Research Article

General Anesthesia for Cesarean Section: Indications and Materno-Fetal Outcomes

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Abstract

Introduction: General Anesthesia (GA) during Cesarean Sections (CS) is uncommon. The objective of the study is to evaluate the maternal-fetal outcome aiming to improve the care of the mother and the newborn.

Methods: This is a retrospective observational study done in a University hospital. It included all cases who had CS under GA. The parameters that were studied included operative indication, reasons for choosing GA, maternal and neonatal outcome.

Results: The study included 91 patients. The total rate of CS is 34% for all deliveries and GA accounted for 4% of CS. The mean age is 33 years, the mean parity is 3.4 deliveries, and 68% of deliveries were premature. The most common indication for CS in GA cases is invasive placental implantation (48%) followed by repeat CS (21%). The most common indication of GA for CS is the need for a hysterectomy associated with invasive placentation (70%) followed by failure of loco-regional anesthesia (LRA) for urgent CS (34%). Postoperative complications occurred in 11% with hemorrhage being the most common. Complication related to GA, particularly intubation failure and hypothermia occurred in 3% of the patients. Prematurity (27%) and neonatal respiratory distress (14%) are the most common complications in newborns.

Conclusion: CS under GA exposes mother and fetus to considerable morbidity and mortality. Adequate indications and programming of this intervention could improve the maternal and neonatal outcomes.

Keywords: General anesthesia; Cesarean; Pregnancy; Morbidity; Mortality; Placenta; Prematurity.

Abbreviations: GA: General anesthesia; CS: Cesarean Sections; LRA: Loco-Regional Anesthesia; BMI: Body Mass Index

Introduction

The birth rate by CS has risen steadily in recent decades around the world. In the United States, CS is the most frequently performed surgical procedure and constitutes 24.1% of the births [1]. In 1985, WHO advocated that national caesarean section rates should be between 10% and 15% of births, assuming that pregnancy and childbirth are physiological phenomena and that dystocia remains the exception and should not exceed the average rate of 10%. In 9 Asian countries, the birth rate by caesarean section was at 27.3%. In 2010, the WHO was alarmed by the increasing number of caesarean births in China, which was 45%. The recent increase in CS rate is partly explained by the increase in maternal age, the prevalence of obesity, multiple pregnancies, and the instances of uterine scarring. New indications, mainly 'convenience' cesareans, as well as the increasingly medico-legal constraints, also contribute to this increased rate.

CS can be performed under General Anesthesia (GA), or Loco Regional Anesthesia (LRA). LRA is to be favored because it yields less maternal morbidity and mortality and has become the reference technique for non-urgent and semi-urgent situations [2]. It includes spinal anesthesia, spinal anesthesia with epidural, and epidural anesthesia. Spinal anesthesia is the most used anesthesia technique for CS. In fact, more than 95% of CS in the United States and Canada are done under spinal anesthesia due to its superiority to the epidural in terms of speed of installation and efficiency.

As for the GA, its indications consist essentially of the contraindications and failures of the LRA: extreme urgency, abnormal anatomy of the lumbar region, failure of spinal anesthesia, infection at the point of puncture, hemostasis disorders, unbalanced intracranial hypertension, hemodynamic instability (especially in a septic context), and maternal hemorrhage. The refusal of the LRA by the parturient is also an indication of GA.

The latest report of the 2010 PERINAT survey shows that rates for GA and LRA for CS in France are 5.8% and 94.2% respectively. Therefore, it has become the least frequently used anesthesia technique for CS because it leads to greater maternal morbidity and mortality [3]. Recent reports point out the negative impact of GA on fetal central nervous system development and advise against using it for CS [4].

Our study aims to define indications along with maternal and fetal outcomes for CS under GA.

Materials and methods

A retrospective descriptive study was conducted. The aim was to evaluate the practice of CS under GA in our institution, its indications, and its fetal-maternal impacts to improve the care of the woman and the newborn.

This observational study includes all women who underwent caesarean delivery under GA at Hôtel-Dieu de France University hospital in Beirut, between 2011 and 2017. The retrospective study relies on information retrieval from medical files followed by data analysis. We determined the incidence of GA during CS, the maternal characteristics, the indications for CS, the GA indications, and the maternal and fetal complications.

