

# Anesthetic practices for patients with preeclampsia or HELLP syndrome: A survey

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## Abstract

**Objective:** Substantial controversy exists regarding anesthetic management for patients with preeclampsia or hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome. Experts, researchers, clinicians, and residents in Turkey were surveyed about their practices.

**Material and Methods:** Questionnaires were distributed to attendees at a national conference, and they were filled out immediately. Anonymous 10-item paper surveys were administered to both residents and non-residents. Descriptive statistics were used in the analysis. Agreement among  $\geq 75\%$  of the respondents was considered a majority opinion. Surveys with missing responses were used to analyze the non-response bias. The Chi-square test was used for comparisons. A historical cohort of obstetricians–gynecologists was used for comparison with anesthesiologists.

**Results:** Of 339 surveys distributed, 288 were returned (84.9% response rate). Among the returned surveys, the completion rate was 96.1%. The job experience in years among clinicians and residents was  $9 \pm 5$  and  $3 \pm 1$ , respectively. General anesthesia was still significantly preferred by 36.1% among patients with preeclampsia with platelet counts of  $\geq 100,000/\mu\text{L}$ . Compared to obstetricians–gynecologists, anesthesiologists more often preferred general anesthesia. With platelet counts of  $< 50,000/\mu\text{L}$  or eclampsia, most respondents preferred general anesthesia 94.4% for very low platelets and 89.5% for eclampsia.

**Conclusion:** A preferential trend toward general anesthesia for patients with preeclampsia or HELLP syndrome exists among anesthesiologists in Turkey, particularly for patients with severe thrombocytopenia and/or eclampsia. There exists a need for well-designed and well-executed prospective clinical trials to provide evidence for the best consensus practice. (J Turk Ger Gynecol Assoc 2016; 17: 128-33)

**Keywords:** Anesthesia, platelet count, glucocorticoids, HELLP syndrome, preeclampsia, survey

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## Introduction

Severe preeclampsia and hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome (hemolysis, elevated liver enzymes, low platelet count) are life-threatening complications during pregnancy (1). Complications and underlying etiopathogenesis of both preeclampsia and HELLP syndrome are globally associated with severe maternal morbidity and mortality. The two syndromes often involve multiple organ systems, including the mother's vasculature and her liver, lungs, kidney, and brain (1). Hence, concerted efforts to enhance the management of these disorders are vital to reduce, to the maximum extent possible, both maternal and fetal morbidity and mortality.

Despite significant advances in our understanding of both preeclampsia and HELLP syndrome, numerous unknowns remain and several controversial issues persist regarding etiology, diagnosis, and best practice management. The literature concerning the two syndromes is extensive but often conflictive. As part of the clinical paradigm, safe and evidence-based

anesthetic management of at-risk patients in the peripartum period is of critical importance. When high-grade evidence is lacking, controversy exists. The choice of the anesthetic method is largely dictated by the composite condition of patients with preeclampsia, their platelet counts, and their coagulation statuses. With a focus on these issues, a cohort of anesthesiologists, including residents and clinicians, was surveyed to solicit their opinions and practice patterns.

## Material and Methods

A 10-item paper survey was developed to query potentially controversial practices in the anesthetic management of patients with preeclampsia and/or HELLP syndrome. No respondents were compensated for this survey, consisting of single answer multiple-choice questions. Beyond the resident and practice experience questions, additional information about respondents was not requested and surveys were not paired with the clinician or resident, so that survey responses remained anonymous.



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The questionnaires were distributed to attendees at the Turkish Anesthesiology and Reanimation Association 2014 Annual meeting and were filled out immediately. Returned surveys were included in the analysis if at least 90% of the questions were answered. Surveys with missing responses were used to analyze items for non-response bias. To test for bias in non-responses, we compared survey answers between those who completed all the questions with those who did not. An agreement above 75% or more was considered a majority opinion. Descriptive statistics were used in summarizing the data. The Chi-square test with post hoc analysis was used for comparisons. Two-tailed p values of 0.05 or less were considered as non-chance differences. Responses to the first three questions in the survey were compared to prior responses obtained from obstetricians-gynecologists with international origin during a prior survey-whereby they functioned as a historical control group (2). In order to compare responses between the two professional groups, a weighting was applied according to the overall response rate to both of the surveys, respectively. In order to determine the internal consistency of the survey, answers to questions 1, 7, and questions 2, 5, and 8 were used to compute reliability coefficients. A Cronbach's alpha of >0.7 was considered acceptable (3). The survey appeared to have good internal consistency ( $\alpha_1=0.805$ ,  $\alpha_2=0.875$ , respectively). Data analysis and management was performed using IBM SPSS® 21 (IBM Corp.; Armonk, NY, USA).

