

# Unnecessary emergency Caesarean section due to silent CTG during anaesthesia?

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We present a case of a probably unnecessary Caesarean section due to misinterpretation of the cardiotocography (CTG) trace during general anaesthesia. A 27-yr-old patient in her 30th week of an uneventful, normal first pregnancy presented with a deep venous thrombosis in the pelvic region. She was to undergo an emergency thrombectomy under general anaesthesia. During the operation, the CTG showed a lack of beat-to-beat heart rate variation (silent pattern CTG) with normal fetal heart rate. This silent CTG pattern was probably a result of the effect of general anaesthesia on the fetus. The CTG pattern was interpreted as indicating fetal distress, and an emergency Caesarean section was performed after the thrombectomy. The infant was apnoeic and had to be resuscitated and admitted to the neonatal intensive care unit. The pH at delivery was 7.23 and the baby was extubated 2 days later. Mother and child recovered without short-term sequelae. In the absence of alternative explanations, reduced fetal beat-to-beat variability with a normal baseline heart rate during general anaesthesia is probably normal.

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Surgery for non-obstetric reasons has to be performed in 1 or 2% of all pregnant women.<sup>1,2</sup> Intraoperative fetal heart rate (FHR) monitoring of the infant during non-obstetric surgery is controversial. Several case reports have shown that general anaesthesia influences the variability of the FHR,<sup>3–10</sup> but no systematic studies have been performed concerning the value of cardiotocography (CTG) monitoring during general anaesthesia for non-obstetric surgery. It is assumed that uneventful general anaesthesia providing adequate oxygenation and circulatory stability does not have any influence on the fetus.

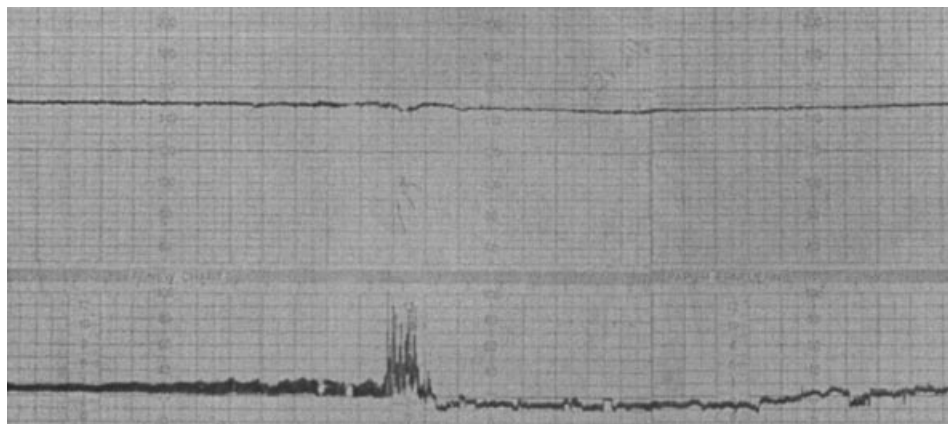
We describe an emergency Caesarean section due to a probable misinterpretation of a silent CTG (lack of beat-to-beat heart rate variation), in a patient undergoing uncomplicated emergency vascular surgery.

## Case report

A 27-yr-old female patient in the 30th week of pregnancy was to undergo emergency thrombectomy of the iliac and common femoral vein. Four weeks earlier, she had been immobilized because of pneumonia. Eight days previously

her left leg had become swollen and the diagnosis of a deep venous thrombosis was made. She was admitted to hospital 2 days later because of pain in the left groin and uterine contractions and vomiting. Low molecular weight heparin treatment was started with subcutaneous nadroparinum 0.8 ml twice daily, and the contractions were controlled with oral hexoprenaline 0.5 mg four times daily combined with oral magnesium 7.5 mmol twice daily. Sonographic examination showed complete obstruction of the iliac, common femoral, and the superficial femoral vein. Because of the short time span from symptom onset and the extension of the thrombosis into the iliac vein, surgical thrombectomy was indicated, and the patient was transferred to our hospital.

The pregnancy had thus far been uneventful. The CTG the day before and on the day of surgery was normal. Because of the heparin treatment, a general anaesthetic was planned. Rapid sequence induction with thiopental 350 mg, succinylcholine 100 mg, and fentanyl 0.25 mg was performed, and anaesthesia was maintained with isoflurane in an oxygen/air mixture supplemented with fentanyl (total of 1.0 mg during the 3.5 h anaesthetic). Vecuronium 4 mg



**Fig 1** CTG trace recorded during anaesthesia. The upper line shows the FHR. This is constant at 150 beats  $\text{min}^{-1}$ , but without variations in baseline frequency (silent pattern). The lower line shows there is no uterine activity. The 'irregularity' in the middle of the lower trace was an attempt to disturb the child by external stimulation of the uterus; it had no effect on the FHR.

was used for muscle relaxation. After induction of anaesthesia, CTG monitoring, set up by a midwife, showed a FHR of 150/min with no variability (Fig. 1).

