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Considerations When Performing an Epidural Blood Patch on a Patient Anticoagulated with Low Molecular Weight Heparin: A Case Report

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Background: Epidural blood patch (EBP) procedure timing can be difficult in patients on anticoagulant therapy when balancing the goals of EBP, safety, and efficacy.

Case Report: We present the case of a patient on anticoagulant therapy with low molecular weight heparin (LMWH) who presented for a planned cesarean section which was complicated by dural puncture with a Tuohy needle during combined spinal-epidural placement. She then developed a postdural puncture headache (PDPH) after restarting LMWH. After holding LMWH for 18 hours, an EBP was placed resulting in symptomatic relief; LMWH was restarted 12 hours later. However, her symptoms returned and EBP was repeated 78 hours after the initial blood patch, again with relief of symptoms.

Conclusion: This case highlights the importance of EBP procedure timing in the setting of LMWH administration in order to maximize efficacy while minimizing neuraxial hematoma and venous thromboembolism risk.

Key words: Epidural blood patch, postdural puncture headache, anticoagulation, efficacy, timing.

BACKGROUND

Postdural puncture headache (PDPH) is a potential complication that can occur after accidental puncture of the dura during an epidural injection. The exact mechanism is unclear, but is thought to be related to intracranial hypotension. The leakage of cerebrospinal fluid (CSF) through the dural puncture causes a reduction in CSF volume. This causes tension on the meninges and results in headaches. An epidural blood patch (EBP) creates a seal and prevents the leakage of additional CSF by injecting autologous blood into the epidural space (1). Patients on anticoagulant therapy have an increased risk of bleeding if appropriate time intervals for discontinuation and re-initiation are not followed. This case report discusses the proposed management of a parturient who was on low molecular weight heparin (LMWH) and required 2 EBPs after accidental dural puncture during combined spinal-epidural (CSE) placement.

Health Insurance Portability and Accountability Act authorization was obtained from the patient.

CASE DESCRIPTION

A 36-year-old Gravida 2 Para 1 with a history of endometriosis, asthma, childhood seizures, and pulmonary embolism secondary to oral contraceptive pill use, presented for a planned cesarean section (CS) due to a 4th degree laceration with prior delivery. In her third trimester, she was started on prophylactic LMWH 30 mg

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twice a day that was discontinued 12 hours prior to CS. A CSE was performed. The initial epidural attempt was complicated by an accidental dural puncture with a 17-gauge Tuohy needle. Subsequent epidural placement at an interspace above the initial attempt was successful, and a T4 dermatomal level was achieved. CS proceeded without complication and the epidural catheter was removed 4 hours after delivery. LMWH was restarted 12 hours after removal.

The patient then developed a PDPH approximately 24 hours following her dural puncture. Her symptoms included a bilateral frontal headache that was worse in the upright position with associated nausea and dizziness. Conservative measures including an abdominal binder, hydration, and caffeine were unsuccessful in resolving her symptoms. The patient continued to report a 9/10 headache that was worse in the upright position, consistent with the classic characteristics of PDPH. Thirty-six hours after her delivery, an EBP procedure was performed after holding her prophylactic LMWH dose for 18 hours. Thirty ml of blood were drawn in a sterile manner from the patient's left arm. A 17-gauge Tuohy needle was advanced using the loss of resistance technique to a depth of 6 cm at the interspace of her dural puncture. The blood was injected into the epidural space until the patient endorsed cramping in her lower back. A total of 30 ml of blood were injected. The back pain resolved after removal of the Tuohy needle. She endorsed improvement in her PDPH symptoms. LMWH was resumed 12 hours after the EBP.

The patient was discharged home the next day, but unfortunately her PDPH symptoms returned 74 hours after the initial EBP. After again holding her LMWH for 18 hours, the same EBP procedure was repeated uneventfully with another 30 ml of blood. She again had prompt and full symptomatic relief of her headache after the second EBP procedure. Her prophylactic LMWH dose was restarted 12 hours after the second EBP, and the patient then remained asymptomatic without complications.