## Results

Of 339 surveys distributed, 288 were returned, for an overall response of 84.9%. Among the returned surveys, the completion rate was 96.1%. In all of the surveys, more than 90% of the questions were answered. The non-response analysis did not indicate differences between those respondents who provided complete data and those with incomplete data. The job experience in years among clinicians and residents was  $9\pm 5$  and  $3\pm 1$ , respectively. Comparison between the residents and clinicians indicated only limited differences in the responses to questions 1 and 6. Table 1 presents the responses to the survey questions 1 to 8.

When analyzed according to decreasing levels of platelet count in questions 1 to 4, there was a significant inverse relation between the platelet count and the utilization of general anesthesia ( $p<0.01$ ). When compared to obstetricians-gynecologists working with a platelet count of  $>100,000/\mu\text{L}$ , anesthesiologists more often preferred general anesthesia ( $p<0.001$ ) (Figure 1). In addition, when the platelet count ranged between 50,000 and  $100,000/\mu\text{L}$ , anesthesiologists preferred general anesthesia more often than the obstetric providers ( $p<0.001$ ) (Figure 2). Below a platelet count of  $50,000/\mu\text{L}$  with severe thrombocytopenia, the responses between anesthesiologists and obstetric providers were similar (Figure 3).

For the last two survey questions (questions 9 and 10), we queried the future use of corticosteroid administration and ultrasound-guided regional anesthetic methods for patients complicated with se-

**Table 1. Responses to survey questions 1–8**

Questions	General anesthesia	Epidural anesthesia	Spinal anesthesia
Q1: For a patient with severe preeclampsia or HELLP syndrome with a platelet count above $100,000/\mu\text{L}$ and normal INR, which type of anesthesia do you prefer?	36.11%	10.07%	53.82%
Q2: For a patient with severe preeclampsia or HELLP syndrome with a platelet count between 50,000 and $100,000/\mu\text{L}$ and normal INR, which type of anesthesia do you prefer?	61.11%	5.9%	32.99%
Q3: For a patient with severe preeclampsia or HELLP syndrome with a platelet count between 25,000 and $50,000/\mu\text{L}$ and normal INR, which type of anesthesia do you prefer?	94.44%	0.35%	5.21%
Q4: For a patient with severe preeclampsia or HELLP syndrome with a platelet count less than $25,000/\mu\text{L}$ and normal INR, which type of anesthesia do you prefer?	97.92%	0.35%	1.74%
Q5: A patient with severe preeclampsia or HELLP syndrome with a platelet count below $50,000/\mu\text{L}$ was transfused with a thrombocyte suspension, and a platelet count above $50,000/\mu\text{L}$ was attained. The INR was normal. In this patient, which type of anesthesia do you prefer?	67.71%	4.17%	28.13%
Q6: In a patient with eclampsia, which type of anesthesia do you prefer?	89.58%	2.08%	8.33%
Q7: Corticosteroid administration may increase the platelet counts in a patient with preeclampsia or HELLP syndrome. After corticosteroid treatment, a platelet count between 100,000 and $150,000/\mu\text{L}$ was attained. The INR was normal. In this patient, which type of anesthesia do you prefer?	40.97%	8.33%	50.69%
Q8: Corticosteroid administration may increase the platelet counts in a patient with preeclampsia or HELLP syndrome. After corticosteroid treatment, a platelet count between 50,000 and $100,000/\mu\text{L}$ was attained. The INR was normal. In this patient, which type of anesthesia do you prefer?	68.06%	4.51%	27.43%

INR: international normalized ratio; HELLP: hemolysis, elevated liver enzymes, low platelets

vere preeclampsia and HELLP syndrome. Half of the respondents agreed that corticosteroid administration via increasing platelet counts might increase the utilization of regional methods (Figure 4). Approximately half of the respondents thought that ultrasound-assisted regional anesthesia methods might decrease complication rates and might increase the procedural safety in this subset of patients (Figure 5).

