

# Use of Nitroglycerin Spray in Uterine Inversion

James C. Hicks, MD

Uterine inversion is an infrequent obstetric emergency, occurring in 1 in 2000 to 1 in 2500 obstetric patients. Uterine inversion, so named because the uterus turns inside out, has been associated with multiparity, placenta accreta, short umbilical cord, and a fundal placenta. The degree of inversion is described as ranging from first-degree (incomplete) inversion, in which the corpus extends to the cervix but not beyond the cervical ring, to third-degree (complete) inversion, where the inverted uterus extends to the perineum. The additional term *total uterine inversion* describes prolapse of the vagina along with the uterus. Excessive cord traction in the third stage of labor and fundal pressure (Credé maneuver) have been implicated in its cause. Even so, uterine inversion is an unpredictable entity with more than one half of cases reported without detectable precipitants. Hemorrhage can be rapid and life-threatening, requiring prompt recognition and aggressive management. Accompanying hypotension is common and often exceeds what might be expected from concomitant blood loss, further complicating the clinical presentation.

Treatment modalities involve immediate replacement of the uterus (Johnson maneuver), use of tocolytics, and replacement of lost fluid. In some patients, contraction of the cervical ring around the uterus renders replacement of the inversion difficult.<sup>1</sup> In 10% to 15% of patients general anesthesia is required to allow replacement of the uterus.<sup>2</sup> Rarer still, laparotomy with traction or incision of the contracted ring has been used in refractory cases.

Several authors have suggested a role for intravenous nitroglycerin in treatment of uterine inversion.<sup>3-5</sup> A recent search of the literature, however, did not find oral forms of nitroglycerin described as being used for the same purpose. I describe a case of uterine inversion with cervical entrapment of the

inverted lower segment alleviated with nitroglycerin administered sublingually.

## Case Report

The patient was a 38-year-old woman, gravida 2 para 1, who initially came to the birthing center at 33 weeks' gestation complaining of frequent contractions. The patient's membranes were found to be ruptured, and cervical examination showed 3 cm of dilation with 40% effacement. She was given intravenous ampicillin, intramuscular betamethasone, and magnesium for tocolysis with the intent of staving off labor for 24 to 48 hours.

Forty-eight hours later tocolytic efforts were discontinued. The patient entered active labor, spontaneously giving birth to a vigorous 2,005-g female infant with Apgars of 8 and 9 just 4 hours after discontinuing magnesium.

Expectant management of stage III became alarming when the placenta had not separated from the uterus within 1 hour. Gentle traction to the cord was applied, and the physician felt that the placenta was finally releasing, when the emerging tissue showed itself to be a complete uterine inversion. The adherent placenta was removed by means of blunt dissection from the inverted uterine wall (although open to discussion, it is generally recommended that the uterus be replaced before removal of the placenta because of increased risk of bleeding). Manual reinsertion of the inversion using the Johnson maneuver was attempted unsuccessfully, even after administration of intravenous terbutaline. A second intravenous line was placed, and the patient was moved to a Trendelenburg position. An anesthesiologist and obstetric operative support staff were alerted, although the situation resolved itself by the time of their arrival. Fentanyl and midazolam, as well as cefotetan, were administered. Reexamination of the patient showed that the base of the inversion was trapped by the contracted cervix. At this point two sprays of sublingual nitroglycerin were given (a total dose of 400 µg), resulting in prompt release of the cervix, and easy replacement of the uterus. After repositioning of the

Submitted, revised, 28 September 1999.

From North Colorado Family Medicine, Greeley, Colo. Address reprint requests to James C. Hicks, MD, 304 First St, Unit 5, Liverpool, NY 13088.

uterus, the patient had a fundal massage and was given oxytocin.

The patient did not require surgical intervention. Further bleeding was minimal. Her hematocrit dropped from an antepartum measurement of 36% to 22%, and she had symptoms of hypovolemia. She received 2 units of packed red blood cells. She was given a second dose of cefotetan 12 hours after the first dose, but received no further antibiotics thereafter. She went home on the second postpartum day with a prescription for ferrous sulfate.

## Discussion

First synthesized in 1846, nitroglycerin has been used in many ways in medicine. Obstetric use of nitroglycerin dates back to the late 1800s. Since that time it has been used successfully in the treatment of uterine inversion, internal podalic version, retained placenta, and breech delivery.<sup>6</sup> Its usefulness in the obstetric field lies in its ability to relax smooth muscle within the cervix and uterus. Uterine relaxation occurs within 30 to 95 seconds, and the medication has a half-life of 1 to 3 minutes. This short duration of action makes nitroglycerin useful at times when the prolonged effects of tocolytics might be hemodynamically disadvantageous to the mother. It can be administered by a variety of routes (lingual, sublingual, intranasal, intrabuccal, oral, and topical), or it can be given through intravenous infusion. Although nitroglycerin can cause hypotension and headache, therapeutic doses are generally well tolerated.

The extant body of data on using intravenous nitroglycerin in the treatment of uterine inversion suggests infusing doses ranging from 50 to 200 mg, with success noted at all dosing levels.<sup>3,5</sup> Doses up to 500  $\mu$ g have been used in other obstetric conditions, such as retained placenta.<sup>7</sup> Intravenous nitroglycerin, although a staple of hospital pharmacies, is unlikely to be stocked in the average birthing center. Obstetric nursing staff might be unfamiliar with its intravenous administration. Sublingual ni-

troglycerin is more readily stored for infrequent use but suffers from an unpredictable shelf life. On the other hand, nitroglycerin spray has a shelf life of up to 2 years. Each spray of nitroglycerin delivers 200  $\mu$ g, which is entirely absorbed within 2 minutes. Our patient received a total dose of 400  $\mu$ g to good effect with no evident worsening of her blood pressure.

In the treatment of uterine inversion, contraction of the cervical ring is another obstacle in what is already an anxiety-ridden situation requiring rapid assessment and action. Proposed surgical interventions are drastic and not always readily available. Nitroglycerin is a useful tool in the obstetric armamentarium. Its short duration of action and rapid absorption make it ideal for expeditious uterine and cervical relaxation. Although most forms of the medication should be equally effective, the convenience of the nitroglycerin lingual spray makes it convenient for occasional use in the birthing center.

## References

1. Zahn CM, Yeomans ER. Postpartum hemorrhage: placenta accreta, uterine inversion, and puerperal hematomas. *Clin Obstet Gynecol* 1990;33(3):422-31.
2. Brar HS, Greenspoon JS, Platt LD, Paul RH. Acute puerperal uterine inversion. New approaches to management. *J Reprod Med* 1989;34:173-7.
3. Bayhi DA, Sherwood CD, Campbell CE. Intravenous nitroglycerin for uterine inversion. *J Clin Anesth* 1992;4:487-8.
4. Vinatier D, Dufour P, Bérard J. Utilization of intravenous nitroglycerin for obstetrical emergencies. *Int J Gynaecol Obstet* 1996;55:129-34.
5. Altabef KM, Spencer JT, Zinberg S. Intravenous nitroglycerin for uterine relaxation of an inverted uterus. *Am J Obstet Gynecol* 1992;166:1237-8.
6. Dufour P, Vinatier D, Puech F. The use of intravenous nitroglycerin for cervico-uterine relaxation: a review of the literature. *Arch Gynecol Obstet* 1997; 261:1-7.
7. DeSimone CA, Norris MC, Leighton BL. Intravenous nitroglycerin aids manual extraction of a retained placenta. *Anesthesiology* 1990;73:787.