After collecting the data, a descriptive and qualitative analysis was performed. The results are presented in averages or medians in cases of asymmetric distribution for quantitative variables and as percentages for qualitative variables

This study respects the principles of Helsinki Declaration and has been approved by the ethics committee of Saint Joseph University in Beirut and is registered as CEHDF-1146.

Results

Ninety-one patients were included in the study. The average age of patients under GA was 33 years old (23-46 years) with a parity of 3.4 deliveries. 71% of patients had a BMI between 30-40 (Figure 1).

14% of the patients had a medical history, including, mainly, hematologic problems such as coagulation factor deficiency, thalassemia, thrombotic disease, vasculitis (61%) and hypothyroidism (15%). Epilepsy, poliomyelitis, and chronic renal failure treated by transplant were also present.

Only three patients had a surgical history (gastric bypass, endometriosis by laparoscopy and resection of an ovarian cyst).

73% of patients who had a CS under GA suffered from at least one complication during the pregnancy, listed in Table 1.

68% of CS under GA were performed before 37 weeks and only 32% were at term. The indications for CS in the studied population are divided into five broad categories (Figure 2). The CS performed under GA constitute 4% of all cesareans in our institution. 45% of the CS were done in a context of an emergency with the main reason being the failure of LRA. Figure 3 shows the detailed indications of the GA.

For scheduled CS, the most common indication of GA remained the placental implantation abnormalities requiring the completion of a hysterectomy. Figure 4 shows the GA indications for programmed or urgent CS.

64% of patients who underwent CS under GA had no postoperative maternal complications. Only 12% of patients suffered a serious complication requiring intervention (uncontrollable bleeding, serious infection, uterine atony). Anesthetic difficulties were rare (3%) and consisted of two complications (difficulty with intubation and severe hypothermia).

Admission in the intensive care units for surveillance was reported in 24% of the cases.

48% of newborns were transferred to the neonatal intensive care unit for prematurity (27%), neonatal respiratory distress (14%) and neonatal infection (7%). While 46% of newborns were reported to not have any complications, 6% of the newborns, unfortunately, died following delivery (Figure 5).
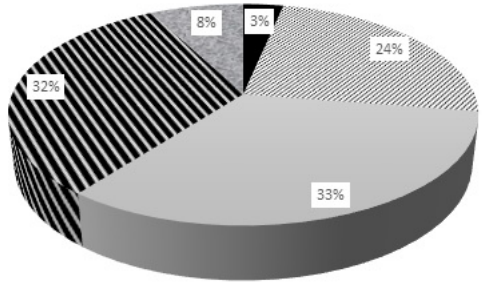
Figure 1: Image showing retrograde pyelography. Ureter appeared to be dilated with? vujo.
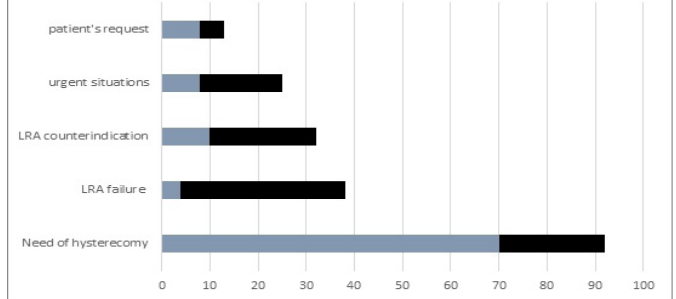
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Figure 2: Indications of the CS in cases with GA.

Figure 3: Reason for deciding for GA during the CS.

Table 1: Complications occurring during pregnancy in patients having GA during CS.

Type	%
Invasive implantation	44%
Vaginal bleeding	28%
Preterm labor	14%
PROM	12%
Urinary infection	12%
Gestational diabetes	10%
Preeclampsia	7%
Amniotic fluid abnormalities	6%
Placental abruption	4%
Fetal anomalies	4%
Hematological complications	3%
Retroplacental Hematoma	3%
Chorioamniotitis	2%

Figure 4: General anesthesia indications regarding scheduled cesareans (gray) and urgent cesareans (black).