### Discussion

Our understanding of preeclampsia/HELLP syndrome has continued to significantly increase during recent decades. However, the two entities are still classified as a syndrome and not as a single disease entity. A syndrome, by definition, is any combination of signs and symptoms that is indicative of a process. Accordingly, the cause of preeclampsia/HELLP syndrome remains elusive (4). When faced with this dilemma in a clinical setting, clinicians try to improve the outcome for both the mother and

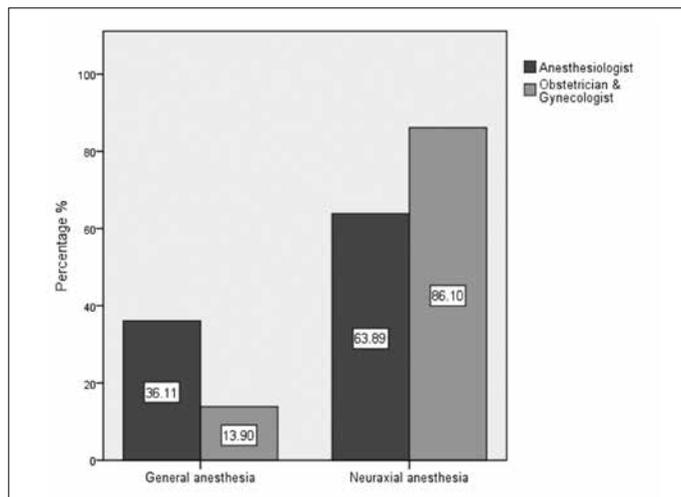


Figure 1. Preference in the type of anesthesia according to anesthesiologists and obstetricians–gynecologists for a platelet count above 100,000/μL

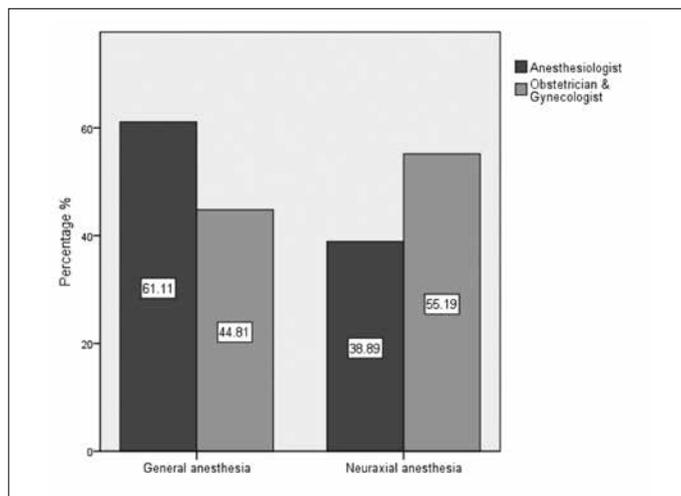


Figure 2. Preference in the type of anesthesia according to anesthesiologists and obstetricians–gynecologists for a platelet count between 50,000 and 100,000/μL

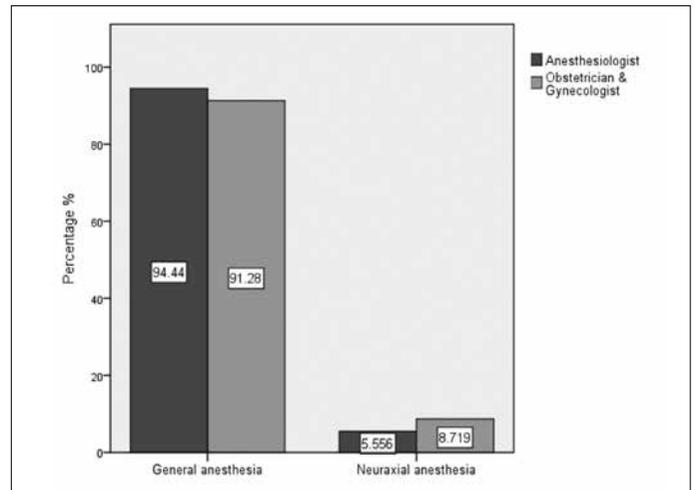


Figure 3. Preference in the type of anesthesia according to anesthesiologists and obstetricians–gynecologists for a platelet count below 100,000/μL

