

ANESTHESIA FOR CESAREAN SECTION

REVIEW ARTICLE

SEZARYEN ANESTEZİSİ

Sevgi Bilgen, MD

*Yeditepe University Hospital
Assistant Professor Department of Anesthesiology*

Ozge Koner, MD

*Professor Department of Anesthesiology
Yeditepe University Hospital*

Nurcan Sancar, MD

*Yeditepe University Hospital
Department of Anesthesiology*

Corresponding Author

Sevgi Bilgen, MD

*Yeditepe University Hospital
Assistant Professor Department of Anesthesiology
İstanbul/Turkey
e-mail: sevgibilgen@yahoo.com*

ABSTRACT

Elective cesarean section rate is worldwide increasing. Anesthetic management of cesarean section is important for both mother and the fetus. The haemodynamic changes occur during pregnancy and the anesthesiologist should be consider this changes during anesthesia.

Anahtar Kelimeler: Sezaryen; Genel anestezi; bölgesel anestezi.

ÖZET

Elektif sezaryen oranı dünyada artmaktadır. Sezaryenda anestezi yönetimi anne ve fetus için önemlidir. Gebelik sırasında hemodinamik değişiklikler olur ve anestezi bu değişiklikleri anestezi sırasında göz önünde bulundurulmalıdır.

Key Words: Cesarean section; general anesthesia; regional anesthesia.

BACKGROUND

Cesarean section is one of the most common surgical process and the number of women undergoing cesarean section is increasing(1,2). Cesarean section can be performed under either regional (spinal, epidural, and combined spinal/epidural) or general anesthesia(3). Regional anesthesia has become the preferred technique for cesarean section. The choice of anesthesia for cesarean section depends on multiple factors: the indication of surgery, urgency of the procedure, patient's and also surgeon's preference(4) and skills of anesthetist. Regional anesthesia is beneficial for the mother and may reduce the risks associated with general anesthesia for cesarean section(3).

GENERAL ANESTHESIA

General anesthesia has a more rapid and reliable onset, a better control over the airway and ventilation, and potentially

less hypotension than regional anesthesia during cesarean section. The most common risks of general anesthesia are failed endotracheal intubation, hypoxia and aspiration of gastric contents.

Pregnancy results in significant changes affecting most maternal organ systems. The physiological and anatomical changes are responsible for the reduced apnea tolerance, increased risk of pulmonary aspiration and difficult intubation(5). The reduced tolerance for apnea in pregnant women is due to the increased metabolic rate and decreased functional residual capacity(3). Anatomic changes of the airway such as edema of the upper airway and vocal cords, lead to difficult endotracheal intubation. The associated diseases such as obesity or preeclampsia raise the risks of difficulties with airway management. The incidence of difficult intubation is 1/30, the incidence of impossible intubation is 1/280 in obstetrics and eight times greater than in the general population(5). Therefore, a variety of laryngoscope blades, a short laryngoscope handle, at least one extra styleted endotracheal tube, Magill forceps, laryngeal mask should be ready before anesthesia for cesarean section. Because of the improved difficult airway management, and the rescue use of the laryngeal mask airway the incidence of failed airway is decreased(6).

The barrier pressure at the level of the lower esophageal sphincter is reduced, and gastric emptying is delayed in pregnancy. The angle of the gastroesophageal sphincter becomes less acute(7). Because of the increased the risk of aspiration, timely administration of nonparticulate antacids, histamine (H_2) receptor antagonists, and/or metoclopramide for aspiration prophylaxis should be considered before cesarean section(8).

Compression of the vena cava by the gravid uterus results in a reduced cardiac preload, reduced cardiac output and maternal hypotension. Therefore the

pregnant women should be kept in the left lateral tilt position during surgery(9).

REGIONAL ANESTHESIA

Regional anesthesia should be preferred when balancing the risks and benefits for the mother and the fetus. All of the anesthetic agents administered to the mother cross the placenta and may cause fetal and neonatal depression. Systemically administered anesthetic agents cross the placenta to a greater degree than local anesthetic agents injected via the neuroaxial route(3). Regional anesthesia reduces risk of gastric aspiration, helps avoid the depressant effects of systemic anesthetic drugs, and keeps the mother awake during delivery. Regional anesthesia may reduce the operative blood loss in comparison to general anesthesia(10).

Both spinal and epidural techniques provide effective anesthesia for cesarean section(11). However, both techniques have a failure rate of 3%, even with experienced practitioners(12). The choice between spinal and epidural anesthesia is based on physician's preferences. The advantages of spinal anesthesia over epidural anesthesia are; the ease of technique, rapid onset time of the anesthesia, a more intense block, decreased serious systemic drug toxicity incidence. Potential disadvantages include a rapid onset of profound hypotension and postdural puncture headache(PDPH).

