How low did we go? A case report of unexpected thrombocytopenia

M.L. Meng, E. Wang, C. Cain, R. Landau
Columbia University Medical Center, Department of Anesthesiology, New York, United States of America

ABSTRACT
We report the case of a normotensive 31-year-old parturient who received combined spinal-epidural analgesia for early labor, and who was then found to have an unexpectedly low platelet count (25 000/μL) with elevated liver enzymes, but without alterations in blood pressure.

Keywords: Thrombocytopenia; Neuraxial anesthesia; Hematoma, epidural, spinal, neuraxial; Parturition

Introduction

There is no consensus regarding the platelet count threshold for performing neuraxial labor analgesia in thrombocytopenic parturients. The risk of spinal epidural hematoma (SEH) must be weighed on a case-by-case basis against the suffering caused by untreated labor pain, the risks and potential complications for both mother and fetus of alternative analgesic options such as intravenous opioids, and the potential for airway difficulties in the setting of urgent cesarean delivery.[1] Current American Society of Anesthesiologists (ASA) and Society for Obstetric Anesthesia and Perinatology (SOAP) guidelines state 'a routine platelet count is not necessary in the healthy parturient'.[2]

We report the case of an apparently healthy parturient who received early neuraxial labor analgesia and was subsequently found to have severe thrombocytopenia in the setting of an atypical presentation of hemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome.

Case report

A healthy, normotensive 31-year-old nulliparous parturient requested neuraxial labor analgesia in early active labor. Results of admission laboratory tests from that day were pending. Since there were no signs or symptoms of a hypertensive disorder of pregnancy and the platelet count had been normal throughout pregnancy, a combined spinal-epidural (CSE) technique, using Whitacre 27-gauge and Tuohy 17-gauge needles with a 19-gauge epidural catheter, was performed at the time of request. The intrathecal dose was bupivacaine 2.5 mg, fentanyl 10 μg, followed by an epidural infusion of bupivacaine 0.0625% with fentanyl 2 μg/mL at 12 mL/h. A few minutes after completion of the neuraxial procedure, the admission platelet result returned at 25 000/μL. The sodium citrate automated platelet count was 14 000/μL, and the manual count was 30–40 000/μL. Other results showed proteinuria, creatinine 1.03 mg/dL and abnormal liver function tests (aspartate aminotransferase (AST) 726 U/L (10–37 U/L), alanine aminotransferase (ALT) 678 U/L (9–50 U/L), lactate dehydrogenase (LDH) 823 U/L (135–214 U/L), total bilirubin 2.4 mg/dL (0.2–1.3 mg/dL). Coagulation studies were a normal prothrombin time (PT) of 14 s, activated partial thromboplastin time (aPTT) of 35 s, and International Normalized Ratio (INR) of 1.1. The HELLP syndrome was then diagnosed.

A spontaneous vaginal delivery occurred eight hours after CSE placement, without major bleeding. An oxytocin infusion was started at 30 U/h, and tranexamic acid 1 g and desmopressin 0.3 μg/kg were given immediately after delivery. A nadir in platelet concentration (18 000/μL) occurred two hours after delivery. The epidural catheter was left in situ until postpartum day four, when the platelet count was 99 000/μL (Fig. 1). The patient remained normotensive during the entire peripartum course, and did not develop symptoms of SEH.

