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Publicação Oficial da Sociedade Brasileira de Anestesiologia
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CLINICAL INFORMATION

Perioperative management of a morbidly obese pregnant patient undergoing cesarean section under general anesthesia – case report[☆]



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Received 5 January 2014; accepted 6 May 2014

Available online 30 April 2016

KEYWORDS

Morbid obesity;
Cesarean section;
General anesthesia;
remifentanil

Abstract

Background and objectives: The increased prevalence of obesity in the general population extends to women of reproductive age. The aim of this study is to report the perioperative management of a morbidly obese pregnant woman, body mass index $>50 \text{ kg/m}^2$, who underwent cesarean section under general anesthesia.

Case report: Pregnant woman in labor, 35 years of age, body mass index 59.8 kg/m^2 . Cesarean section was indicated due to the presumed fetal macrosomia. The patient refused spinal anesthesia. She was placed in the ramp position with cushions from back to head to facilitate tracheal intubation. Another cushion was placed on top of the right gluteus to create an angle of approximately 15° to the operating table. Immediately before induction of anesthesia, asepsis was carried out and sterile surgical fields were placed. Anesthesia was induced in rapid sequence, with Sellick maneuver and administration of remifentanil, propofol, and succinylcholine. Intubation was performed using a gum elastic bougie, and anesthesia was maintained with sevoflurane and remifentanil. The interval between skin incision and fetal extraction was 21 min, with the use of a Simpson's forceps scoop to assist in the extraction. The patient gave birth to a newborn weighing 4850 g, with Apgar scores of 2 in the 1st minute (received positive pressure ventilation by mask for about 2 min) and 8 in the 5th minute. The patient was extubated uneventfully. Multimodal analgesia and prophylaxis of nausea and vomiting was performed. Mother and newborn were discharged on the 4th postoperative day.

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<http://dx.doi.org/10.1016/j.bjane.2014.05.011>

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PALAVRAS-CHAVE

Obesidade mórbida;
Parto cesariano;
Anestesia geral;
remifentanil

Controle perioperatório de gestante obesa mórbida submetida a parto cesariano sob anestesia geral – relato de caso**Resumo**

Justificativa e objetivos: O aumento na prevalência da obesidade na população geral se estende para mulheres na idade reprodutiva. O objetivo deste estudo é relatar o controle perioperatório de uma gestante obesa mórbida com índice de massa corporal $>50 \text{ Kg/m}^2$, submetida a parto cesariano sob anestesia geral.

Relato do caso: Gestante de 35 anos com índice de massa corporal de $59,8 \text{ Kg/m}^2$. Estava em trabalho de parto. Foi indicado parto cesariano devido a macrosomia fetal presumida. A paciente recusou raqui-anestesia. Ela foi posicionada em rampa com coxins no dorso até a cabeça para facilitar a intubação traqueal. Outro coxim foi colocado na parte superior do glúteo direito para criar uma angulação próxima de 15° com a mesa cirúrgica. Imediatamente antes da indução anestésica, procedeu-se a assepsia e colocação de campos cirúrgicos estéreis. Foi feita indução em sequência rápida com manobra de Sellick, com remifentanil, propofol e succinilcolina. A intubação foi feita com auxílio de gum elastic bougie. A anestesia foi mantida com remifentanil e sevoflurano. O intervalo entre a incisão na pele e a extração fetal foi de 21 minutos e foi usada uma das colheres do fórceps de Simpson para auxílio na extração. Paciente concebeu recém-nascido com peso de 4.850 g, apresentou índice de Apgar de 2 no primeiro minuto (recebeu ventilação com pressão positiva sob máscara por aproximadamente dois minutos) e 8 no quinto minuto. A paciente foi extubada, sem intercorrências. Foi feita analgesia multimodal e profilaxia de náuseas e vômitos. Mãe e recém-nascido receberam alta no quarto dia de pós-operatório.