Hypotension and bradycardia are the most common clinical problem following regional anesthesia. The effect of spinal or epidural anesthesia on the cardiovascular system depends on the level and the degrees sympathetic blockade. Although treatment for hypotension is more likely if spinal anesthesia is used(11), maternal hypotension can be managed successfully with left uterine displacement, intravenous (iv) ephedrine (5-15 mg) or phenylephrine (25-50 μ g) and iv fluid infusions (at least 10-15 mL/kg, crystalloid solution)(13). If hypotension

occurs despite these measures, both left uterine tilt and the rate of iv infusion should be increased and repeated doses of ephedrine or phenylephrine should be used. Hypotension following epidural anesthesia is generally not as severe as after spinal anesthesia because the local anesthetic is administered in incremental doses through the epidural catheter.

Accidental dural puncture (ADP) and post-dural puncture headache are important complication in pregnant women during epidural anesthesia. The incidence of accidental dural puncture is correlated with the skill of the anesthesiologist(14). When the dura is punctured accidentally, either the needle should be removed and another epidural catheter insert attempt should be made using a different intervertebral space or a sunarachnoid catheter should be inserted through the epidural needle. The catheter can be used to replace the cerebrospinal fluid with isotonic saline, another option is to use the catheter for anesthesia. Epidural blood patch with 20 mL of blood or epidural saline boluses may be performed. Conservative treatment for PDPH includes bedrest, analgesics, iv or oral fluid resuscitation, and caffeine.

The incidence of persistent neurologic symptoms following regional anesthesia is extremely low. The overall incidence of severe regional anesthesia related neurologic complications in obstetric anesthesia is less than 1/10.000(15).

ANESTHESIA IN COMPLICATED PREGNANCY PREECLAMPSIA AND ECLAMPSIA

Preeclampsia is a multisystem disease and responsible for significant morbidity and mortality in the pregnant women. There are several risk factors for preeclampsia; nulliparity, multiple pregnancy, maternal age ≥ 40 years, renal disease, hypertension, ≥ 10 years since previous pregnancy and presence of antiphospholipid antibodies(16). Symptoms typically occur after the 20 th week of

gestation and/or within 48 hours after delivery and consist of hypertension ($>140/90$ mmHg) and proteinuria (>300 mg/day).

The choice of anesthesia for preeclamptic women undergoing cesarean section was controversial in the past. But, if not contraindicated, regional anesthesia techniques are the methods of choice in those patients. There are few contrindications for regional anesthesia such as, severe clotting abnormalities or severe plasma volume deficit. Epidural anesthesia is preferred to spinal anesthesia in preeclamptic women because of its slower onset of action and the ability to titrate the local anesthetic through the epidural catheter. But, Chiu and at al. demonstrated that spinal anesthesia induced blood pressure decreases are similar to epidural anesthesia in preeclamptic women and there is no difference regarding the maternal and neonatal outcome(17). If general anesthesia is used, the potentially fatal hypertensive response to intubation should be considered.

ANTEPARTUM HEMORRHAGE

Plesenta previa and abruptio plesenta are most common reasons for antepartum hemorrhage. Uterine rupture is relatively uncommon. Volume resuscitation, massive blood transfusion, replacement of coagulation factors and platelets are required frequently. An emergency hysterectomy may be required because of severe hemorrhage and uterine atony.

General anesthesia is indicated in the presence of uncontrolled hemorrhage and coagulation deffects, but epidural anesthesia may be considered.

POSTOPERATIVE ANALGESIA

Effective pain control is vital after cesarean section. Pain after cesarean section may decrease the ability to function and interfere with maternal care of newborn. The ideal analgesic of choice

should be transferred to the breast milk minimally without undesired effects on neonates, and the mother(18). Severe postoperative pain can cause atelectasis, hypoxemia, sputum retention due to reduced cough and increased incidence of nausea and vomiting and as a result longer postoperative hospital stay(19). Post cesarean section patients are at higher risk for thromboembolic events, which way also be precipitated by immobility from inadequate pain control or excessive sedation with opioids. An effective pain control provides early mobilization. Besides mothers can take care of the newborn effectively.

Systemic opioids are commonly used for postoperative pain control after general anaesthesia for cesarean section(20). Patient-controlled analgesia with intravenous opioids is highly popular. The most frequently used opioid is morphine HCL. Opioid related side effects include; respiratory depression, nausea, vomiting and pruritus.

Regional analgesia is more effective than systemic analgesics for postoperative pain control after cesarean section(21). Morphine is commonly used either intrathecally or epidurally. It provides a significantly prolonged postoperative analgesia(19). Anti-inflammatory drugs improve the quality of analgesia, potentiate opioid effects, decrease opioid consumption and reduce opioid related side effects for postoperative analgesia in cesarean section.

Chronic pain is an expected problem for the mother after cesarean section. General anesthesia is one of the risk factors for chronic pain after cesarean section(22). Spinal anesthesia for elective cesarean section may reduce the intensity of postoperative pain, use of additional analgesics and side-effects more than epidural anesthesia(23).