Discussion

This healthy term parturient presenting with normotensive HELLP syndrome had the placement of an epidural catheter (using CSE labor analgesia), while admission laboratory results were still pending. This case adds to the reported cases of neuraxial anesthesia in pregnant patients with platelet counts less than 50 000/μL, and

Accepted November 2018
Correspondence to: Marie-Louise Meng, Department of Anesthesiology, 622 West, 168th Street, NY 10032, United States.
E-mail address: mm3847@cumc.columbia.edu

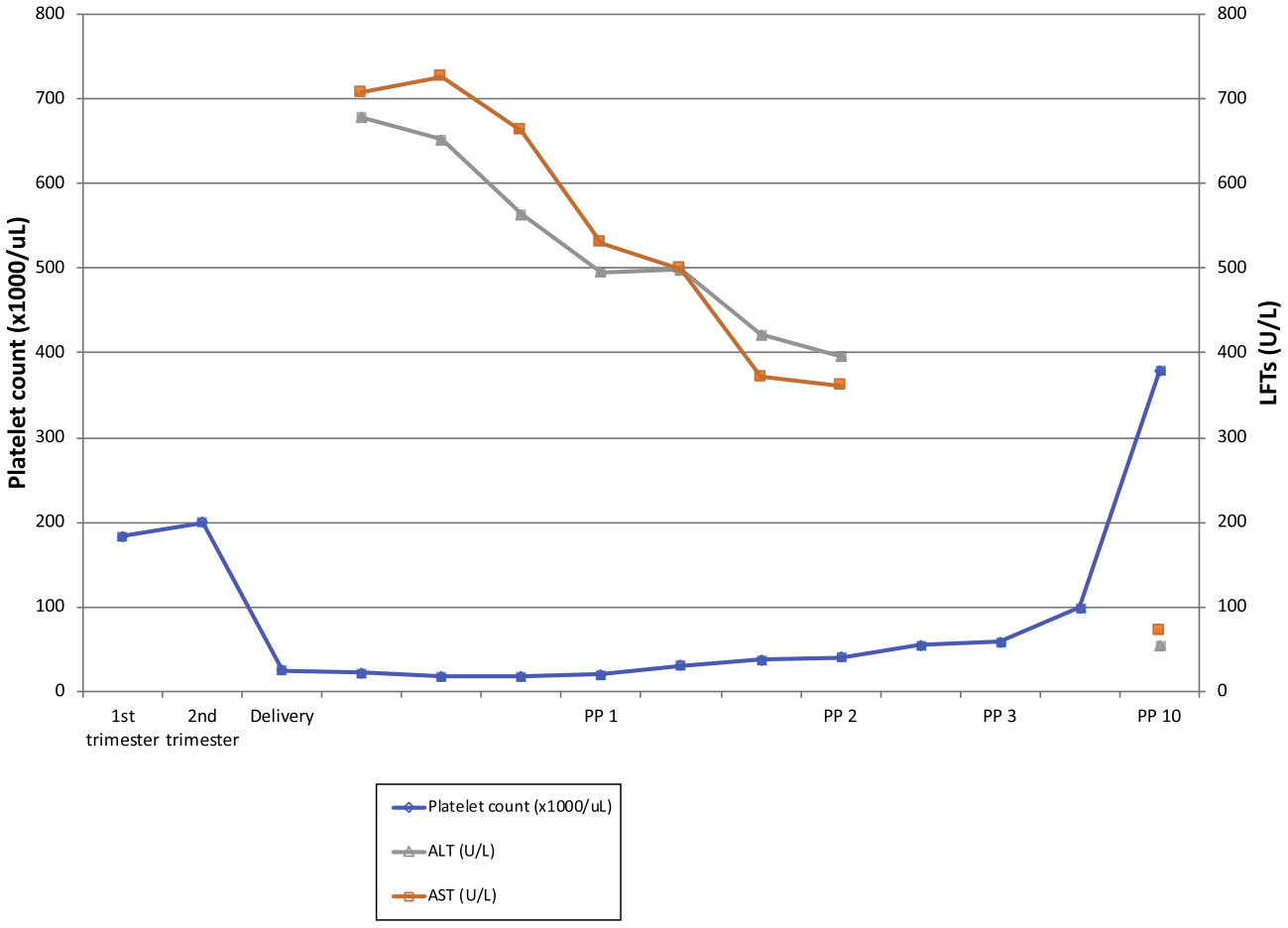

Fig. 1 Platelet count and liver function test (LFT) results during pregnancy and the postpartum period

contributes to risk estimates of developing SEH in extremely thrombocytopenic pregnant patients who receive neuraxial analgesia.[3–5]