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Introduction

The prevalence of obesity is on the rise in countries with low and middle income, especially in urban areas.¹ This increase in the prevalence of obesity in the general population extends to women of reproductive age. Obesity is associated with several unwanted clinical outcomes during pregnancy, including preeclampsia, gestational diabetes mellitus, venous thromboembolism, post-term pregnancy, fetal macrosomia, and stillbirth.² Cesarean delivery rate is higher in obese pregnant women, especially in morbidly obese ones.²⁻⁴ Obese pregnant women are at increased risk for labor induction, dysfunctional labor, shoulder dystocia, higher rate of surgical site infection, urinary tract infection, endometritis, and postpartum hemorrhage.⁵ Maternal obesity is associated with increased difficulty in performing neuraxial anesthesia,⁶ higher incidence of arterial hypotension,⁷ and intubation failure during general anesthesia.⁸ Newborns of obese patients are at increased risk for perinatal complications (low blood pH, lower base excess, hypoglycemia, and lower Apgar index).^{9,10} Pregnant women with body mass index (BMI) $\geq 50 \text{ kg m}^{-2}$, also called super-obese,^{2,11} have significantly higher risk for complications during pregnancy compared with others less obese.¹¹ The perioperative anesthetic and surgical management of obese patients with BMI $> 50 \text{ kg m}^{-2}$ undergoing cesarean delivery can be quite a challenge. The objective of this paper is to report the perioperative management of a pregnant woman with BMI $> 50 \text{ kg m}^{-2}$, undergoing cesarean section under general anesthesia.

Case report

Pregnant woman, 35 years old, 169 kg and 168 cm (BMI = 59.8 kg m^{-2}) (Fig. 1), gravida 4, para 2, abortion 1 with 41 weeks and six days of gestation. With hypertension for 14 years, the patient was taking alpha methyl dopa 1.5 g day^{-1} ; with uterine myomatosis, she had several episodes of metrorrhagia before the pregnancy. She underwent curettage for missed abortion four years ago, without anesthetic and surgical complications. The patient was admitted to the obstetric unit in labor with amniotic sac rupture, and was fasting for eight hours. Cesarean section was indicated due to suspected fetal macrosomia (estimated fetal weight of 4600 g in ultrasound) and the expected difficulty of fetal monitoring. Laboratory tests showed hemoglobin 9.8 g dL^{-1} , hematocrit 31.3%, WBC 7900 mm^3 , platelets $190,000 \text{ mm}^3$, urea 26 mg dL^{-1} , and creatinine 0.6 mg dL^{-1} . The patient complained of discomfort when placed in the supine position. She was lucid, collaborative, with dry mucous membranes and pallor skin. Airway examination revealed Mallampati grade II, mouth opening larger than 3 cm, and thyromental distance greater than 6 cm. Neck flexion and extension were limited. Apron abdomen, gravid, with hyperemia in the lower region, diffusely tender to palpation. The patient refused spinal anesthesia despite arguments to the contrary. In the operating room, the patient was monitored with 5-lead ECG, pulse oximetry (oxygen saturation), noninvasive blood pressure and, after intubation, capnography and gas analyzer (O_2 and CO_2 and inhalational anesthetics). Arterial blood pressure, oxygen saturation,



Figure 1 35-year old pregnant woman, weighing 169 kg and 168 cm.