DISCUSSION

The incidence rate of accidental dural puncture with a Tuohy needle is 0.04-6%, and up to 80% of these patients can develop a PDPH (2). Pregnant patients have a high risk for a PDPH based on risk factors of female gender, young age, and regional anesthesia in addition to a lower CSF volume in pregnancy (3). The dura is thought to be more elastic in younger patients, thus causing increased loss of CSF. PDPH can be debilitating in this obstetric population that have a new baby to care for. It is important to time EBP with administration of anticoagulants in order to maximize sealant formation but minimize the risk of neuraxial hematoma. The risk of venous thromboembolism (VTE) is approximately 5-fold higher in pregnant women compared to nonpregnant women, and up to 20-fold higher in the puerperium period (4). Therefore, there is an increasing likelihood of having to manage patients that are on anticoagulation therapy when an EBP is indicated.

American Society of Regional Anesthesia and Pain Medicine (ASRA) and Society for Obstetric Anesthesia and Perinatology guidelines recommend holding low doses of LMWH (LMWH $\leq$ 40 mg subcutaneous daily or 30 mg subcutaneous twice daily) for 12 hours prior to performing neuraxial procedures in order to decrease the risk of bleeding and subsequent epidural hematoma (5,6). If the anticoagulant is held appropriately, there should only be 3% of the active drug present at the time of the procedure, thus it is unlikely that this would affect the efficacy of the EBP procedure. ASRA guidelines also recommend to not restart LMWH until a minimum of 12 hours after needle puncture (5). However, these guidelines are intended to prevent neuraxial hematomas and are not specific to EBP. There are additional considerations for restarting LMWH after the procedure in order to optimize the efficacy of the EBP. There is concern that if an anticoagulant is administered shortly after an EBP, this may prolong clot formation, leading to poor EBP efficacy. Therefore, there is the potential that restarting LMWH more than 12 hours after the EBP may lead to improved efficacy. However, VTE is one of the leading causes of maternal mortality in the US, responsible for 9.2% of maternal deaths (7). Thus, interrupting anticoagulation in the hypercoagulable postpartum state should be time-limited due to the increased thrombosis risk, so it is necessary to find a balance between these 2 considerations.

Two case reports documented successful EBPs in parturients on anticoagulation therapy when EBP was indicated. LMWH was held for 12 hours prior in one case (8) and for 24 hours in the other for prophylactic LMWH dosing (9). In both cases, LMWH was resumed 12 hours postprocedure per ASRA guidelines. Both cases resulted in successful symptomatic relief of the PDPH with no adverse outcomes in terms of clotting events or the need for additional procedures.

In order to balance the risk of bleeding from the procedure and in order to maintain efficacy of the

EBP, we held our patient's LWMH for 18 hours (1.5 times the minimum recommended time for neuraxial procedures). Our first epidural blood patch provided instant symptomatic relief that lasted for 74 hours. We felt that waiting 18 hours after her most recent dose of LMWH allowed for a greater degree of clotting and success of the blood patch in the setting of a patient on anticoagulant therapy, though 12 hours should have been sufficient based on the low active drug present at that time. However, her symptoms of headache and dizziness then returned approximately 3 days later.

CONCLUSION

While EBP is the treatment of choice after conservative measures for PDPH, the exact mechanism is still unknown. It is unclear whether it is due to the temporary increase in epidural pressure or the inflammatory reactions that help with dural healing (10). While the first blood patch was initially successful, a repeat EBP is rarely indicated (11). Thirty-percent of patients receiving an EBP will have a return of their headache, although not as severe (10). Of those requiring a repeat EBP, 17 % will require 2 EBPs and 1.5% will require three EBPs (12). There is concern that re-administering her LMWH 12 hours after her initially successful EBP could have contributed to her return of symptoms and thus a loss of efficacy.

With the increased complexity of obstetric patients, the need to perform an EBP on a patient on anticoagulant therapy may become more common in the future. With this case report, we add to the evidence that holding LMWH for 18 hours may result in a successful EBP. However, this case report emphasizes that the ideal timing for re-administration of anticoagulant therapy after an EBP so as to not affect the efficacy needs to be studied further.

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