Review Article
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Frequency of anesthetic techniques used in preeclamptic patients undergoing cesarean section

Abstract

Introduction: Preeclampsia is a gestational complication characterized by high blood pressure and proteinuria. It is one of the main causes of maternal and perinatal morbidity and mortality worldwide. During cesarean section, choosing the appropriate anesthetic technique is crucial to ensure the safety of the mother and fetus. However, there is a paucity of updated information on anesthetic techniques and their frequency in patients with preeclampsia undergoing cesarean section.

Objective: Determine the frequency of anesthetic techniques used to carry out the cesarean section procedure in pre-eclampsia obstetric patients in HGZ 3 of the IMSS, Aguascalientes, during the period from January 2022 to December 2022.

Methodology: A descriptive, retrospective study was carried out. , in a sample of 64 obstetric patients with a diagnosis of preeclampsia undergoing cesarean section at HGZ 3 IMSS, Aguascalientes, during the period January to December 2022, who met the selection criteria.

Results: We analyzed 64 records of patients with a diagnosis of preeclampsia undergoing cesarean section in order to determine the frequency of anesthetic techniques used to perform a cesarean section in patients with the previously mentioned diagnosis. It was observed that the anesthetic techniques used were: 26 (40.62%) mixed neuraxial block, 30 (46.87%) subarachnoid blocks, 1 (1.56%) epidural block and 7 (10.93%) general anesthesia.

Conclusion: The most used anesthetic technique was subarachnoid block followed by mixed neuraxial block, while general anesthetics were less common, however, more frequent than expected. There is no anesthesia protocol for the anesthetic management of pregnant patients with a diagnosis of preeclampsia who must undergo a Caesarean section.

Keywords: Obstetric patients, Preeclampsia , Caesarean section, Anesthetic technique

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Introduction

In 2020, Jordaan M et al. published an article titled: *A retrospective audit of anesthesia for caesarean section in parturients with eclampsia at a tertiary referral hospital in Cape Town.*[1] The purpose of the study was to determine the proportion of patients with eclampsia who received spinal anesthesia or general anesthesia for cesarean section, as well as evaluation of the rationale for the choice of method. Additionally, short-term maternal and neonatal outcomes were recorded. For this purpose, a retrospective study was carried out. There were 11 exclusions from the selected sample of 100 patients, therefore the study sample was 98 patients. Of them, 7 (7.9%) received spinal anesthesia and 82 (92.1%) received general anesthesia. It was decided to perform general anesthesia because there was no platelet count available in three, pulmonary edema in two, difficult airway due to a bitten tongue in two, fetal bradycardia in two, HELLP syndrome in one, renal failure in one, and patient refusal in a one. In seven women there was no clear reason for general anesthesia. The conclusion was that the small percentage of women with eclampsia who received spinal anesthesia for cesarean section experienced good maternal and fetal outcomes, and more patients could have safely received spinal anesthesia.

In 2021, Chu Cheng et al. published a systemic review with network meta-analysis titled: *A systematic review with network meta- analysis on mono strategy of anesthesia for preeclampsia in cesarean section.*[2] The objective of this study was to reveal the effects of anesthesia strategies on maternal mean arterial pressure (MAP), heart rate, vasopressor consumption, adverse events, and neonatal resuscitation when women with preeclampsia (PE) undergo cesarean section (CS). To do this, three main databases were searched for randomized controlled trials (RCTs) and prospective controlled studies (PCS). Two authors independently reviewed, extracted, and verified eligibility and outcome data. Outcomes involved MAP, vasopressor use, maternal adverse events, APGAR scores, and neonatal resuscitation. Pooled estimates were carried out using contrast-based network meta-analysis, and pooled effect sizes were presented with a 95% confidence interval (CI). General anesthesia was found to have significantly lower vasopressor consumption than spinal anesthesia (standardized mean difference = − 1.19, 95% confidence interval [CI]: − 1.76 to − 0.63), but had a lower risk of event highest maternal adverse effect (= 2.00, 95% CI 1.16 – 3.47). It was concluded that an optimal anesthesia strategy has not been shown to achieve a balanced maternal and neonatal outcome, and therefore a shared decision-making process may be necessary regarding the most appropriate choice of anesthetic strategy for the individual preeclamptic mother undergoing to cesarean section.