This CTG trace persisted throughout the operation, which took 80 min and was performed without complications. Arterial pressure and oxygenation of the mother were stable throughout. As a result of the pathological pattern of the CTG (i.e. lack of beat-to-beat variability), a senior obstetrician was consulted at the end of the thrombectomy. Neither the senior obstetrician nor the senior anaesthetist were certain about the effects of general anaesthesia on the CTG, so the CTG pattern was interpreted as fetal distress, and an emergency Caesarean section was performed. The infant was apnoeic on delivery and had to be intubated. APGAR scores of 0/2/6 at 1/5/10 min, respectively, were recorded. The pH of the umbilical vessel was normal (pH 7.23 mixed arterial/venous) indicating that the silent CTG pattern was not a result of fetal distress. The child was transferred to the paediatric ICU where she was extubated 2 days later. She recovered without apparent sequelae.

## Discussion

FHR monitoring during non-obstetric surgery in the mother is controversial and may not always be possible. For instance, during abdominal operations the ultrasound probe may interfere with surgery. In a review, Rosen<sup>11</sup> advocates fetal monitoring whenever possible. However, Horrigan and co-workers<sup>12</sup> concluded that there is no documented evidence that FHR monitoring is required during non-obstetric surgical procedures in the pregnant patient, provided the mother is not hypoxic or hypotensive. The main problem during intraoperative CTG monitoring is interpretation of the CTG trace. Anaesthetic drugs have in several case reports<sup>3–10</sup> been shown not to alter the fetal baseline heart rate, but to decrease the heart rate variability (silent pattern). This decrease in variability may continue

for up to 90 min after the mother has recovered from anaesthesia, probably because of residual concentrations of the anaesthetic agents in the fetus.<sup>4,6,9</sup> Usually, a 'silent pattern' in the CTG trace indicates fetal distress. If the effects of general anaesthetics on the CTG are not understood, this can, as in the present case, lead to serious misinterpretation.

Elective surgery in pregnant women is often delayed until either after delivery or at least to the third trimester, in order to maximize the chances of infant survival. However, there are still many clinical situations in which urgent surgery in pregnancy is necessary. It is assumed that apart from a slightly higher abortion rate at the beginning of pregnancy, the infant is not exposed to a higher risk and, therefore, emergency operations should not be delayed.<sup>2,13–15</sup> If the mother is not hypoxic or hypotensive, or if there are no other reasons for impaired uterine perfusion, a reduced fetal beat-to-beat variability with a normal baseline frequency during general anaesthesia can be regarded as normal, especially with a normal preoperative CTG.

## References

- 1 Mazze RI, Kallen B. Appendectomy during pregnancy: a Swedish registry study of 778 cases. *Obstet Gynecol* 1991; **77**: 835–40
- 2 Brodsky JB, Cohen EN, Brown BW, Jr, Wu ML, Whitcher C. Surgery during pregnancy and fetal outcome. *Am J Obstet Gynecol* 1980; **138**: 1165–7
- 3 Katz JD, Hook R, Barash PG. Fetal heart rate monitoring in pregnant patients undergoing surgery. *Am J Obstet Gynecol* 1976; **125**: 267–9
- 4 Fedorkow DM, Stewart TJ, Parboosingh J. Fetal heart rate changes associated with general anesthesia. *Am J Perinatol* 1989; **6**: 287–8
- 5 Douglas MJ. Foetal monitoring during general surgery: a case report. *Can Anaesth Soc J* 1979; **26**: 220–1
- 6 Liu PL, Warren TM, Ostheimer GW, Weiss JB, Liu LM. Foetal monitoring in parturients undergoing surgery unrelated to pregnancy. *Can Anaesth Soc J* 1985; **32**: 525–32

- 7 Caforio L, Draisci G, Ciampelli M, Rossi B, Sollazzi L, Caruso A. Rectal cancer in pregnancy: a new management based on blended anesthesia and monitoring of fetal well being. *Eur J Obstet Gynecol Reprod Biol* 2000; **88**: 71–4
- 8 Gill TE, Mani S, Dessables DR. Anesthetic management of cerebral aneurysm clipping during pregnancy: a case report. *AANA J* 1993; **61**: 282–6
- 9 van Buul BJ, Nijhuis JG, Slappendel R, Lerou JG, Bakker-Niezen SH. General anesthesia for surgical repair of intracranial aneurysm in pregnancy: effects on fetal heart rate. *Am J Perinatol* 1993; **10**: 183–6
- 10 Newman B, Lam AM. Induced hypotension for clipping of a cerebral aneurysm during pregnancy: a case report and brief review. *Anesth Analg* 1986; **65**: 675–8
- 11 Rosen MA. Management of anesthesia for the pregnant surgical patient. *Anesthesiology* 1999; **91**: 1159–63
- 12 Horrigan TJ, Villarreal R, Weinstein L. Are obstetrical personnel required for intraoperative fetal monitoring during nonobstetric surgery? *J Perinatol* 1999; **19**: 124–6
- 13 Duncan PG, Pope WD, Cohen MM, Greer N. Fetal risk of anesthesia and surgery during pregnancy. *Anesthesiology* 1986; **64**: 790–4
- 14 Mazze RI, Kallen B. Reproductive outcome after anesthesia and operation during pregnancy: a registry study of 5405 cases. *Am J Obstet Gynecol* 1989; **161**: 1178–85
- 15 Reedy MB, Kallen B, Kuehl TJ. Laparoscopy during pregnancy: a study of five fetal outcome parameters with use of the Swedish Health Registry. *Am J Obstet Gynecol* 1997; **177**: 673–9