heart and respiratory rate at baseline were 130/80 mmHg, 89%, 80 beats per minute (bpm), and 15 breaths per minute (rpm), respectively. After venous puncture with intravenous catheter 16G, infusion of lactated Ringer's solution (RS) was started (10 mL kg^{-1} ideal body weight). The patient was placed in the ramp position with cushions from back to head to parallel her with the ground, the imaginary line from the ear canal to the sternum. Another cushion was placed on top of the right gluteus to create an angle of about 15° to the operating table in order to move the uterus to the left. Intravenous (IV) ranitidine (100 mg) was administered and bladder catheterization performed before starting the operation. Immediately before induction of anesthesia, asepsis was carried out and sterile surgical fields were placed. The patient received 7 L min^{-1} of oxygen via face mask for three minutes followed by remifentanyl $70 \mu\text{g IV}$ over 60 s, lidocaine 80 mg, propofol 200 mg, and succinylcholine 150 mg. During airway management Cormack-Lehane grade III was identified by laryngoscopy, and tracheal intubation was performed with a 7.5 mm cannula in quick sequence with Sellick maneuver and use of a tracheal tube introducer (gum elastic bougie, GEB) without complications. Controlled ventilation was performed with tidal volume of 680 mL, respiratory rate of 12 rpm, PEEP of 5 cm H_2O , and FiO_2 of 0.5. Maintenance of anesthesia performed with sevoflurane 1.5–2.5%, atracurium 25 mg, and remifentanyl of $0.3 \mu\text{g kg}^{-1} \text{ min}^{-1}$ up to fetal extraction and $0.2 \mu\text{g kg}^{-1} \text{ min}^{-1}$ after fetal extraction to the end of the operation. Ephedrine was administered IV before and after fetal extraction, 15 mg and 5 mg, respectively. After clamping the umbilical cord oxytocin was administered in a bolus injection of 5 IU and 10 IU in 500 mL of RS solution. Cephalothin IV 2 g (maintained with 1 g 6/6 h for four days), dexamethasone 10 mg, and ketorolac 30 mg were also infused. Thirty minutes before the end of surgery the patient received dipyrone 2 g IV, methadone 10 mg, and ondansetron 8 mg. It took two assistants, one on each side of the patient, to lift the apron abdomen cephalically in order to facilitate the Pfannenstiel incision. The interval between the skin incision and fetal extraction was 21 minutes. One of Simpson forceps spoons was used to aid in the extraction. The newborn was male, weighing 4850 g, with Apgar score of 2 in

the first minute (received positive pressure ventilation by mask for about 2 min) and of 8 in the fifth minute. After 140 minutes from the start of anesthesia, the patient was extubated uneventfully. The patient had no perioperative awareness. Intravenous dipyrone 2 g/every 4 h and ketorolac 30 mg every 8 h were maintained for 48 h. The patient had no pain at rest within the first 12 hours. Intravenous tramadol (100 mg) was administered diluted in 100 mL saline solution approximately 13 h after the operation due to complaints of moderate pain during ambulation. The patient was satisfied with the post-operative pain management and had no postoperative nausea or vomiting. Mother and newborn were discharged on the fourth day after surgery.

Discussion

Pregnant women with $\text{BMI} \geq 50 \text{ kg m}^{-2}$ have an increased risk for cesarean delivery, regardless of parity.¹¹ In our case, we believe that cesarean delivery would be better because there was an estimated fetal macrosomia, combined with expectations of technical difficulty in monitoring the fetal well-being. Because general anesthesia is associated with increased morbidity and mortality,¹² regional anesthesia has become the most widely recommended anesthetic technique. However, because the patient refused spinal anesthesia despite arguments to the contrary, the use of this technique was discarded. The patient received intravenous ranitidine before surgery in order to reduce the gastric pH, to mitigate a possible aspiration of gastric contents during tracheal intubation. Oral non-particulate antacid (0.3 molar sodium citrate) was not given preoperatively, as recommended by the guidelines,¹³ because this drug is not available in our service. The positioning of the patient on the operating table, using ramp cushions from back to head or device that does the same function, as suggested by Simoni,¹⁴ is mandatory in a patient like this, as it greatly facilitates tracheal intubation. Placing a cushion under the right gluteus of the patient was also very important to move the pregnant uterus to the left, in order to prevent the aortocaval compression syndrome, as the manual displacement of the pregnant uterus could be very difficult or even unproductive in this patient with a quite large abdomen. Furthermore, the cushion allowed letting one of the staff members free for other tasks. The urinary catheter, asepsis and placement of surgical fields prior to induction of anesthesia may enable shortening the drug transfer time to the fetus. We used remifentanyl, a potent synthetic opioid of fast onset of action, around one minute, that presents a unique pharmacokinetic feature of, among other opioids, plasma and tissue esterases metabolism into inactive metabolite, with a context-dependent half-life of 3 min. Consequently, it does not accumulate in the mother, even after prolonged administration.¹⁵ Remifentanyl can offer maternal hemodynamic stability and attenuate responses to airway management and surgical stimulation.¹⁶ Similar to other opioids, remifentanyl crosses the placental-uterus barrier, but it is rapidly cleared from the newborn plasma.¹⁷ Therefore, it may not have the disadvantage of neonatal respiratory depression associated with fentanyl and alfentanil.^{18,19} The decreased functional residual capacity and increased O_2 demand in pregnant women results

