OBSTETRIC ANESTHESIA AND PERINATOLOGY V

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Title: MATERNAL BLOOD LOSS ASSOCIATED WITH LOW DOSE HALOTHANE ADMINISTRATION FOR CESAREAN SECTION

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Introduction. Low dose halothane (0.5%) is frequently added to N₂O during cesarean section. The nitrous oxide concentration is usually reduced from 70 to 50%. This combination of halothane and N₂O allows higher inspired maternal O₂ concentrations and decreases the likelihood of maternal awareness. Some anesthesiologists discontinue halothane after birth believing that possible relaxation of the myometrium could increase blood loss.

Methods. With the approval of the Institutional Committee on Human Research, patients' records were reviewed to assess the effects of low dose halothane on blood loss during cesarean section, and these results were compared to those of women receiving epidural anesthesia. All consecutive patients underwent general anesthesia with 0.5% halothane pre-delivery and 50% N₂O in O₂ in group 3, who had 3 hematocrit determinations (preoperatively, postoperative day 1 and postoperative day 2) were included. We excluded patients at increased risk for postpartum hemorrhage or uterine atony (placenta previa, polyhydramnios, high parity, multiple births). For comparison, we randomly selected a similar number of patients who received epidural anesthesia during this same time period. Patients were divided into 3 groups based on the anesthetic received: group 1 (n = 22) 50% N₂O in O₂ and 0.5% halothane pre-delivery only and N₂O/narcotic post-delivery; group 2 (n = 20) 50% N₂O in O₂ and 0.5% halothane pre-delivery and 0.3-0.8% halothane post-delivery combined with N₂O/narcotic; group 3 (n = 23) epidural anesthesia. Every patient received a continuous infusion of oxytocin after delivery of the placenta. Maternal charts were reviewed for hematocrits preoperatively, and on postoperative day 1 and day 2, and for requirements of blood transfusions. The hematocrits for each group were analyzed as means ± SD and compared by analysis of variance. Demographic data were analyzed by Chi square analysis and Student t test when appropriate. A p < 0.05 was considered significant.

Results. The groups were similar with regard to age, weight, height, gestational age, gravity, parity and indications for section (elective repeat or cephalopelvic disproportion). Mean hematocrits ± SD preoperatively and on postoperative day 1 and day 2 are displayed in the table. The 3 groups were comparable for preoperative hematocrits. Both the hematocrits on day 1 and day 2 decreased significantly regardless of the anesthetic technique. The percentage decrease in hematocrits from the preoperative values ranged between 12% to 16% on day 1 and 14% to 20% on day 2. However, there were no significant differences for the percentage decrease in hematocrits among the three groups (p > 0.05). None of the patients received blood transfusions.

Discussion. Halothane has been found in vitro to produce a dose related decrease in uterine contractility and tone. Previous studies estimating blood loss during cesarean section with respect to anesthetic technique are conflicting. Moir using the hemoglobin extraction dilution technique to estimate blood loss reported no increased bleeding following the addition of 0.5% or 0.8% halothane to N₂O compared to N₂O alone. Interestingly, he reported that the general anesthetic techniques were associated with twice the blood loss compared to epidural anesthesia. Abboud et al, using percentage change in pre- and postoperative hematocrits, similarly demonstrated no differences in blood loss between N₂O alone or combined with 0.25% or 0.5% halothane pre-delivery. Halothane was discontinued in each patient after delivery. However, Gillis et al, also using pre- and postoperative hematocrit changes to assess blood loss reported that the addition of 0.3-1% halothane to N₂O was associated with much more bleeding than N₂O alone or epidural anesthesia. Furthermore, they reported that 18% of the 114 patients receiving halothane were given blood transfusions while only one of the 152 patients in the regional group received blood. Approximately 60% of the patients receiving halothane received this agent both pre- and post-delivery. Finally, Moore et al in a study that did not report blood loss but rather some estimate of uterine tone at cesarean section delivery, reported that 0.5% halothane induced greater uterine relaxation than 0.75% isoflurane, thus suggesting that more blood loss could be expected with low dose halothane compared to low dose isoflurane.

In our study the addition of low dose halothane throughout the surgical procedure was not associated with greater blood loss compared to low dose halothane administration only before delivery. Furthermore, blood loss was not greater in groups who received general anesthesia compared to epidural anesthesia as previously reported. We conclude that low dose halothane can be safely administered both before and after delivery during cesarean section and is associated with the same blood loss as is epidural anesthesia.

References:

Table: Hematocrit values before and after cesarean section

| Anesthetic Technique | Hematocrit * | Hematocrit * | Hematocrit *
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