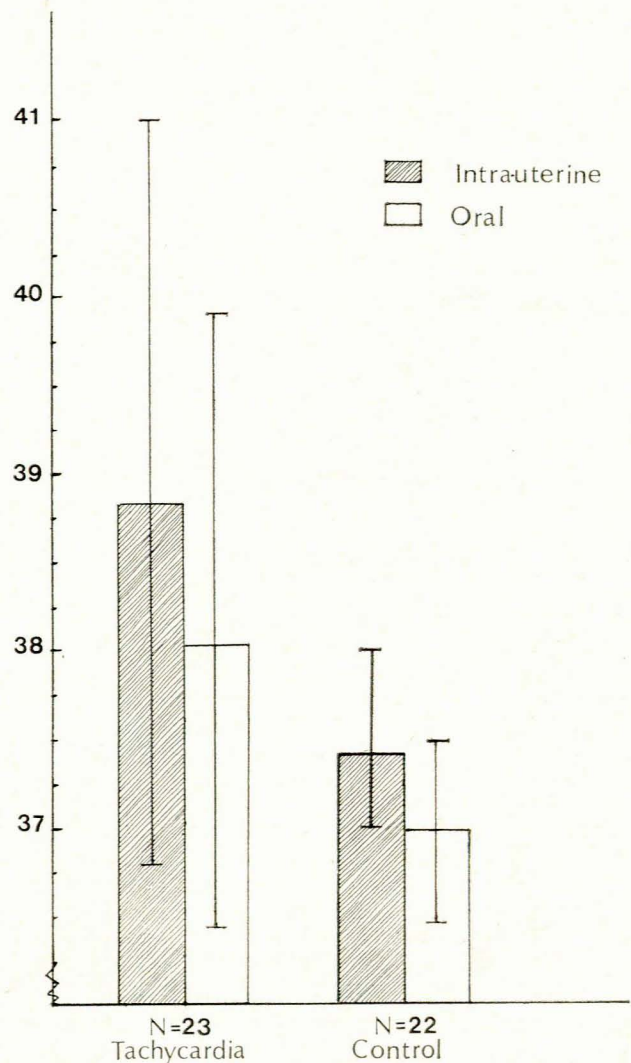

Fig. 1. Intra-uterine and oral temperatures.

In the study group the mean oral temperature was 38,05°C, against 36,98°C in the control group. The mean intra-uterine temperature in the study group was 38,83°C, against 37,44°C in the control group. All these differences were statistically highly significant ($P<0,001$). The differences between intra-uterine and oral temperatures in each group were significant ($P<0,01$) — 0,77°C in the study group and 0,46°C in the control group. These differences also differed significantly from each other ($P<0,01$) (Fig. 1).

The only fetal heart pattern that differed significantly in the two groups was the loss in beat-to-beat variation ($P<0,05$); this occurred in 10 patients in the study group and in 1 patient in the control group. There were 5 patients with meconium in the amniotic fluid in the study group and 3 in the control group.

There were significantly more abnormal deliveries in the study group, namely 19 as against 11 in the control group ($P<0,05$). Five mothers in the study group and none in the control group developed postpartum infections. These infections included 2 cases of postoperative wound sepsis, 2 of septic episiotomy and 1 of puerperal sepsis.

The 1-, 5- and 10-minute Apgar scores were slightly lower in the study group (7,7, 8,9 and 9,6), but did not differ significantly from those in the control group (8,6, 9,6 and 9,8). Neither was there a significant difference in mean birth weight in the two groups.

The only significant difference in the two groups of infants was the incidence of neonatal infections ($P<0,01$) — 11 in the study group and 1 in the control group. In the study group, the infections included 5 cases of pneumonia, 3 of impetigo and 1 each of umbilical infection, tachypnoea (?pneumonia) and aspiration pneumonia. In the control group the single infective case was a patient who developed gastro-enteritis on day 12.

Two cases in the study group need to be discussed in more detail.

Case 1 — Rise in Intra-uterine Temperature before the Onset of Fetal Tachycardia and Maternal Pyrexia

Membranes were artificially ruptured in an 18-year-old primigravida during the first stage of labour with the cervix 6 cm dilated. Immediately thereafter, the intra-uterine temperature was 37,7°C and the oral temperature 36,8°C. At that stage the fetal heart demonstrated a baseline rate of 140 beats/min, with a few small variable decelerations. After 10 hours fetal tachycardia was noted, followed by maternal pyrexia. Six hours later cephalopelvic disproportion was diagnosed and the fetal heart rate was 200 - 230/min, with a loss in beat-to-beat variation. The intra-uterine temperature was 41,0°C and the oral temperature 39,8°C. A lower segment caesarean section was done and a female infant weighing 3 230 g, with an Apgar score of 6, 10 and 10 at 1, 5 and 10 minutes respectively, was delivered. After 24 hours the baby died from a massive pulmonary haemorrhage secondary to neonatal pneumonia. The mother developed postoperative wound sepsis.

