Brief Reports

Airway changes during Cesarean hysterectomy

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Purpose: To document whether hemorrhage and fluid administration during peripartum hysterectomy results in changes in the airway that may predispose to subsequent difficult intubation, in the event that intraoperative general anesthesia is required during regional anesthesia.

Clinical features: A 32-yr-old underwent peripartum hysterectomy for placenta accreta. Blood loss of 5.5 L occurred during surgery requiring 6 L crystalloid, 1 L hetastarch, five units packed RBCs and two units fresh frozen plasma. Airway changes were followed using Samsoon's modification of Mallampati airway classification. In addition, airway photographs were obtained using a Polaroid camera. The airway of the patient changed from class 2 preoperatively to class 4 in the immediate postoperative period. The airway gradually returned to normal over the ensuing 48 hr, during which a negative fluid balance of 4 L occurred due to substantial postoperative diuresis.

Conclusion: Peripartum airway changes were detected during Cesarean hysterectomy and fluid resuscitation that gradually returned to normal within 48 hr after surgery.

Objectif : Vérifier si une hémorragie et l'administration de liquide pendant une hystérectomie péripartum peut modifier l'intubation prédisposant à une intubation difficile subséquente, dans le cas où une anesthésie générale peropératoire serait nécessaire pendant l'anesthésie régionale.

Éléments cliniques : Une femme de 32 ans a subi une hystérectomie péripartum à cause d'un placenta accreta. Une perte sanguine de 5,5 L est survenue pendant l'opération et a nécessité 6 L de cristalloïde, 1 L de hetastarch, cinq culots globulaires et deux unités de plasma frais congelé. Les changements de l'intubation ont été observés grâce à la modification de Samsoon de la classification de Mallampati. De plus, des photographies de l'intubation ont été réalisées avec une caméra Polaroïd. L'intubation du patient est passée de la classe 2, avant l'opération, à la classe 4, immédiatement après. Elle est graduellement revenue à la normale au cours des 48 h qui ont suivi et durant lesquelles un bilan hydrique négatif de 4 L est survenu, causé par une importante diurèse postopératoire.

Conclusion : Les changements dans l'intubation péripartum ont été détectés pendant l'hystérectomie postcésarienne et la réanimation liquidienne qui se sont graduellement normalisés pendant les 48 h qui ont suivi l'intervention chirurgicale.

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PERIPARTUM hysterectomy may be associated with substantial blood loss requiring large quantities of crystalloid and colloid fluid infusions to maintain intravascular volume.[1–4] Peripartum hysterectomy has been performed successfully under general as well as regional anesthesia.[1] However, intraoperative general anesthesia may be required occasionally during the procedures performed under regional anesthesia when associated with prolonged surgery, patient discomfort, or hemodynamic instability.[2] We evaluated airway changes in a patient scheduled for elective Cesarean hysterectomy to document changes in the airway that could predispose to a subsequent difficult intubation.