The HELLP syndrome occurs in 0.1–0.2% of pregnancies and is characterized by the triad of hemolysis, elevated liver enzymes, and low platelet count. It falls within the spectrum of hypertensive disorders of pregnancy and is considered to be severe pre-eclampsia. The syndrome usually presents with hypertension (82–88% of patients) and proteinuria (86–100% of patients),[6] however parturients with HELLP can present with signs and symptoms at different times and hypertension does not always precede or accompany thrombocytopenia.[6]

This case was an unusual presentation of the HELLP syndrome, with no hypertension and no suggestion that the platelet count might be low. While laboratory results on the day of neuraxial labor analgesia are preferable, parturients are not made to wait for initiation of neuraxial labor analgesia when platelet counts have been normal throughout pregnancy and when hypertensive disorders of pregnancy are not suspected.[7,8] The usual course of providing neuraxial labor analgesia to this patient, without waiting for a platelet count, was therefore appropriate.

The American College of Obstetricians and Gynecologists suggests that neuraxial anesthesia can be placed safely in obstetric patients with platelet counts greater than 80 000/μL, but the lowest safe limit of platelet count to perform neuraxial anesthesia is unknown.[9] The Society for Obstetric Anesthesia and Perinatology and the American Society of Regional Anesthesia and Pain Medicine do not have formal guidelines about the safe lower limit of platelets for neuraxial anesthesia placements. Experts have called for a national "low platelet" registry to aid in understanding the safe lower limit of platelets for performance of neuraxial anesthesia and to avoid the risk of SEH at low counts.[3,10]

Obstetric anesthesiologists provide neuraxial anesthesia at relatively low platelet counts when the risk benefit ratio favors neuraxial anesthesia over general anesthesia.[11] A multicenter, retrospective cohort study of the risk of SEH associated with neuraxial procedures in thrombocytopenic parturients demonstrated that not performing neuraxial anesthesia resulted in a morbidity rate (due to aspiration pneumonia, prolonged tracheal intubation and hemoptysis) of 6.5% in women who received general anesthesia because thrombocytopenia

was considered to preclude a neuraxial procedure.[3] As an alternative to neuraxial anesthesia, general anesthesia in thrombocytopenic parturients who require cesarean delivery is clearly not without risk. Providers must weigh up the individual's risks and benefits of a neuraxial procedure. Comorbidities and maternal airway anatomy may influence anesthesiologists to perform neuraxial anesthesia at lower platelet counts.

The risk of SEH in parturients is estimated to be 1:168 000 (a figure lower than in the non-obstetric population).[1] In the context of thrombocytopenia, the risk is difficult to calculate as neuraxial anesthesia if often not performed in thrombocytopenic patients. A multicenter retrospective cohort study of 499 cases of parturients with platelets less than 100 000/μL in whom neuraxial anesthesia was performed demonstrated that confidence interval for a risk of a SEH was 0–0.6% in thrombocytopenic parturients.[3] The Multicenter Perioperative Outcomes Group (MPOG) reported a retrospective cohort study of thrombocytopenic parturients who had neuraxial procedures. Since there were no cases of SEH, the rule of three was applied (the upper limit of the 95% CI can be estimated by 3/n) to calculate the upper limit 95% confidence interval for the risk of SEH by degree of thrombocytopenia: 0–0.2, 0–3 and 0–11% for platelet counts of 70–99 000/μL, 50–69 000/μL, and 0–49 000/μL respectively.[4] There were 27 cases of platelet counts in the 0–49 000/μL range in the MPOG analysis. It is likely that we are too conservative about the alleged risk of neuraxial techniques in patients with a low platelet count, as there are no reported cases of SEH in these larger studies and case reports; the "zero numerator" estimate must be invoked in an attempt to calculate the risk of SEH. Therefore, there is no real evidence that these techniques are dangerous, even at apparently alarmingly low platelet counts. It may be that our practice of avoiding neuraxial anesthesia in extreme thrombocytopenia is a fear-based practice.

