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Letter to the editor

Absence of electrical uterine activity after endoscopic access for fetal surgery in the Rhesus monkey

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Accepted 6 December 1994

The high incidence of preterm labour after hysterotomy places stringent limitations on the indications for in utero repair of fetal anomalies [1]. Access to the uterine cavity by means of endoscopic techniques could be less traumatic on the uterus. The postoperative effects of such a technique on uterine activity have, however, not been investigated so far.

We studied the effect of endoscopic surgical uterine access on postoperative myometrial activity in five rhesus monkeys (Macaca mulatta) during mid-trimester pregnancy (90–108 gestational days). After induction (50 mg of ketamine, 0.05 mg fentanyl, 0.25 mg atropine and 5 mg midazolam) general endotracheal anaesthesia was maintained with 1–2% ethrane and 60% nitrous oxide in oxygen (1 l/min) and a lower midline laparotomy was performed. For the recording of electrical myometrial activity two stainless steel electromyograph (EMG) electrodes were sutured into the uterine wall about 2 cm apart and the (Cooner wire AS 630) wire was passed subcutaneously to the maternal neck.

The uterus was left in the abdominal cavity and covered with a sterile plastic sheet. A guide wire was introduced in the amniotic cavity through an 18 gauge needle. In order to avoid separation of the membranes, further dilatation followed by insertion of a 6-mm (outer diameter) balloon cannula was performed within a plastic sheath which had been introduced over the guide wire. A second and third cannula were then inserted under direct endoscopic vision after partial amniotic fluid exchange with isothermic saline. Adequate fetal visualisation was achieved in all monkeys. After removal of the cannulas the puncture sites were closed with collagen plugs and interrupted silk sutures. Fetal viability was confirmed by ultrasound examination. As prophylactic tocolytic agent, diclofenac 25 mg i.m., was given daily for 14 days.

Twenty-four hours postoperatively electrical uterine activity was recorded for 1 h, while the monkey was immobilised with 10 mg/kg of ketamine. The electrical signals were filtered by a band-pass filter and recorded on an eight-channel polygraph system with a paper speed of 25 mm/min. The electrical myometrial activity was analysed visually for intermittent epochs of distinct electrical activity, referred to as bursts. None of the monkeys showed any repetitive bursts indicative of uterine contractions (Fig. 1). Two monkeys, however, aborted on the second and sixth postoperative day, respectively; the first had shown a fetal bradycardia at the end of the operative procedure.

The recording of myometrial activity was repeated in the third trimester of pregnancy (140–155 days) in the three remaining monkeys. Again, no uterine contractions were noted. The administration of 2 mU/min of oxytocin, however, induced a distinct contractile pattern in all three monkeys, confirming the validity of registration by the electrodes (Fig. 2).

In conclusion, electrical myometrial recordings on the first day postoperatively suggest that the transuterine endoscopic approach for fetal surgery induces no significant premature contractions in the non-human primate. This is in contrast to the severe contractile activity seen after open hysterotomy [2]. More laboratory research will be necessary, however, regarding maternal and fetal safety before widespread application of endoscopic fetal surgery can be considered in human pregnancy.
Fig. 1. Electromyographic activity 24 h after endoscopy.

Fig. 2. Electromyographic activity, near term, during oxytocine infusion.

References