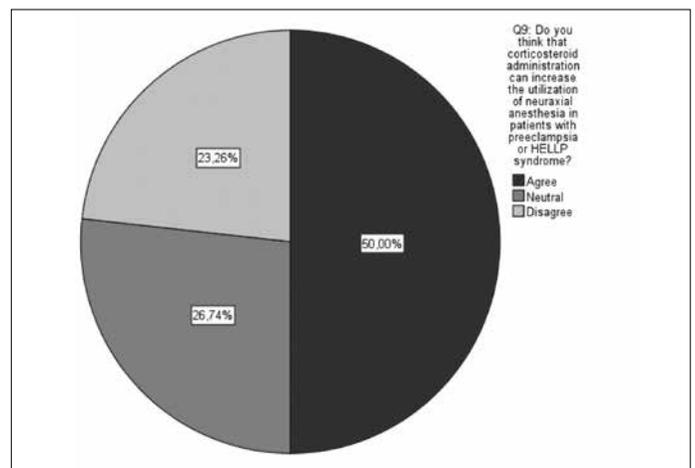


Figure 4. Thoughts on the potential of corticosteroid administration to increase the utilization of neuraxial anesthesia

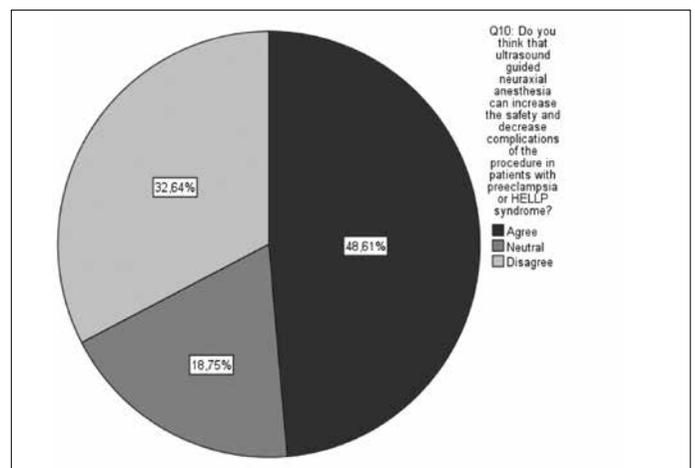


Figure 5. Thoughts on the potential of ultrasound-guided neuraxial anesthesia to decrease complications and increase the safety of the procedure

baby. One excellent intervention for severe thrombocytopenia in the setting of HELLP syndrome has been high dose corticosteroids around the time of delivery. The peripartum period is a critical time, during which there are important opportunities to improve maternal-perinatal outcomes. Anesthetic management is no exception. Rapid resolution of preeclampsia and HELLP syndrome without mortality and with as little severe maternal morbidity as possible is thus highly desirable.

Either general or neuraxial methods may have some disadvantages in patients with preeclampsia. Due to upper airway edema, exacerbated hypertension, failed intubation, and aspiration, general anesthesia carries a significant risk of maternal death. Due to bleeding from the epidural veins, neuraxial anesthesia carries a significant risk of epidural hematoma and, consequently, paraplegia. Since the individualization of care is desirable, the choice of anesthetic method is directed by the maternal condition and laboratory parameters, which include the presence of eclampsia, severity of symptoms, platelet count and possibly complicating coagulopathy. For patients with preeclampsia who are not coagulopathic or thrombocytopenic, the risk of difficult or failed airway management and delayed recognition of maternal stroke during a general anesthetic are exceeded by the potential risk of adverse outcomes from neuraxial anesthesia (5). Moreover, maternal mortality statistics identify general anesthesia as a greater risk to parturients than neuraxial anesthesia (6, 7).

When the platelet count falls below 50,000/ $\mu\text{L}$  (severe thrombocytopenia), over 90% of the respondents prefer general anesthesia. However, respondents did not discriminate between platelet count ranges below 25,000/ $\mu\text{L}$  and 25,000/ $\mu\text{L}$  to 50,000/ $\mu\text{L}$  according to their clinical practice, as reflected by survey responses.

