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Research Article

A comparative study of general anesthesia versus combined spinal–epidural anesthesia on the fetus in cesarean section



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KEYWORDS

Combine spinal–epidural;
Fetal acidosis;
Apgar score;
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Abstract *Background:* Obstetric anesthesia guidelines recommend regional over general anesthesia for most caesarean sections to decrease the risk for both fetus and mother.

Aim of the work: To determine the effects of combined spinal epidural anesthesia and general anesthesia on the newborns and the mother undergoing elective cesarean section.

Subjects: A total of 60 consecutive women with uncomplicated singleton pregnancies at term and scheduled to undergo elective cesarean section at Kasr Al-Aini obstetric hospital participated in this prospective study. The women were divided into 2 groups (each 30), a general anesthesia group (A) and combined spinal–epidural anesthesia group (B).

Methods: Umbilical artery blood gas analysis and Apgar scores were assessed at 1 and 5 min after delivery in the newborn while systolic and diastolic blood pressure, heart rate, oxygen saturation and (capnography in general anesthesia) were measured preoperative and after 5, 10 and 15 min of induction of anesthesia in the mothers. In addition, the time from induction of anesthesia till delivery of the fetus and duration in operative room were measured.

Results: Apgar score recorded statistically significant differences between the 2 groups at 1 min and 5 min, where with combined spinal–epidural anesthesia the Apgar score readings were higher than with general anesthesia. HCO_3 readings showed a statistically significant difference between the 2 groups after 1 and 5 min, where the newborns in general anesthesia group had a statistically significant lower HCO_3 compared to the newborns in combined spinal–epidural group. Patients in

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general anesthesia group were significantly more tachycardic compared to patients in combined spinal–epidural group.

Conclusion: Combined spinal–epidural anesthesia is safer on the newborn than general anesthesia regarding the APGAR scores and acid–base balance.

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1. Introduction

Mother and fetus well-being should be taken into account while planning for anesthetic for cesarean delivery. Regional anesthesia is safer for the mother than general anesthesia and the most common method of anesthesia for delivery because it allows the mother to be awake and immediately interact with her baby [1].

Spinal and combined spinal epidural anesthesia are more commonly used than epidural anesthesia because it has a more rapid onset and lower incidence of failed block than pure epidural techniques. The use of spinal anesthesia for cesarean delivery was facilitated by the popularization of pencil-point needles, which dramatically reduced the incidence of postdural puncture headache [2].

In contrast to regional anesthesia, general anesthesia offers a very rapid and reliable onset, control over the airway and ventilation and potentially less hypotension. The major adverse fetal effect of regional anesthesia and its sympathetic blockade is utero-placental hypo-perfusion which leads to an acute fall in intervillous blood flow with the potential for fetal acidemia [3].

The question posed regarding the effect of general versus regional anesthesia on neonatal Apgar scores is an interesting one. This subject has been studied by many investigators over the years, most commonly retrospectively and in the setting of elective cases. Some have shown no difference in Apgar scores between the groups. Some have reported lower Apgar scores and worse outcomes with the use of general anesthesia, suggesting that these differences are a result of transient sedation secondary to anesthetic agents [4]. Others have suggested an increased degree of acidosis in neonates delivered under regional anesthesia, possibly due to greater incidence of maternal hypotension and need for ephedrine to support maternal blood pressure [5].

Although the safety of regional anesthesia is evidenced based yet it is not properly positioned during anesthesiologist decision making in our country due to false cultural believes. Also the familiarity for working under regional anesthesia among surgeon is still lacking in our country.

The aim of this work is to compare the effects of Combined Spinal Epidural anesthesia and general anesthesia on the newborns and the mother undergoing elective cesarean section to highlight the safety of regional techniques.

2. Patients and methods

2.1. Type of the study

This is a cross-sectional observational prospective study.

2.2. Ethical consideration

The study was conducted after approval of the ethical and scientific committee of the department of anesthesia Kasr El Aini hospitals-Cairo University.

2.3. Patients

A total of 60 consecutive pregnant women at term (> 37 completed weeks) was scheduled to undergo elective CS participated in this study. The women were allocated into two equal groups (each 30), a general anesthesia group (A) and a combined Spinal Epidural anesthesia group (B). They fulfilled the following inclusion criteria: women who had uncomplicated singleton cephalic pregnancies with birth weights greater than 2500 g who were indicated to undergo elective caesarean section due to previous Caesarean delivery, precious baby and history of primary infertility. They were consenting to participate at the study. Exclusion criteria were the following: pregnancies with any medical complications, pregnancies with obstetric complications such as hypertension, oligo-hydramnios, poly-hydramnios, ante-partum hemorrhage, suspected fetal abnormality and multiple pregnancies, any coagulopathies, infection at site of regional anesthesia and any sensitivity to used drugs. Preoperative evaluation for both groups included a detailed history, physical examination and investigations (hemoglobin level, platelet count, random blood glucose, serum creatinine, liver function tests, prothrombin time (PT) and international normalized ratio (INR), prothrombin concentration, urea and creatinine). Preoperative medications: ranitidine 50 mg intravenously (H₂-blocker), and metoclopramide 10 mg intravenously. Women in both groups were kept in the left 15° lateral tilt position till delivery to protect against supine hypotension syndrome.

2.4. Technique

On arrival to the operating room all patients received standard continuous monitoring in the form of 5 leads electrocardiography (ECG), automated non-invasive blood pressure monitoring (NIBP), pulse oximetry and capnography (after induction for group A patients) and 18 gauge intravenous canula was inserted in cephalic vein then. *For group A:* (General anesthesia): Pre-induction oxygenation regimen of 4 or 5 vital-capacity breaths of pure oxygen was followed by 5 mg/kg of thiopental intravenously and administration of 1 mg/kg of succinylcholine chloride, endotracheal intubation then maintenance of anesthesia was done by 0.5 mg/kg of atracurium, Controlled mechanical ventilation with 100% oxygen, and 1.0 minimum alveolar concentration of isoflurane. End tidal carbon dioxide pressure kept at 35 mm Hg. *For group B:* (Combined spinal–epidural anesthesia): After IV intravascular fluid administration with 8 mg/kg ringer acetate, the epidural space was identified at the L2-3 interspace with an 18-gauge Touhy needle using the loss-of-resistance to saline technique. A 20-gauge epidural catheter was positioned 4 cm into the epidural space. Then Spinal anesthesia was performed using a 25-gauge Sprotte needle introduced in the mid-line and placed in the L3–L4 intervertebral space. At this step, 12 mg bupivacaine with 25 µg fentanyl was administered (total

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