Case 2 — Fetal Tachycardia Associated with Fetal Distress and a Normal Intra-uterine Temperature

Membranes were artificially ruptured in a 19-year-old primigravida during the first stage of labour with the cervix 3 cm dilated. Immediately thereafter the intra-uterine temperature was 36,83°C and the oral temperature 36,80°C. The fetal heart pattern was normal with a baseline of 140 beats/min. Six hours later fetal tachycardia (165 - 170/min) with variable decelerations and a good beat-to-beat variation were noted. The intra-uterine temperature was 36,8°C and the oral temperature 36,5°C. The maternal pH was 7,42 and the fetal scalp pH 7,25. A lower segment caesarean section was performed. A male infant of 2 700 g, with an Apgar score of 4, 6 and 10 at 1, 5 and 10 minutes respectively, was delivered. The postoperative course of the mother was normal, but the baby developed mild umbilical sepsis.

DISCUSSION

In a normal pregnancy the fetal, intra-amniotic and placental temperatures are practically the same, with the surrounding maternal tissue temperature 0,45 - 0,55°C lower.[2] The mean oral temperature in the control group of this study was 36,98°C with the intra-uterine temperature 0,46°C higher. Wood and Beard[3] found the normal intra-uterine temperature in pregnancy to be 37,2°C and the rectal temperature 36,7°C, but their series only comprised 8 patients.

The mean oral temperature in the tachycardia group was 38,05°C, with the intra-uterine temperature 0,77°C higher. In 27 patients, some of whom presented with fetal tachycardia, Walker et al.[2] found a fetal temperature of 38,10°C and a rectal temperature 0,55°C lower. Some of their cases of fetal tachycardia were associated with an elevated fetal temperature and maternal pyrexia. One case (No. 498) was described in which the rise in fetal temperature was followed by fetal tachycardia and maternal pyrexia. In another case (No. 570) the maternal temperature rose from 36,8° to 39,6°C, associated with a rise in fetal temperature from 38,46° to 39,75°C, with fetal tachycardia. These observations correlate with findings in this study (case 1), in that the rise in intra-uterine temperature preceded the onset of fetal tachycardia in some cases.

In this study the association between fetal tachycardia and elevated intra-uterine temperatures was conclusively demonstrated. However, there were cases of fetal tachycardia with normal intra-uterine and oral temperatures. In patients in whom neonatal infections developed, the intra-uterine temperatures were significantly higher in comparison with the other cases of fetal tachycardia ($P<0,05$).

Other factors associated with fetal tachycardia were prolonged rupture of membranes, maternal pyrexia, abnormal deliveries and neonatal morbidity. Repeated vaginal examinations and a loss in beat-to-beat variation were also associated with fetal tachycardia. Odendaal and Crawford[4] previously described the association between fetal tachycardia, maternal pyrexia and prolonged rupture of membranes. Underlying cephalopelvic disproportion was a potential aetiological factor. In this study there were

13 caesarean sections in the study group. Twelve of these were performed for prolonged labour or disproportion. In the control group 4 of the 6 caesarean sections were associated with these indications. Furthermore, the mean birth weights were lower than those described by Odendaal and Crawford.[4] A possible explanation is that the two studies were done in different population groups.

The conclusion drawn from this study is that a highly significant elevation in intra-uterine temperature occurs in cases of fetal tachycardia associated with intra-uterine infection. Intra-uterine temperature measurements could be applied as a diagnostic aid to distinguish infection from other causes of fetal tachycardia. Owing to the high neonatal morbidity and even mortality, as well as maternal postpartum morbidity, the early diagnosis of intra-uterine infection is mandatory. The fetus should be delivered as soon as the diagnosis has been made and the paediatrician informed beforehand. Antibiotics should be administered to both mother and newborn. Although this has not been well documented yet, it seems as if there is a rise in intra-uterine temperature before the onset of fetal tachycardia and maternal pyrexia in cases of intra-uterine infection.

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Colposcopy and Selective Biopsy in Patients with Abnormal Cervical Cytology

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SUMMARY

Patients with atypical or positive findings on cervical cytology should be referred to a special colposcopy clinic as the next step in investigation. Colposcopy complements cytology, and when combined with selective biopsy of the worst-affected area allows a high level of diagnostic accuracy (90,7%). The necessity for diagnostic conization with its risks is markedly reduced. When all three modalities were used in combination, only 0,7% of invasive cancers were missed.

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Colposcopy was first introduced by Hinselman[1] in 1925 and was soon advocated as a primary method of early cancer detection. This technique has since gained widespread acceptance in Europe,[2] but until recently has not enjoyed a similar reputation in the UK or the USA.[3] With improved technology and photographic equipment, and a better understanding of the role of colposcopy in the diagnosis of pre-invasive disease of the cervix, renewed interest has been shown over the last decade.[4]

Cervical cytology remains the best screening method for premalignant disease of the cervix. However, the increasing use of colposcopy as an adjuvant to cytology, and not as a competitor, is confirmed in this study, as it has been by others.[2-6]

Selective biopsy is an integral part of colposcopic examination, allowing the worst-affected areas to be sampled and sent for histological examination. The sample can be examined by conventional light microscopy, by electron microscopy, or by scanning electron microscopy.[7,8] It must be emphasized that cytological examination is a laboratory technique, whereas colposcopy is a clinical method, and each evaluates a different aspect of neoplasia.[4]