Over a platelet count of 50,000/ $\mu\text{L}$ , opinions were divided between general and neuraxial methods. A significant 60% of the respondents preferred general anesthesia when the maternal platelet count was between 50,000 and 100,000/ $\mu\text{L}$ . It was also interesting and illuminating that when the maternal platelet count exceeds 100,000/ $\mu\text{L}$ , approximately 35% of the respondents still preferred general anesthesia.

Moreover, above a platelet count of 100,000/ $\mu\text{L}$ , residents were more likely to prefer general anesthesia compared to clinicians ( $p=0.02$ ) (Figure 6). Below a platelet count of 100,000/ $\mu\text{L}$ , the responses were similar between clinicians and residents. Accordingly, above a platelet count of 100,000/ $\mu\text{L}$ , residents likely are being instructed to utilize neuraxial methods. When compared to obstetric providers, anesthesiologists were less eager to prefer neuraxial methods for obstetric patients with platelet counts above 50,000/ $\mu\text{L}$  and above 100,000/ $\mu\text{L}$  (Figure 1, 2). Although there appears to be consensus between anesthesiologists and obstetricians-gynecologists when maternal platelet counts decrease below 50,000/ $\mu\text{L}$ , otherwise there exists a difference of opinion between the two specialties. Thus more evidence to guide practice and replace opinion is needed.

Altered hemostasis in preeclampsia is more often secondary to severe thrombocytopenia rather than to coagulopathy. Several studies have reported variable incidences of thrombocytopenia (platelet <100,000/ $\mu\text{L}$ ), prolonged prothrombin time, and a prolonged activated partial thromboplastin time in patients with preeclampsia: 2% to 19%, 0% to 16%, and 1.3% to 2.5%, respectively (8-10). In one retrospective analysis, 8% of parturients exhibited both thrombocytopenia and coagulopathy (11). Studies investigating coagulation in women with preeclampsia

using thromboelastography reported that if the platelet count was greater than 100,000/ $\mu\text{L}$  (absence of severe or moderate thrombocytopenia), there were no detectable coagulation abnormalities (12, 13). Platelet counts of less than 100,000/ $\mu\text{L}$  in women with preeclampsia may be associated with an impaired coagulation function and should prompt additional investigations of the coagulation status (12).

Instead of stratifying patients according to platelet count as a trigger to order coagulation tests, some recommend that it is practical and cost-effective to screen for both platelet count and coagulation studies at the same time (14, 15). As reflected from the current survey findings, a significant proportion of anesthesiologists in Turkey still prefer general anesthesia regardless of a normal coagulation profile and a platelet count exceeding 100,000/ $\mu\text{L}$ . With a platelet count above 100,000/ $\mu\text{L}$ , balancing the remote risk of maternal death due to epidural hematoma and choosing the greater risk of maternal death via general anesthesia in the clinical setting of preeclampsia/HELLP syndrome does not seem rational. Because there is not an established lower threshold for the platelet count to guarantee no potential for bleeding, practice guidelines simply indicate that the use of platelet count may reduce the risk of neuraxial anesthesia-related complications (5, 16, 17). However, authors in the field generalize safety in the range of a platelet count somewhere between 50,000 and 100,000/ $\mu\text{L}$ . In addition, the most cited cut-off is 70,000 to 80,000/ $\mu\text{L}$  (5, 12, 14). The real dilemma, therefore, lies with the management of patients with preeclampsia whose platelet counts range between 50,000 and 100,000/ $\mu\text{L}$ . Neuraxial anesthesia is very safe in this platelet range, particularly when the coagulation profile is normal. In this range, two groups of patients raise special issues for clinical practice: patients with preeclampsia and HELLP syndrome. There are several reasons for this. First of all, the clinical course of HELLP syndrome is difficult to predict and variable in onset with usually a rapid progression of the syndrome (18, 19). Once initiated, patients with HELLP syndrome exhibit a 35–50% decrease in platelet count per 24 hours and a mean daily reduction of 40,000/ $\mu\text{L}$  (18). Second, HELLP syndrome is a more potent and significant threat to the mother and fetus than preeclampsia. In the English literature, one patient series recorded 77 deaths among 2346 treated patients (ratio of 1:30), 53

