Intravenous Nitroglycerin Aids Manual Extraction of a Retained Placenta

To the Editor—Retained placenta with the uterus firmly contracted around the placenta occurs in about 1% of all vaginal deliveries and may require uterine muscle relaxation to facilitate manual extraction. 1 Usually, uterine muscle relaxation is accomplished with a potent inhalation agent; however, this procedure exposes the parturient to an otherwise unnecessary general anesthetic with the attendant risks of regurgitation and aspiration. Inhalation of any nitrate, 2 as well as intravenous nitroglycerin 3 (NTG) (500 µg) have been used to produce uterine relaxation without general anesthesia, but systemic side effects may occur with these therapies. In addition, any nitrate may explode upon crushing, especially in an enriched oxygen environment. 4 We report the results of a pilot study to determine the safety and efficacy of NTG 50 µg for uterine relaxation and our subsequent experience with this technique.

We observed six postpartum patients who required uterine muscle relaxation after obstetric diagnosis of a retained placenta with the uterus firmly contracted around the umbilical cord. We monitored maternal ECG continuously and blood pressure every minute with an automated blood pressure cuff. We provided analgesia with either epidural injection of local anesthetics (10–15 ml 2% 2-chloroprocaine, n = 5) or iv sedation (fentanyl 100 µg and midazolam 2 mg, n = 1).

We prepared the NTG by diluting commercially prepared NTG (Tridil 5 mg/ml) in normal saline to produce a 10 µg/ml concentration. After recording baseline vital sign measurements, we injected NTG 50 µg iv and instructed the obstetrician to remove the placenta when the uterus relaxed. The obstetrician assessed the degree of uterine muscle relaxation, the ease of removal of the retained placenta, and the time until recovery of uterine muscle tone. We continued to monitor blood pressure, ECG, and maternal subjective effects for 5 min after the NTG injection.

Uterine muscle relaxation sufficient to permit manual removal of the placenta occurred 30–40 s after the intravenous NTG in 5 patients. One patient required an additional bolus dose of NTG 50 µg for uterine relaxation to allow complete removal of the placenta. Recovery of uterine muscle tone occurred approximately 1 min after injection in all patients. There were no clinically significant changes in blood pressure or heart rate after the NTG injection. No patient complained of headache, palpitations, or other subjective effects. Subsequently, we have successfully used NTG 50–100 µg for uterine relaxation in an additional 16 patients with no apparent side effects.

Intravenous NTG is an effective smooth muscle relaxant with a short plasma half-life (5 min) and a brief duration of action. 5 NTG, when administered intravenously, can be titrated to effect and produces controlled smooth muscle relaxation of short duration. Peng et al. reported that NTG 500 µg iv provided effective uterine muscle relaxation but that it was associated with subsequent systolic hypotension requiring treatment with intravenous crystalloid solution. 5 A lower dose of NTG, 50 µg, relaxes smooth muscle enough to allow removal of the placenta without profound dilation of the venous system.

With low doses of NTG, the degree and duration of uterine muscle relaxation can be easily controlled, such that manual extraction of a retained placenta can be performed without significant maternal risks of side effects.

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Emergency Transtracheal Jet Ventilation System

To the Editor—We recently found it necessary to construct a simple transtracheal jet ventilation system, similar to the most economical one described by Benumof and Scheller, 1 quickly and from materials readily at hand. Theirs consisted of the endotracheal tube adaptor from a 4.0-mm (ID) tube, oxygen supply tubing, and the cut-off barrel of a 1-cc syringe applied to a transtracheally applied catheter. We cut the cannula
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from a nasal cannula-and-tubing assembly (Airlife®, no.001510, American Pharmaceul Co.), which then fit a 4.0-mm endotracheal tube adapter. The adaptor in turn fit the 15-mm gas outlet of the anesthesia machine. The proximal end of the cannula assembly was firmly applied to the cut-off barrel of a 1-cc syringe. The Luer taper was applied to a catheter placed transtracheally. This assembly readily sustained the 55-psig pressures available at the gas outlet fitting when oxygen was applied at the "flush" valve.

This system is identical to that described by Benumof and Scheller, except that their system used oxygen supply tubing, whereas ours used the tubing from a nasal cannula. We also found that the suction tubing (Bard/Davol no. 3428; 4.8 mm [ID]) used in our operating rooms can sustain these pressures; it can be attached to the common gas outlet via the adapter from an 8.0-mm endotracheal tube and to the transtracheal catheter via a cut-off 5-cc syringe.

In the process of testing these systems, two problems of which the practitioner should be aware emerged. First, the polypropylene endotracheal tube adaptor must be applied to the gas outlet very firmly in order to avoid its being blown out of the gas outlet fitting. This is less of a problem with the metal adaptors. Second, some modern machines are equipped with pressure relief valves in the "flush" circuit which prevent their delivering oxygen at the theoretical 55 psig. The Narkomed 2B is equipped at the vaporizer outlet with a relief valve that opens at about 20 psig (1034 torr); the Ohmeda Excel is equipped with a pressure relief valve that opens at 3–7 psig (155–362 torr). Other machines vary in their delivered pressure; in fact, older machines deliver 55 psig oxygen at the gas outlet fitting.

The practitioner therefore should evaluate his or her machine before planning on transtracheal jet ventilation via the gas outlet as an emergency "back-up" system.

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Transtracheal Jet Oxygenator from Capnographic Monitoring Components

To the Editor:—Benumof and Scheller recently recommended that every anesthetizing location have the immediate availability of transtracheal jet ventilation for the rare cannot-ventilate or cannot-intubate emergency.1 I fully support this recommendation and the use of the more efficient systems described in their paper. However, anesthesiologists should be aware that an effective transtracheal jet oxygenator can be made quickly from the capnographic monitoring components in use in many hospitals. The T-piece capnographic adapter with attached sampling tubing is placed in the common gas outlet, and the other end of the sampling tubing is attached to a catheter inserted in the trachea (fig. 1). By activating the flush valve of the anesthesia machine and intermittently closing the opening of the T-piece at the common gas outlet, effective oxygenation can be produced.

Advantages of this system include Luer lock connections, noncompliant tubing, and immediate availability wherever these capnographic components are used. Disadvantages include the limitation of flow by the small diameter tubing (<4,000 cc/min) and the need for a double male adapter. The anesthesiologist can ensure that a double male adapter will be available by attaching an adapter to the safety pin holding the keys to his or her scrub clothes.

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