Since significant thrombocytopenia usually contraindicates neuraxial labor analgesia, this case report describes CSE placed without complication in the setting of one of the lowest platelet counts in pregnancy (25 000/μL) reported to date.[3–5,12,13] We recognize it was fortuitous that our patient did well despite marked thrombocytopaenia, and it is certain that we would not have performed neuraxial anesthesia had the platelet count been known.

Once the epidural catheter was in place, the potential for liver failure and further coagulopathy prompted strategies to minimize blood loss and coagulopathy. Efforts were made to improve platelet function (desmopressin) and clot stability (tranexamic acid).[4] Desmopressin dosing carries little risk and may have a theoretical benefit of causing the release of large factor VIII:von Willebrand factor multimers from endothelial cells, which may improve platelet adherence. There is only one reported case of the use of tranexamic acid in the setting of suspected HELLP syndrome, so tranexamic acid was used for its theoretical benefit extrapolating from its use in postpartum hemorhage.[14,15] Platelet transfusions are recommended when platelet counts are less than 50 000/03 μL before major surgery or during suspected disseminated intravascular coagulation, however in pre-eclampsia there is increased platelet destruction, limiting the utility of such transfusions.[9] Additionally, patients with low platelet counts due to pre-eclampsia do not usually have significant bleeding, unless disseminated intravascular coagulopathy also occurs.[9] Due to blood loss associated with vaginal delivery and the frequent need for intrapartum cesarean delivery, prophylactic antenatal platelet transfusion was thought inappropriate, particularly in the absence of signs of bleeding.

The risk of SEH also exists at the time of catheter removal[16] and regular platelet counts and coagulation studies were performed to guide the most suitable time of removal. Rotational thromboelastometry (ROTEM®) is available at our institution but was not used in this case since standard laboratory tests demonstrated that the platelet count was the only coagulation component affected. This would have been performed to guide the management of epidural catheter removal had the platelet number not increased postpartum or had the coagulation studies been affected. The standard epidural infusion rate was maintained because it was considered that symptoms of SEH would present in the setting of low concentration epidural analgesia. The patient was followed postpartum to ensure that SEH did not develop.

Complete blood counts are tested in all women admitted to our labor floor but it is not routine to wait for the results before performing neuraxial anesthesia in normotensive patients who had normal platelet counts during pregnancy. Although neuraxial anesthesia would not have been performed for this patient if the platelet count result been known, we do not plan to alter local practice based on this case. However, it did prompt reassessment of whether admission blood tests should always be examined before initiation of neuraxial anesthesia in pregnancy.

More reports of neuraxial procedures performed on severely thrombocytopenic patients are necessary to further define the risk of SEH, and to determine whether more morbidity is caused by general anesthesia, when used due to the fear of SEH following neuraxial techniques. More data may help delineate the safe lower limits of platelet concentration for neuraxial anesthesia. The etiology of thrombocytopenia and the rate of decline of platelet count may also warrant subgroup analysis to further stratify risk.

Declarations of interest

None.