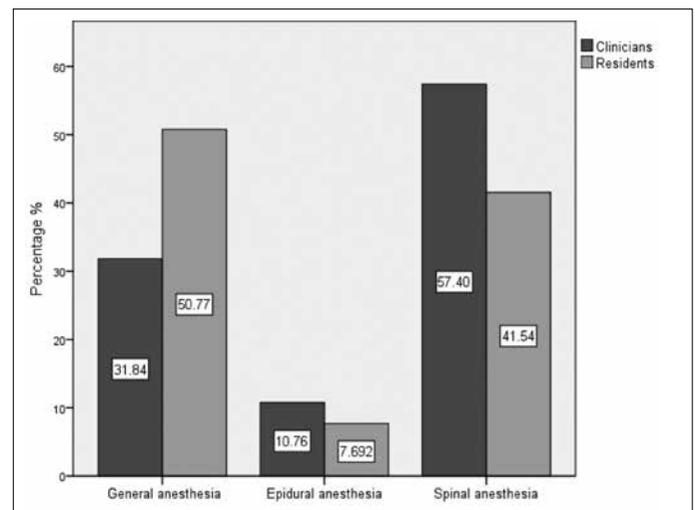


Figure 6. Preference in the type of anesthesia according to residents and clinicians for a platelet count above 100,000/ $\mu\text{L}$ .

strokes (ratio of 1:44), 178 patients with acute renal failure (1 for every 13 patients with HELLP syndrome), and just over 90 liver ruptures (20). Third, most spinal epidural hematomas occurred in patients with HELLP syndrome and not preeclampsia with no evidence of HELLP syndrome (5, 21-23). Moreover, epidural anesthesia was the preferred method in those complicated cases (24, 25). Vigil-De Gracia and colleagues reported 36 patients with HELLP syndrome with platelet counts below 100,000/ $\mu$ L who received regional anesthesia and no epidural hematoma was suffered by any of the patients (12 patients had platelet counts below 50,000/ $\mu$ L) (26). None of those patients with HELLP syndrome in the study by Vigil-De Gracia (26) had disseminated intravascular coagulation and abnormal indices. Review of other series also revealed similar successful outcomes (27, 28). Fourth, laboratory parameters of patients with HELLP syndrome can continue to deteriorate postpartum, although they usually trend toward normal within 96 hours postpartum (18). Although a cut-off for the risk of spinal epidural hematoma has not been established, a platelet count of 40,000/ $\mu$ L and above has been assigned as the threshold above which there is no risk for postpartum bleeding from surgical sites in patients with HELLP syndrome (29). Spinal epidural hematoma and surgical site bleeding are not the same; therefore, the determined cut-off cannot be absolutely transposed for the risks of neuraxial anesthesia. However, in terms of maternal mortality and morbidity risk due to bleeding, they share a similar background.

In patients with severe preeclampsia and HELLP syndrome, the platelet count can be increased to 50,000/ $\mu$ L or above by two means separately or in combination: platelet pack transfusion and potent glucocorticoid administration. Antenatal corticosteroid administration has been reported to increase the platelet count; its use has been debated recently (30-32). It has also been shown to increase the utilization of neuraxial anesthesia among parturients (33). Thus, half of the survey respondents

concluded that corticosteroid administration may increase the utilization of neuraxial anesthesia.

Moreover, respondents did not differentiate between the two methods (questions 5 and 8; Table 1) with regard to platelet counts and anesthesia application. However, a combined approach utilizing potent glucocorticoid administration and platelet pack transfusion may provide a more rapid and safer way to increase the platelet count to above 50,000/ $\mu$ L when cesarean surgery is needed to be performed quickly.

For patients with eclampsia, most respondents preferred general anesthesia (Table 1). Although general anesthesia is advocated in patients with eclampsia by some authors, there is minimal evidence to guide practice in the choice of anesthesia for women following an eclamptic convulsion (12). The hypertensive response to intubation has been identified as a direct cause of maternal mortality. Consequently, particular attention and extreme vigilance are required to ablate the hypertensive effect of intubation. Care must also be taken to avoid complications upon emergence from anesthesia, including hypertension, aspiration, and acute pulmonary edema (12). However, if the patient is stable with a normal level of consciousness and no neurological deficits, in the absence of other contraindications, neuraxial anesthesia is an acceptable choice (12).

