A Reevaluation of the Role of Crystalloid Preload in the Prevention of Hypotension Associated with Spinal Anesthesia for Elective Cesarean Section

Rout CC, et al.

Anesthesiology 79: 262, 1993

	Volume Load (n = 78)	No Volume Load (n = 62)	P
Hypotension	43 (55%)	44 (71%)	0.07
UA pH	7.27 ± 0.07	7.26 ± 0.06	NS

Rout CC, et al.
Anesthesiology 79: 262, 1993

- Although fluid preloading reduces the incidence of postspinal hypotension, the reduction is not sufficient to justify delay in the administration of spinal anesthesia when this is the most appropriate anesthetic technique for patients who require urgent cesarean section.
- The authors now begin preloading as rapidly as possible, but they do not await administration of a fixed volume of crystalloid before administration of spinal anesthesia in patients who require urgent cesarean section.

Rout CC, et al.

Anesthesiology 79: 262, 1993

Effects of Crystalloid and Colloid Preload on Blood Volume in the Parturient Undergoing Spinal Anesthesia for Elective Cesarean Section

Ueyama H, et al.

Anesthesiology 91: 1571, 1999

- The incidence of hypotension was 75% for the RL group, 58% for the 500 mL HES group, and 17% for the 1000 mL HES group.
- Augmentation of blood volume with preloading -- regardless of the fluid used -- must be large enough to result in a significant increase in cardiac output in order to prevent hypotension effectively.

Ueyama H, et al.

Anesthesiology 91: 1571, 1999

DISADVANTAGES OF COLLOID

- Risk of postpartum pulmonary edema?
- Expense
- Small risk of allergic reaction

Prevention of Hypotension by a Single 5-mg Dose of Ephedrine During Small-Dose Spinal Anesthesia in Prehydrated Cesarean Delivery Patients

Vercauteren MP, et al.
Anesth Analg 90: 324, 2000

A Dose-Response Study of Prophylactic Intravenous Ephedrine for the Prevention of Hypotension During Spinal Anesthesia for Cesarean Delivery

Ngan Kee WD, et al.
Anesth Analg 90: 1390, 2000

BEST PRACTICE

- Modest hydration with 1000 to 1500 mL of crystalloid immediately before spinal blockade, when time allows
- Adequate left uterine displacement
- Early, aggressive pharmacologic treatment of hypotension
- Immediate delivery if hypotension persists

PROPHYLACTIC EPHEDRINE?

- I give prophylactic ephedrine – 5 or 10 mg – intravenously immediately after spinal injection of bupivacaine.
- Overall, published studies do not support the efficacy of this practice.

PREECLAMPSIA: ADVANTAGES OF SPINAL ANESTHESIA

- Rapid onset
- Reliability
- Avoidance of general anesthesia
- Less risk of epidural venous trauma than epidural anesthesia

- Spinal anesthesia resulted in a decrease in blood pressure that was similar to that observed after administration of epidural anesthesia in women with severe preeclampsia.

- The study was retrospective. Thus the authors could not exclude the potential for selection bias, with the possibility that the two groups were at dissimilar risk.

Hood DD, Curry R

Anesthesiology 90: 1276, 1999

PREECLAMPSIA: DISADVANTAGES OF SPINAL ANESTHESIA

- Abrupt onset of sympathetic blockade
- Hypotension is not tolerated well in patients with preexisting uteroplacental insufficiency.
- Published studies are small and excluded women with nonreassuring FHR tracings.

PREECLAMPSIA: CHOICE OF ANESTHESIA

- When time allows, incremental administration of epidural anesthesia seems preferable to spinal anesthesia for women with severe preeclampsia.
- Spinal anesthesia may be a better choice in cases of urgent – but not stat – cesarean section.
- Encourage early administration of epidural anesthesia in laboring women with preeclampsia.

- Epidural anesthesia did not increase the incidence of cesarean delivery or pulmonary edema among laboring women with severe hypertensive disease.

Hogg B, et al.
Am J Obstet Gynecol 181: 1096, 1999

BLOOD LOSS

- Uterine rupture
- Uterine atony
- Placenta accreta

ACOG GUIDELINES FOR VBAC

- Because uterine rupture may be catastrophic, VBAC should be attempted only in institutions equipped to respond to emergencies, with physicians immediately available to provide emergency care.