Figure 5: Neonatal outcome in cases of CS under GA.
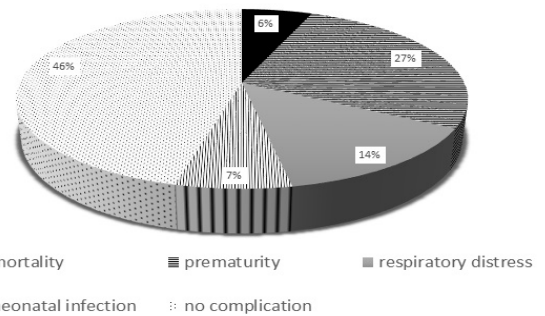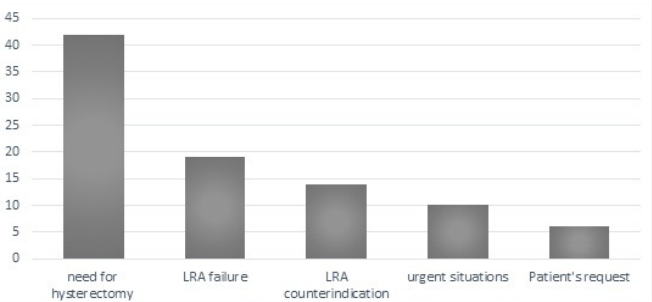
Discussion

Cesarean section is a major event in a woman's life. Using GA is an additional stressor for her. This mode of anesthesia has its own risks making the indications a challenging decision. Our institution is a reference center for pathological deliveries, especially abnormalities of placental implantation, which is the first indication of CS under GA according to the results of this study. Routine repeat CS are uniformly done under spinal anesthesia. The corrected rate of 34%, of CS (not counting the iterative CS) includes a 4% rate of CS under GA. This value is lower than the rates found in the literature [5]. Compared to such a high rate of CS, a 4% rate of CS under GA is considered moderate.

Smoking and high blood pressure, which were prevalent in our study, put patients at increased risk for complications in pregnancies (invasive insertion of the placenta, preeclampsia, placental abruption) and, thus, at a high risk of an urgent CS [6,7].

The relatively high parity [8] and obesity [9] rates contribute to the high prevalence of complicated cesareans and placental implantation abnormalities in our studied population and among other studies.

Prior medical history is mainly represented by hematologic problems. However, abnormal blood crease does not systematically increase the indication of CS under GA. In fact, there is lack of evidence investigating the most appropriate mode of delivery in this population and the surgeon must rely on his best clinical judgment to decide on the optimal delivery method [10].

A meta-analysis published in 2016 about maternal mortality related to anesthesia, has shown that GA by itself is an independent risk factor for maternal mortality [11]. Thus, the GA for CS

is a risk factor for maternal mortality, with an additional risk in urgent situations. However, many of our cases were planned because of the high prevalence of placental implantation abnormalities among our studied population. Our institution is one of the reference centers for this pathology which explains invasive placentation being the most common indication of CS in the studied population. Failure of LRA is the second indication of GA in our series and ranks first for urgent CS. It could be explained by the lack of time required for LRA and the stress of the situation which may affect the performance of the anesthesia team. Devroe. S and al found that the lack of clinical experience of the anesthetist and especially the residents should be considered as an independent risk factor for perioperative morbidity. Simulation training in high-risk situations would be an interesting way to overcome the rates of LRA failure in emergent CS [12].

12% of women in the studied population had a serious early complication related to the intervention. The population characteristics may have an impact on the complications. There is an established correlation between obesity [13], advanced age [14], multiparity, smoking [15], hypertension [15], and the occurrence of post-operative complications and the urgent nature of cesarean section (which occurred in 45% in this series).

Prematurity is the most common neonatal problem and is related mainly to emergency situations, where maternal and fetal prognosis becomes a priority at the expense of gestational age. The neonatal respiratory distress is linked to the high rate of preterm birth, the CS itself, and the GA, which is also considered as an independent factor of neonatal complications. Indeed, studies that compared materno-fetal outcomes between GA and LRA found a significant .he APGAR score of newborns [16,17]. Similarly, Aiken et al., in a study about the unplanned secondary conversion of LRA to GA, reported a significant delay in the newborn's breathing [18]. The fetal neurologic impact caused by the anesthetic products used in GA may also be responsible for it [19].

Conclusion

Cesarean section has consistently constantly increased over the years in parallel to an increase in invasive placental implantations in cases which would lead to a high rate of GA in CS. An effective collaboration between obstetricians and anesthetists is required to lower the morbidity and mortality, mainly in emergent situations. Adequate prenatal follow-up of pregnancy could possibly decrease the rate of emergency indications. Failure of LRA can be addressed by increasing training and simulation in high risk situations.

Conflicts of interest: None, the authors declare no competing interests.

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