CONCLUSION

The technique of choice for cesarean section anesthesia should be individualized. The decision of the technique should be made according to the preoperative evaluation, obstetric and anesthetic issues. Regional anesthesia is the anesthetic procedure of choice for healthy women undergoing elective cesarean section(3). However the failure rate of regional anesthesia in obstetric patient around 3%; therefore general anesthesia should remain as an option for cesarean procedures.



REFERENCES

- 1) Lavand'homme P. Chronic pain after vaginal and cesarean delivery: a reality questioning our daily practice of obstetric anesthesia. *Int J Obstet Anesth.* 2010;19:1-2. Epub 2009 Dec 2.
- 2) Toledo P. What's new in obstetric anesthesia: the 2011 Gerard W. Ostheimer lecture. *Int J Obstet Anesth.* 2012;21:68-74. Review.
- 3) Wong CA. General anesthesia is unacceptable for elective cesarean section. *Int J Obstet Anesth.* 2010;19:209-12.
- 4) Siddiqi R, Jafri SA. Maternal satisfaction after spinal anaesthesia for caesarean deliveries. *J Coll Physicians Surg Pak.* 2009;19:77-80.
- 5) Boutonnet M, Faitot V, Keïta H. [Airway management in obstetrics]. *Ann Fr Anesth Reanim.* 2011;30:651-64.

- 6)Ranasinghe JS, Birnbach D. Current status of obstetric anaesthesia: improving satisfaction and safety. *Indian J Anaesth.* 2009;53:608-17.
- 7)Ní Mhuireachtaigh R, O'Gorman DA. Anesthesia in pregnant patients for nonobstetric surgery. *J Clin Anesth.* 2006;18:60-6.
- 8)American Society of Anesthesiologists Task Force on Obstetric Anesthesia. Practice guidelines for obstetric anesthesia: an updated report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia. *Anesthesiology* 2007;106:843-63.
- 9)Van De Velde M, De Buck F. Anesthesia for non-obstetric surgery in the pregnant patient. *Minerva Anesthesiol.* 2007;73:235-40.
- 10)Admir Hadzic. *Textbook of Regional Anesthesia and Acute Pain Management.* 2007. p. 707.
- 11)Ng K, Parsons J, Cyna AM, Middleton P. Spinal versus epidural anaesthesia for caesarean section. *Cochrane Database Syst Rev.* 2004;CD003765.
- 12)Bloom SL, Spong CY, Weiner SJ, Landon MB, Rouse DJ, Varner MW, Moawad AH, Caritis SN, Harper M, Wapner RJ, Sorokin Y, Miodovnik M, O'Sullivan MJ, Sibai B, Langer O, Gabbe SG. Complications of anesthesia for cesarean delivery. *Obstet Gynecol.* 2005;106:281-7.
- 13)Qublan HS, Merhej A, Dabbas MA, Hindawi IM. Spinal versus general anesthesia for elective cesarean delivery: a prospective comparative study. *Clin Exp Obstet Gynecol.* 2001;28(4):246-8.
- 14)Admir Hadzic. *Textbook of Regional Anesthesia and Acute Pain Management.* 2007. p. 1043.
- 15)Kuczkowski KM. Neurologic complication of labor analgesia: facts and fiction *Obstet Gynecol Surv.* 2004;59:47-51.
- 16)Duckitt K, Harrington D. Risk factors for pre-eclampsia at antenatal booking: systematic review of controlled studies. *BMJ.* 2005;12;330:565. Epub 2005 Mar 2.
- 17)Chiu CL, Mansor M, Ng KP, Chan YK. Retrospective review of spinal versus epidural anaesthesia for caesarean section in preeclamptic patients. *Int J Obstet Anesth.* 2003;12:23-7.
- 18)Pan PH. Post cesarean delivery pain management: multimodal approach. *Int J Obstet Anesth.* 2006;15:185-8.
- 19)Clarke RSJ. Intravenous anesthetic agents: induction and maintenance. In Wylie, editor. *A practice of anesthesia.* 6th edition. London: Churchill Davidson; 1995. p. 97.
- 20)Pan PH, Coghill R, Houle TT, Seid MH, Lindel WM, Parker RL et al. Multifactorial preoperative predictors for postcaesarean section pain and analgesic requirement. *Anesthesiology* 2006;104:417-25.
- 21)Block BM, Liu SS, Rowlingson AJ, Cowan AR, Cowan JA Jr, Wu CL. Efficacy of postoperative epidural analgesia: a meta-analysis. *JAMA.* 2003;290:2455-63.
- 22)Nikolajsen L, Sørensen HC, Jensen TS, Kehlet H. Chronic pain following Caesarean section. *Acta Anaesthesiol Scand.* 2004;48:111-6.
- 23)Schewe JC, Komusin A, Zinserling J, Nadstawek J, Hoeft A, Hering R. Effects of spinal anaesthesia versus epidural anaesthesia for caesarean section on postoperative analgesic consumption and postoperative pain. *Eur J Anaesthesiol.* 2009;26(1):52-9.