Case report

A healthy 32-yr-old was scheduled for her fifth elective Cesarean delivery for anterior placenta encroaching towards the bladder. Airway examination revealed a class 2 Samsoon's and Young modification of Mallampti airway class with normal neck mobility and no protruding upper teeth. A photograph of the initial airway evaluation was obtained using an Instant Polaroid camera, Macro 5 SLR. With the patient seated comfortably, the camera was focused on to the uvula from a distance of 25 cm (Figure 1A). Two converging beams of light from the camera ensured that the uvula of the patient was at 25 cm from the camera. Line of focus was parallel to the ground. A lumbar epidural catheter was used to provide anesthesia (lidocaine 2% with epinephrine) and a radial arterial line was placed in anticipation of possible prolonged surgery and blood loss. An attempt to extract the placenta manually after an uneventful baby delivery of a healthy female resulted in uterine inversion and substantial blood loss, resulting in hypotension. Volume infusion and boluses of neosynephine and ephedrine were required to maintain the blood pressure > 90 mm Hg systolic. As the bleeding continued from the placental site, we decided to induce general anesthesia approximately 20 min after commencement of Cesarean section with 75 mg ketamine *iv* followed by 100 mg succinylcholine to facilitate rapid sequence intubation which was uneventful. General anesthesia was used expecting substantial blood loss as well as prolonged and difficult surgery. Rapid administration of crystalloid, hetastarch 6%, and packed red cells were transfused to maintain systolic blood pressure over 100 mmHg. There was no placental tissue seen on opening the bladder but there was substantial difficulty encountered in separating the anterior uterine wall from the bladder. Hysterectomy was performed and the bladder was repaired. The total blood loss for the procedure was approximately 5.5 L. The patient received 6 L crystalloid, 1 L hetastarch 6%, five units of packed RBCs, and two units fresh frozen plasma. The hematocrit at the end of the three hour procedure was 24%. The patient was hemodynamically stable and the trachea was uneventfully extubated at the end of the procedure. Bupivacaine 0.25%, 9 ml, was titrated to provide postoperative epidural analgesia, followed by 6 $ml \cdot hr^{-1}$ infusion of bupivacaine 0.125% with 0.02 $mg \cdot ml^{-1}$ hydromorphone. There was obvious facial edema at the conclusion of surgery. When she was alert and able to sit upright comfortably and opened her mouth as wide as she could (4 and 1½ hours after commencement of Cesarean section), airway assessment was performed (class 4) and airway photographs obtained as described above (Figure 1B). She received two more units of fresh frozen plasma and 16 units of platelets to correct prolonged prothrombin and partial thromboplastin time, as well as low platelet count (50,000) in addition to 2 L of crystalloid in the immediate postoperative period. The airway was reassessed at 12 hr, 24 hr and at 48 hr following the commencement of surgery. The airway was class 4 at 12 hr, class 3 at 24 hr (Figure 1C), and returned to class 2 after 48 hr (Figure 1D). The patient had substantial postoperative diuresis and the input/output fluid balance sheet showed a negative balance of 1 L during 12-24 hr period and 4 L during 24-48 hr post surgery interval. The epidural catheter was removed 24 hr after surgery when patient's coagulation profile was normal.

Discussion

Peripartum hysterectomy is often associated with substantial blood loss and fluid requirement (2-8 L fluid and 1-15 units blood, occasionally up to 28 L of fluid and 56 units of blood products.).[1–4] Airways in pregnant patients are susceptible for developing tissue edema as a result of intravenous infusion of fluids that produce a decrease in the colloid osmotic pressure which is already decreased in pregnant subjects.[5,6] Our patient received 6 L crystalloid, 1 L colloid, and 5 units packed RBCs and the airway changed from class 2 to class 4 at the conclusion of surgery. Postoperative diuresis gradually resulted in normalization of the airway in the next 48 hr. Although we did not determine colloid osmotic pressures in our patient, diuresis may have resulted in an increase in colloid osmotic pressure thereby facilitating a decrease in the airway edema.

A change in airway status has two important clinical implications in the management of parturient for peripartum hysterectomy. First, intraoperative induction of general anesthesia may be required in patients undergoing peripartum hysterectomy under regional