The most dreaded complication of neuraxial anesthesia among patients with preeclampsia is the development of spinal epidural hematoma. The incidence of the complication is so low that it is difficult to comment on the methods to decrease its occurrence, such as ultrasound-guided neuraxial anesthesia (34). Theoretically, point-of-care ultrasound may decrease the number of attempts and increase the success of neuraxial anesthesia. Specifically, for patients with a borderline coagulation status, such as preeclampsia, ultrasonography may provide extra help and comfort to the anesthesiologist during the procedure

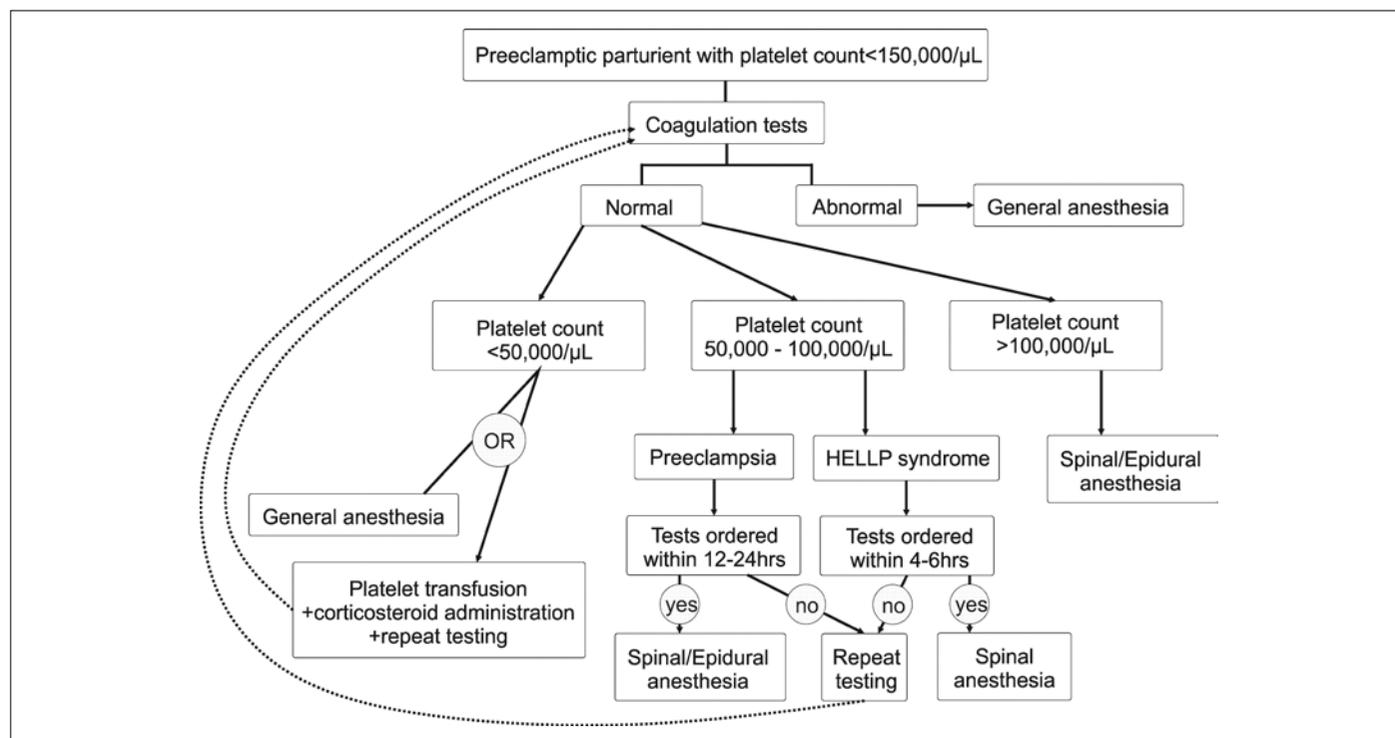


Figure 7. Proposed management algorithm

(34). Accordingly, approximately half of the respondents agreed with this notion and potential (Figure 5).

In conclusion, more evidence from well-conducted prospective randomized trials is needed to clarify many of the issues raised in our survey and in clinical practice. In the interim, based on the available relevant recent literature, a management algorithm is proposed for this very specific at-risk patient group (Figure 7). The marked diversity in anesthesiology practice, as reflected by our survey results, underscores the need for more clarity in obstetric care, which can be principally gained through excellent clinical research.

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