References

1. Ruppen W, Derry S, McQuay H, Moore RA. Incidence of epidural hematoma, infection, and neurologic injury in obstetric patients with epidural analgesia/anesthesia. *Anesthesiology* 2006;**105**:394–9.
2. Apfelbaum J, Hawkins J, Agarkar M, et al. Practice Guidelines for Obstetric Anesthesia: an Updated Report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and the Society for Obstetric Anesthesia and Perinatology. *Anesthesiology* 2016;**124**:270–300.
3. Goodier CG, Lu JT, Hebbar L, Segal BS, Goetzl L. Neuraxial anesthesia in parturients with thrombocytopenia: a multisite retrospective cohort study. *Anesth Analg* 2015;**121**:988–91.
4. Lee LO, Bateman BT, Kheterpal S, et al. Risk of epidural hematoma after neuraxial techniques in thrombocytopenic parturients: a report from the Multicenter Perioperative Outcomes Group. *Anesthesiology* 2017;**126**:1053–63.
5. Levy N, Goren O, Cattan A, Weiniger CF, Matot I. Neuraxial block for delivery among women with low platelet counts: a retrospective analysis. *Int J Obstet Anesth* 2018;**35**:4–9.
6. Sibai BM. Diagnosis, controversies, and management of the syndrome of hemolysis, elevated liver enzymes, and low platelet count. *Obstet Gynecol* 2004;**103**:981–91.
7. Elkayam U, Goland S, Pieper PG, Silverside CK. High-risk cardiac disease in pregnancy: Part I. *J Am Coll Cardiol* 2016;**68**:396–410.
8. Duong C, Kidson-Gerber G, Peters N, Listijono DR, Henry A. Trajectory of platelets in pregnancy – do low-risk women need an intrapartum full blood count prior to epidural? *Aust N Z J Obstet Gynaecol* 2015;**55**:511–4.
9. American College of Obstetricians and Gynecologists' Committee on Practice B-O. Practice Bulletin No. 166: thrombocytopenia in pregnancy. *Obstet Gynecol* 2016;**128**:e43–53.
10. Camann W. Obstetric neuraxial anesthesia contraindicated? Really? Time to rethink old dogma. *Anesth Analg* 2015;**121**:846–8.
11. Beilin Y, Zahn J, Comerford M. Safe epidural analgesia in thirty parturients with platelet counts between 69,000 and 98,000/mm^3. *Anesth Analg* 1997;**85**:385–8.
12. Moeller-Bertram T, Kuczkowski KM, Benumof JL. Uneventful epidural labor analgesia in a parturient with immune thrombocytopenic purpura and platelet count of 26,000/mm^3 which was unknown preoperatively. *J Clin Anesth* 2004;**16**:51–3.
13. Rasmus KT, Rottman RL, Kotelko DM, Wright WC, Stone JJ, Rosenblatt RM. Unrecognized thrombocytopenia and regional anesthesia in parturients: a retrospective review. *Obstet Gynecol* 1989;**73**:943–6.
14. Schott M, Henkelmann A, Meinköhn Y, Jantzen JP. Postpartum eclampsia and fulminant HELLP syndrome. *Anaesthesist* 2011;**60**:343–51.
15. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. *Lancet* 2017;**389**:2105–16.
16. Vandermeulen EP, Van Aken H, Vermylen J. Anticoagulants and spinal-epidural anesthesia. *Anesth Analg* 1994;**79**:1165–77.

0959-289X/$ - see front matter
https://doi.org/10.1016/j.ijoa.2018.11.008

Syncope after administration of epidural analgesia in an obstetric patient with a vagus nerve stimulator

J.E. Tang, J.B. Hyman

Department of Anesthesiology, Perioperative and Pain Medicine, Icahn School of Medicine at Mount Sinai, One Gustave L. Levy Place Box 1010, New York, NY 10029, United States

ABSTRACT

Vagus nerve stimulation (VNS) is an adjunctive therapy for medically refractory epilepsy and depression. Vagus nerve stimulation is generally well-tolerated, but cardiac arrhythmias or asystole are rare complications that have been reported. This case report describes an obstetric patient who received epidural analgesia and subsequently experienced two episodes of syncope synchronous with stimulation from her VNS device. These resolved after deactivating the device. This is the first report of a suspected arrhythmia during VNS in the setting of epidural analgesia.

Keywords: Vagus nerve stimulation; Epidural analgesia; Syncope

Accepted December 2018
Corresponding author.
E-mail address: jaime.hyman@mountsinai.org