- The operational definition of “immediately available” remains the purview of each local institution.

American College of Obstetricians and Gynecologists
July, 1999

UTERINE RUPTURE DURING ATTEMPTED VBAC

- At least one obstetrician has proposed the use of a VBAC consent form that includes the following statement:
  - "I understand that if my uterus ruptures during my VBAC, there may not be sufficient time to operate to prevent the death of – or permanent brain injury to – my baby."

Phelan JP
OBG Management, November, 1996

UTERINE ATONY: MAJOR RISK FACTORS

- Uterine overdistention
- Chorioamnionitis

UTERINE ATONY: TREATMENT

- Oxytocin
- Methylergonavine (Methergine)
- 15-Methylprostaglandin $F_{2\alpha}$ (Hemabate)

PLACENTA PREVIA – ACCRETA

- Placenta previa alone is associated with increased blood loss at cesarean section.
- When placenta accreta accompanies placenta previa, massive hemorrhage may occur after delivery.

PLACENTA ACCRETA: RISK FACTORS

- Previous cesarean section
- Placenta previa in current pregnancy

PLACENTA ACCRETA

- Prepare for major blood loss and likely need for hysterectomy
  - Large-gauge intravenous access
  - Immediate availability of blood and blood products
- Choice of anesthetic technique?

Anesthetic Management for Obstetric Hysterectomy: A Multi-Institutional Study

Chestnut DH, et al.

Anesthesiology 70:607, 1989

- Twelve patients (eight from the elective group and four from the emergency group) received continuous epidural anesthesia, but none required intraoperative induction of general anesthesia.

Chestnut DH, et al.
Anesthesiology 70:607, 1989

REGIONAL ANESTHESIA IN THE PATIENT AT RISK FOR PLACENTA ACCRETA:

- Will the patient remain comfortable during prolonged surgery?
- Will operating conditions remain optimal for potentially difficult surgery (i.e., cesarean hysterectomy)?
- Will anesthesia-induced sympathectomy exacerbate hypotension during intraoperative hemorrhage?
- Can the patient protect her airway during potentially difficult abdominal surgery, hemorrhage, and hypotension?

SPINAL HEADACHE: PATHOPHYSIOLOGY

- Decreased intracranial pressure
- Compensatory cerebral vasodilation

DIAGNOSIS

- Postural component
- Secondary cervical muscle spasm
- Other common causes should be excluded.

CLINICAL COURSE

- Not always self-limited
- Not always benign
  - Abducens nerve palsy
  - Auditory disturbances
  - Subdural hematoma

TREATMENT

- Recognition and psychologic support
- Bedrest?
- Hydration?
- Drugs
- Autologous blood patch

AUTOLOGOUS BLOOD PATCH

- Rationale: Prevent further leakage of CSF.
- Immediate relief often results from restoration of intracranial pressure.

TIMING

- The evidence supporting a delay in performing blood patch – until more than 24 hours after dural puncture – is tenuous.

TECHNIQUE

- The lateral position is more comfortable for the patient.
- When in doubt, choose the more caudad interspace.
- Inject 15 to 20 mL of blood, obtained by an assistant using sterile technique.
- If correct needle placement in doubt, consider giving a test dose.

PRECAUTIONS

- Avoid in patients with coagulopathy.
- Avoid in febrile patients at risk for bacteremia.
- There is no evidence that epidural blood patch should be avoided in HIV-infected patients.

PRECAUTIONS

- Discontinue injection with onset of back pain.
- Two hours of recumbent bedrest seems to improve the likelihood of success.
- Patients should avoid a Valsalva maneuver and heavy lifting.
- Prescribe a stool softener and/or cough suppressant as indicated.

PROPHYLACTIC BLOOD PATCH

- Unnecessary in as many as 50% of patients with unintentional dural puncture
- Risk of injecting blood through a catheter that is not sterile
- Uncertain location of catheter tip relative to dural puncture site
- Should be avoided in patients with residual epidural anesthesia