in more rapid onset of oxyhemoglobin desaturation during apnea compared to non-pregnant women. In morbidly obese pregnant women, the onset of desaturation can be even faster.²⁰ The cricoid pressure application during the Sellick maneuver, in rapid sequence induction, worsens the glottis view. Tracheal intubation in this situation is greatly facilitated by the use of GEB.²¹ This device is easy to use, portable, and relatively inexpensive. GEB was the most commonly used device in 3423 emergency intubations analyzed by Martin et al.²² During intubation, the use of GEB combined with the ramp positioning of our patient was very helpful because it allowed rapid intubation without lowering of oxygen saturation. The patient remained hemodynamically stable during surgery, required small doses of ephedrine for correction of short periods of hypotension. A vertical skin incision is a technique often used for cesarean delivery in morbidly obese pregnant women.^{23,24} However, skin vertical incisions, compared with low transverse incisions, are associated with increased surgical time, greater blood loss, increased postoperative pain, higher incidence of atelectasis, superficial wound, and fascia dehiscence.^{24–26} In this case, the presence of hyperemia and warmth in the periumbilical region (cellulitis?) definitely ruled out the possibility of a cross-surgical approach. And the biggest problem with the Pfannenstiel surgical approach was the fetal extraction difficulty, which required the use of Simpson forceps. It is also noteworthy that because of the unique anatomical characteristics of the patient the time interval between skin incision and fetal extraction was large (21 min), but comparable to that reported by Conner et al. (16 ± 11.3 min for $\text{BMI} > 50 \text{ kg m}^{-2}$).²⁷ Conner et al.²⁷ also reported that the increase in BMI was associated with a statistically significant increase in pH < 7.2 and excess base $\leq 8 \text{ mmol L}^{-1}$ of umbilical cord blood. The Apgar score of the newborn was low in the first minute, but recovered promptly after positive pressure ventilation by mask. This may have resulted from the longer period of time between the skin incision and fetal extraction itself, prolonged exposure to the effect of balanced general anesthesia with remifentanyl, and some degree of aortocaval syndrome. Obese patients are susceptible to increased risk for surgical wound infection, urinary tract infection, endometritis, and sepsis. Evaluating 133 morbidly obese patients undergoing cesarean delivery, Brocato et al.²⁶ reported 27% incidence of surgical wound complications (infection or dehiscence) and 4% endometritis. Alanis et al.,²⁵ studying 194 women with $\text{BMI} \geq 50 \text{ kg m}^{-2}$ undergoing cesarean section, reported an incidence of about 27% of surgical wound dehiscence and 4% of cellulite in the surgical wound. Therefore, it is important to establish preventive measures against infection for these patients. Prophylactic antibiotics for cesarean delivery has traditionally been used after the umbilical cord clamping for fear that the antibiotic was harmful to the baby and could produce resistance of microorganisms to antibiotics or mask neonatal infections. However, in 2010, the ACOG Committee Opinion recommended that the antibiotic is administered within 60 min before skin incision.²⁸ More recently, Baaqeel H and Baaqeel R, in a meta-analysis that included 2313 women, reported a 41% reduction in the incidence of endometritis with the preoperative use of antibiotics.²⁹ However, our patient received antibiotic after clamping, which was maintained for seven days on suspicion of cellulite. Provide

adequate postoperative analgesia to patients should be a commitment of the entire team of caregivers. Because the patient received remifentanyl in high doses, there was concern about the possibility of hyperalgesia in the early postoperative period.³⁰ To obviate this problem, an analgesic regimen including methadone, dipyron, and ketorolac (multimodal analgesia) was established. Particular attention was given to methadone for its action as NMDA receptor antagonist.^{31,32} And this regimen was satisfactory in controlling postoperative pain.

Conclusion

Because the prevalence of obesity is increasing among pregnant women, an increasing number of patients will undergo cesarean delivery. And many pregnant women, for various reasons, will require general anesthesia for delivery. The multidisciplinary team should take into account the anatomical, physiological, and clinical characteristics of these patients for the best possible perioperative management, aimed at their rapid recovery and to preserve the integrity of their newborns.

Conflicts of interest

The authors declare no conflicts of interest.

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