For their part, in May 2022, Derartu Neme et al. published a text titled: *Effect of anesthesia choice on hemodynamic stability and fetomaternal outcome of the preeclamptic patient undergoing cesarean section.*[3] The objective of the study was to compare the hemodynamic stability and fe-maternal outcome between general anesthesia and spinal anesthesia in patients with preeclampsia undergoing cesarean section. This was a prospective cohort study in which a sample of 266 patients was used. The comparison of numerical variables between the study groups was performed using the unpaired Student 's t test and the Manny Whitney

U test for symmetric and asymmetric data, respectively. A P value < 0.05 was considered significant. Patients undergoing general anesthesia were found to have a longer hospital stay with a mean of 5.92 days compared to 4.67 days in the spinal anesthesia group, with a statistically significant difference (p = 0.024). The spinal anesthesia group showed a lower maternal mortality of 2.6% compared to 14.8% in the general anesthesia group during the first 48 hours (p = 0.027). In the first 48 h (houres), only 7.14% of the neonates in the spinal anesthesia group were reported dead, while in the general anesthesia group they were 16.6% (p = 0.315). The conclusion was that spinal anesthesia shows a better maternal-fetal outcome during the first 48 hours compared to general anesthesia.

In the same year 2022, Mamdouh EL et al. published *Low -dose combined spinal -epidural versus conventional epidural anesthesia for elective cesarean section in severe preeclampsia* [4] to compare spinal-epidural and conventional low-dose epidural anesthesia for elective cesarean section in patients with severe preeclampsia. A study was carried out that included a sample of 60 patients with severe preeclampsia undergoing elective cesarean section. They were divided into two groups: group I received combined spinal-epidural anesthesia in low doses, with 7 mg of 0.5% heavy bupivacaine with 25 µg of fentanyl intrathecally and incremental 3 - 5 ml of simple bupivacaine in the epidural catheter 10 – 15 min after intrathecal injection; while patients in group II received conventional epidural anesthesia, with 16 ml of simple 0.5% bupivacaine (after 4 ml of 2% lidocaine as a test dose). No statistically significant differences were found between the two groups studied concerning to mean arterial pressure, heart rate and oxygen saturation of the mother, umbilical cord measurements and APGAR score of the fetus at different time points. Consequently, they concluded that the use of low-dose combined spinal-epidural anesthesia for elective cesarean section in patients with severe preeclampsia appears to be as safe and efficient for the mother and fetus as conventional epidural anesthesia.

Finally, in this year, Fatungase OM et al. They published a study titled: *Pattern and outcome of Anaesthesia techniques in patients presenting with pre-eclampsia /eclampsia for caesarean section in a Teaching Hospital.*[5] The purpose of this study was to review the pattern of anesthesia techniques in pregnant women with preeclampsia or eclampsia undergoing cesarean section. For this purpose, a retrospective analysis was carried out for all obstetric patients with preeclampsia or eclampsia who had cesarean sections under different types of anesthesia in a tertiary hospital between January 1, 2014 and December 31, 2018. The following results were found: 182 patients who presented preeclampsia and eclampsia had emergency cesarean sections. Of these, 134 (74%) were diagnosed before eclampsia and 48 (26%) had eclampsia. The mean age was 29.71 ± 6.40 years. Subarachnoid block was performed in 165 (90.66%), 15 (8.24%) had general anesthesia, and the remaining two (1.10%) had local anesthetic infiltration plus TIVA. Perioperative anesthetic complications encountered included postanesthetic chills 19 (10.44%), hypotension 16 (8.79%), and nausea 1 (0.55%). The incidence of death in the operating room was six percent (11 patients). Among the deceased, the anesthesia technique was general anesthesia in eight cases (73%), while three patients (27%) had subarachnoid blocks. The conclusion of the study was that spinal anesthesia was the most commonly used anesthesia technique at this center for patients with preeclampsia and conscious ecliptic patients, and it was found to be a relatively safe technique with low mortality.

