Case Report : Epidural Anesthesia in a Pediatric Patient with Unrecognized Hemophilia A

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Abstract

Background: Hemophilia A is a common inherited bleeding disorder that has wide spectrum of manifestations. In the majority of patients, hemophilia is diagnosed at birth because of a family history or in childhood period because of history of bleeding diathesis. However, some of patients may be undiagnosed for many years until the time of surgery. We report a case of 12-year-old patient with unrecognized hemophilia A receiving epidural anesthesia for elective surgery. Management after performing epidural anesthesia and the necessity of preoperative coagulation tests are also discussed.

Keywords: *hemophilia, epidural, coagulation*

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รายงานผู้ป่วย : Epidural anesthesia ในผู้ป่วยเด็กโรคฮีโมฟีเลียเอที่ไม่เคยมีอาการนำมาก่อน

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บทคัดย่อ

บทนำ: โรคฮีโมฟีเลียเป็นโรคเลือดออกง่ายทางพันธุกรรมที่พบบ่อยโรคหนึ่ง โดยที่อาการแสดงของโรคนั้นมีได้หลากหลายขึ้นอยู่กับความรุนแรงของโรค ผู้ป่วยโรคฮีโมฟีเลียส่วนใหญ่มักจะถูกวินิจฉัยตั้งแต่ในวัยเด็กเนื่องจากประวัติเลือดออกง่ายผิดปกติร่วมกับประวัติครอบครัว แต่อย่างไรก็ตามผู้ป่วยจำนวนหนึ่งโดยเฉพาะผู้ป่วยที่มีความรุนแรงของโรคน้อยอาจไม่ได้รับการวินิจฉัยมาก่อนที่จะเข้ารับการผ่าตัด ซึ่งอาจจะนำไปสู่การเกิดภาวะแทรกซ้อนจากการให้การระงับความรู้สึกเฉพาะส่วนที่รุนแรงได้ เช่น ภาวะเลือดออกในช่องเหนือเยื่อหุ้มไขสันหลัง ผู้นิพนธ์จึงได้นำเสนอผู้ป่วยรายนี้เป็นกรณีศึกษาซึ่งเป็นผู้ป่วยโรคฮีโมฟีเลียที่ไม่เคยมีประวัติเลือดออกง่ายหรือได้รับการวินิจฉัยมาก่อน ที่มาเข้ารับการระงับความรู้สึกเฉพาะส่วนด้วยวิธี epidural anesthesia เพื่อการผ่าตัด โดยในบทความนี้ผู้นิพนธ์ยังได้กล่าวถึงแนวทางการดูแลผู้ป่วยโรคฮีโมฟีเลียหลังให้การระงับความรู้สึกเฉพาะส่วนไปแล้ว และความสำคัญของการตรวจการแข็งตัวของเลือดก่อนผ่าตัดอีกด้วย

คำสำคัญ: *ฮีโมฟีเลีย, ช่องเหนือเยื่อหุ้มไขสันหลัง, เลือดออกผิดปกติ, การระงับความรู้สึก*

Introduction

One of the most common coagulation factor disorders is hemophilia A, an inherited condition characterized by potentially severe mucocutaneous and deep tissue bleeding, which results from a deficiency in clotting factor VIII. Hemophilia A occurs with an incidence of 1 in 5000 male births.[1] On occasion, anesthesiologists have to provide regional anesthesia in the form of neuraxial block to patients with hemophilia A. Some of these patients, especially in the children, undergo surgery before the diagnosis of hemophilia A is made. Performing neuraxial block in these patients risks the development of an epidural hematoma, a potentially catastrophic complication that can lead to permanent paralysis.

In this report, we describe a patient with unrecognized hemophilia A who receiving epidural anesthesia for elective surgery. Written permission was obtained from both of the patient's parents for reporting of our observations.

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Case description

A 12-year-old, 36-kilogram, male child was diagnosed with Legg-Calvé-Perthes disease. He was scheduled for an elective innominate osteotomy of right hip. He had no history of bleeding diathesis. Hemophilia has not been identified in any of his first degree relatives nor did they have any clinical evidence of the disease. He did not receive any hemostasis-altering medications.

The results of his routine preoperative blood investigations revealed a normal complete blood count including normal platelet count of 393×10^9 liter^{-1}. According to our hospital guidelines, the patient had not been investigated on activated partial thromboplastin time (aPTT) and prothrombin time (PT) routinely.