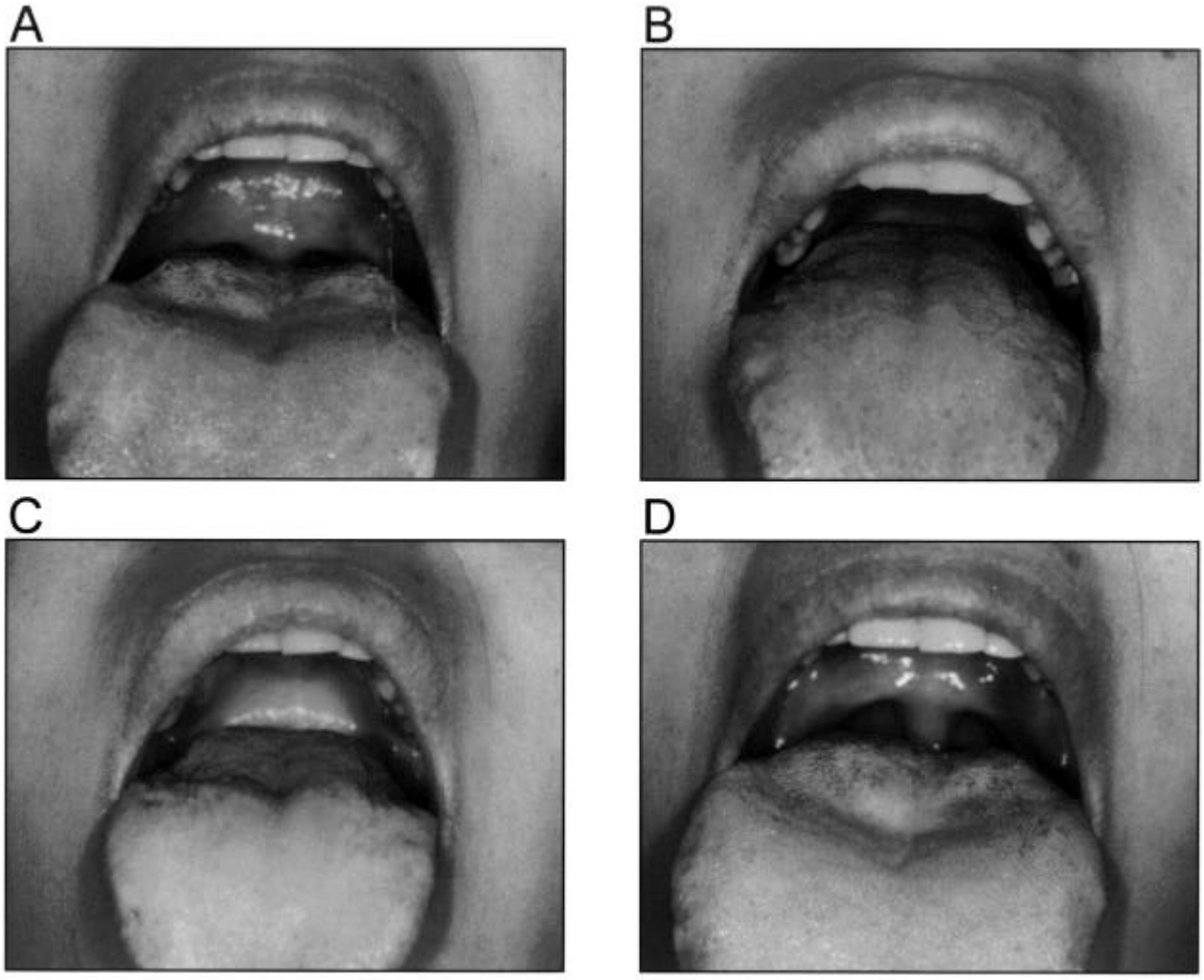

FIGURE 1 Airway changes during Cesarean hysterectomy. A: Preoperative (airway class 2); B: Immediate postoperative (airway class 4, lips and tongue are swollen); C: 24 hr postoperative (airway class 3); D: 48 hr postoperative (airway class 2).

anesthesia any time during the course of the procedure and, secondly, general anesthesia may be required to facilitate re-operation to explore and control excessive postoperative hemorrhage. Although it is not a contraindication to perform Cesarean hysterectomy under regional anesthesia, one should carefully take into consideration that the airway may worsen during the course of surgery. The relative risk of experiencing a difficult intubation in comparison to an uncomplicated class I airway increases by four times when the airway class changes from class 2 to class 4 airway.[7] The risk may increase further if the patient has other risk factors such as obesity, protruding upper teeth, short thyromental distance, and increased weight gain in the pregnancy.[8] In addition, the laryngeal edema that may accompany upper airway edema can also contribute to a difficult intubation. It may be prudent to induce general anesthesia and secure the airway as soon as substantial hemorrhage, requiring large volume infusion/transfusion, is anticipated. On the other hand, if the airway is not secured, periodic assessment of the airway during the course of surgery is recommended to determine worsening of the airway. If this approach is chosen, contingency plans to deal with a challenging airway should be readily available in case a difficult intubation is encountered during intraoperative induction of general anesthesia.

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