Material and method

A descriptive, retrospective study was carried out on total number of 64 obstetric patients with a diagnosis of preeclampsia undergoing cesarean section at the HGZ 3 IMSS, Aguascalientes, during the period January to December 2022. With inclusion criteria, diagnosis of preeclampsia, age 18-50 years, ASA II, III and IV, resolution of pregnancy was via cesarean section, complete clinical record. Pregnant women with oncological disease, kidney disease, cardiovascular disease, systemic arterial hypertension, HELLP syndrome, who have suffered anesthetic complications such as seizures, high block, and warned puncture of the dura mater were excluded. Those with incomplete information in the clinical record were eliminated. An informed consent exception letter was issued, as it was a descriptive study. An operational manual and a data recording sheet were created for data collection to avoid self-selection biases. SPSS v25 was used for statistical analysis. The quantitative analysis was carried out using means and standard deviation, for the qualitative analysis frequencies and percentages were used. The study has the registration number **R-2024-101-007**

Results

We reviewed 6 4 records of patients with a diagnosis of preeclampsia undergoing cesarean section , at General Hospital number 3, aged 18 to 42 years, with an average age of 28 years (Table 1). Regarding gestational age at the time of surgery, it was observed that the average was 36.41 weeks of gestation, in a range of 28.1 to 41 weeks of gestation. Regarding the gynecological-obstetric history of each patient, it was observed that in terms of the number of pregnancies at the time of cesarean section, the average was that 40% of the patients were primigravida and 32.8% were second pregnancies. 75% of the patients had no history of previous abortions.

Table 1 Other sociodemographic characteristics of preeclampsia patients undergoing cesarean section

Anthropometric measurements of patients with a diagnosis undergoing cesarean section				
	EDAD	TALLA	PESO	IMC
Media	27.94	1.57	80.58	32.75
Minimum	18	1.5	60	26.56
Maximum	42	1.6	113	50.2

Considering the above, it was identified that 60.9% of our patients (39 patients) had a history of previous cesarean section.

When analyzing the established diagnosis of preeclampsia, it was determined that 70.3% of the patients were classified as moderate preeclampsia and 29.6% as mild preeclampsia. It was observed that the anesthesiology service assigned a risk according to the ASA classification, with 47 patients with ASA II representing 73.4%, and 17 patients with ASA III, 26.5% of the patients (Table 2).

Table 2 Each of the descriptions of the number of cesarean sections, abortions, number of pregnancies, preeclampsia and ASA is presented

Deeds	n	%	Abortions	n	%
Primigesta	26	40,625	Yeah	16	25
Second feat	twenty-one	32.8125	No	48	75
Third feat	9	14.0625		**64**	**100**
Fourth feat	5	7.8125	**CAESAREAN SECTIONS**	**n**	**%**
Fifth feat	1	1.5625	Yeah	25	39.0625
Sixth feat	2	3,125	No	39	60.9375
	64	**100**		**64**	**100**
PRECLAMATION	**no**	**%**	**ASA**	**no**	**%**
Lighten up	19	29.6875	I	0	0
moderated	45	70.3125	II	47	73.4375
	64	**100**	III	17	26.5625
			IV	0	0
				64	**100**

Finally, it was observed that the anesthetic techniques used were: 26 mixed neuraxial blocks, 30 subarachnoid blocks, 1 epidural block and 7 general anesthesia (Figure 1).

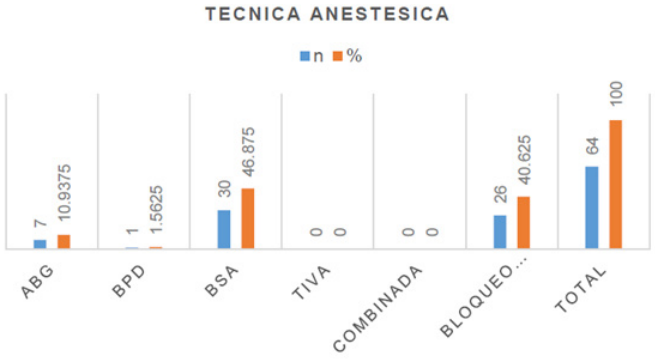

Figure 1 Frequency of anesthetic techniques.

Discussion

Our findings indicate the following frequencies used in patients with preeclampsia undergoing cesarean section in the hospital: 26 (40.62%) mixed neuraxial blocks, 30 (46.87%) subarachnoid blocks, 1 (1.56%) epidural block and 7 (10.93%) general anesthesia, TIVA and combined anesthesia (0%).

