



FIG. 1. Thermograph made 24 h after IVRGB of the left upper limb and 3 min after 120 s of ice water immersion of both arms. * Proximal border of ice water exposure. ** Distal edge of tourniquet during IVRGB.

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Intravenous Nitroglycerin for Uterine Relaxation in the Postpartum Patient with Retained Placenta

To the Editor:—The anesthetic management of the postpartum patient with retained placenta should provide cervicouterine relaxation and analgesia while minimizing the risks to the patient.

Smooth muscle is present in the cervix, uterus, and vagina.¹ Nitroglycerin (NTG) has been shown to be a powerful relaxant of rat uterus myometrium strips *in vitro*.² If the cervix and uterus can be relaxed in the patient with retained placenta, manual exploration of the uterus can be performed without the risk of general anesthesia. We conducted a trial of NTG for the manual extraction of retained placenta.

Institutional Review Board approval for this study was obtained. Fifteen postpartum patients (ages 29 ± 10 SD, parity 1.4 ± 0.7 SD) needing manual removal of retained placenta were entered in this study and informed consent was obtained. Patients were entered into the study if their cervix was closed, they had not completely expelled their placenta after 30 min, and the neonatal age was at least 32 weeks. Patients with blood loss greater than 25% total blood volume or with cardiac disease (*e.g.*, aortic stenosis) were not included in this study. At

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least 500 ml of crystalloid was infused prior to NTG administration. Vital signs were monitored by an automated blood pressure device and an electrocardiogram. Bicitra[®] 30 ml po was administered preoperatively. Blood loss was estimated by the obstetrician. Prior to NTG administration, the patient was determined to be normotensive by two systolic blood pressure measurements greater than 110, 3 min apart, and that infused crystalloid was appropriate for the estimated blood loss. A bolus of NTG 500 micrograms was administered intravenously. After NTG administration, the blood pressure was determined each minute. The obstetrician determined the time to adequate cervicouterine relaxation by cervical palpation. Supplemental analgesia during manual extraction of the uterus was obtained with 50–100 micrograms of intravenous fentanyl and/or 40% nitrous oxide *via* mask. A *t* test for paired samples was performed to determine the statistical significance of the blood pressure changes.

Successful extraction of the placenta was achieved in all cases. Tracheal intubation was not required with any of the patients. All patients

remained awake and alert during the procedure. Side effects such as headache and prolonged uterine relaxation were not observed. Systolic and diastolic blood pressure were reduced to a statistically significant (8% and 5%, respectively), but clinically unimportant degree. No statistically significant increase in the heart rate was observed. In all cases, hypotension after NTG was mild.

The onset of uterine relaxation assessed by the obstetrician ranged from 75–95 s. In this study, the obstetrician frequently noted the closed cervix to open spontaneously approximately 80 s after NTG administration. In several cases, after the NTG-induced opening of cervix, the entire retained placenta was expelled. This is more rapid than the 5 min required for other techniques.⁵

The preoperative estimated blood loss ranged from 400–900 ml. The blood loss as a percent of total blood volume was 10–20%.

Although this study is limited in that a control group was not studied, the results suggest that NTG may be useful in avoiding general anesthesia and tracheal intubation in the patient with retained placenta.

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