Leffert LR. In 2015, it was established that preeclamptic women benefit from neuraxial anesthesia, since these techniques reduce circulating catecholamines[6] and Russell in 2019 points out that spinal anesthesia is the preferred technique, as long as there are no contraindications.[7] In our institution we document that of the 64 patients who underwent cesarean section, 40.62% were under mixed block, 1.56% with epidural block, 46.87% with subarachnoid block, and 10.93% with general anesthesia; The neuraxial technique of choice is the subarachnoid block.

In 2020, Jordaan M et al pointed out in their retrospective study that in their studied population of 100 patients with preeclampsia undergoing cesarean section, 7.9% received spinal anesthesia and 92.1% received general anesthesia.[1] They concluded that the small number of women with eclampsia who receive spinal anesthesia for cesarean section have good maternal and fetal outcomes, and more patients can safely receive spinal anesthesia. This finding coincides with our study since we observed a higher frequency of neuraxial technique used than general anesthesia in patients with a diagnosis of preeclampsia undergoing cesarean section. Also for Kelly Marisancén -Carrasquilla MD, Lina María Martínez-Sánchez, Carolina Durango-Sánchez, Daniela Vergara-Yáñez (2023) in patients with preeclampsia, neuraxial techniques are considered the method of choice due to their safety profile, they are associated with a lower risk of transplacental passage of anesthetic drugs, the approach to the airway is avoided and since the mother preserves her state of consciousness, the early establishment of the mother-child bond is facilitated.[8] It also coincides with our research.

Therefore, current guidelines recommend that these patients to place an epidural catheter or perform a combined epidural-spinal technique early or provide spinal anesthesia, where possible.[9] This finding does not yet coincide with what was reported in the hospital, since for this we found that no combined technique procedure was performed, leaving an epidural catheter, so this needs to be reinforced in the hospital.

Nowadays it is evident that maternal mortality associated with anesthesia, and specifically during cesarean sections, has decreased significantly after the increase in the practice of neuraxial anesthesia.[10] Although neuraxial anesthesia can address the majority of obstetric procedures that require anesthesia (about 90% of them), in the case of severe maternal hemorrhage, eclampsia, significant thrombocytopenia, HELLP syndrome or the presence of contraindications for To address the neuraxis, it will be necessary to resort to general anesthesia. This is the third anesthetic technique performed in the hospital in 7 patients out of the 64 studied, so it is not very consistent with what is reported in the literature. Reporting that the proportions are similar to non-ill pregnant women, in whom it is evident that general anesthesia is not frequently used, as reported by Sobhy et al. (2017), in their systematic review of the literature that included studies from Africa, the Middle East and Asia, and together they evaluated 10,411 cesarean sections, of which only 16% received general anesthesia, approaching what was reported in our study that it was 10%.[11]

Finally, Fatungase OM et al. published a study in which they reviewed the pattern of anesthesia techniques in pregnant women with preeclampsia or eclampsia undergoing cesarean section. Their results showed that the mean age was 29.71 ± 6.40 years.[5] Subarachnoid block was performed in 90.66% of the patients, and 8.24 had general anesthesia, and 1.10% had local anesthetic infiltration plus TIVA.[5] This coincides with our results with an average age of the patients of 28 years and with the frequency of the anesthetic technique, the neuraxial

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technique being the most used, however, we observed that the frequency of general anesthesia was lower and that of TIVA was null in our study.

Conclusion

The majority of pregnant women admitted with a diagnosis of moderate preeclampsia were primigravida. This finding is closely related to what is established in the literature, which mentions that preeclampsia is more common in young and primigravida pregnant women. The most used anesthetic technique in patients diagnosed with preeclampsia undergoing cesarean section. It was a subarachnoid block followed by a mixed neuraxial block, while general anesthetics were less common, however, more frequent than expected.

In summary, these findings suggest the need to carefully consider the anthropometric characteristics, health status and obstetric history of patients with preeclampsia undergoing cesarean section, as well as the choice of the most appropriate anesthetic technique, taking into account the risk and the safety for both mother and fetus. We can observe that the anesthesiology treatment schemes in the anesthetic technique were varied, so we can also conclude that there is no anesthesia protocol for the anesthetic management of pregnant patients with a diagnosis of preeclampsia who must undergo a Caesarean section. We found that management protocols were not followed, both by obstetrics and by the anesthesiology service, since the therapeutic guidelines by both services were very varied in the management of pregnant patients with a diagnosis of preeclampsia.

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