In theatre, the patient underwent a combined general-epidural anesthetic. Anesthesia was induced with 200 mg of thiopentone and 25 mg of atracurium. Intubation was done with an ID 6.5 mm cuffed endotracheal tube under direct laryngoscopy. After general anesthesia, a 16 guage Tuohy needle was inserted at the L2-3 intervertebral space in the midline and epidural space was identified using the loss of resistance technique, on the first attempt. An epidural catheter was then threaded into the epidural space and secured over the patient's back. The procedures were reported as atraumatic with no bloody tap or blood in the catheter. The patient was given an initial dose of 2 ml of lidocaine 2% with morphine 1.5 mg after an uneventful test dose (3 ml of lidocaine 2% with epinephrine 1:200 000). During the operation, anesthesia was maintained with N_2O, O_2, isoflurane and atracurium. Continuous epidural infusion of bupivacaine 0.1% with fentanyl 2 μg ml^{-1} was started at a rate of 2 ml hr^{-1}. Surgery was done for 2 hours without intraoperative complications. Estimated blood loss was about 600 ml.

After surgery, a continuous infusion of 0.0625% bupivacaine with morphine 0.02 mg ml^{-1} was then started, initially at 2 ml hr^{-1} for postoperative analgesia. Two hours after surgery, bleeding from epidural catheter site was observed. Dressing of epidural catheter was done. PT, aPTT and fibrinogen level were checked instantaneously. The laboratory data revealed the following: PT 14.4 seconds (10.2-14.6), aPTT 60.9 seconds (24-35), and fibrinogen level 194 mg dl^{-1} (200-400). Prolonged aPTT could be corrected with mixing study (mixing PT 12.5 seconds, mixing aPTT 30.4 seconds).

Consequently, pediatric hematologist was consulted. The differential diagnosis included hemophilia and von Willebrand disease. A blood sample was sent for determination of factor VIII level, factor VIII inhibitor, von Willebrand factor activity and Ristocetin cofactor activity. Before the results of these variables were known, the patient received 10 ml kg^{-1} of fresh frozen plasma (FFP). Subsequently, laboratory analysis demonstrated factor VIII assay 14.1% (50-150). Factor VIII inhibitor, von Willebrand factor activity and Ristocetin cofactor activity were normal. Finally, the patient was diagnosed with mild form of hemophilia A. The replacement therapy aimed to raise factor VIII level 200% of normal in order to maintain trough level of 100% until the bleeding stopped. After that, the plan was to maintain

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factor VIII assay more than 50% of normal for 5-7 days. To achieve this plan, replacement therapy was started immediately as shown in Table 1. At 48 hours after replacement therapy, laboratory data revealed PT 14.2 seconds and aPTT 34.2 seconds.

Epidural catheter was removed after aPTT being back to normal. Symptoms of epidural hematoma were closely observed for 2 weeks. Fortunately, there was no neurological deficit in this patient during the hospital admission.

Table 1. Replacement therapy

Postoperative day	1		2-4	5-7
Blood component	FFP*	Cryoprecipitate	Cryoprecipitate	Cryoprecipitate
Amount	400 ml	36 units initially then 18 units every 12 hours		9 units every 12 hours
Desired factor VIII trough level	100%		100%	50%

FFP = Fresh frozen plasma

**FFP was given before the factor VIII level was known*

Discussion

Hemophilia A is a bleeding disorder, suggested by a significant prolongation of aPTT and confirmed by a factor VIII activity level, which has a wide spectrum of manifestations. Patients with severe hemophilia often have bleeding episodes after minimal or unknown trauma, whereas mild hemophilia may often be undiagnosed for many years and these patients may have bleeding only after significant trauma or at the time of surgery.[1]

Accounting for 36% of cases at two centers in the United States, the diagnosis of mild hemophilia was made after one or several bleeding episodes. Bleeding was rarely spontaneous in these patients. In fact, 92% of bleeding events were precipitated by trauma or surgery.[2] These data implied that patients with mild hemophilia may present to an operating theatre without warning. Performing epidural anesthesia in these patients without preparation has an aggravated risk of epidural hematoma development, a rare but potentially devastating complication of central neuraxial blockade.

There are few data in the literature regarding the complications of neuraxial techniques in patients with unrecognized hemophilia. Stephen and Richard reviewed the literature about neuraxial techniques in patients with hemophilia.[3] Among six articles, they identified 107 neuraxial techniques performed on 85 patients with hemophilia. In the 105 neuraxial techniques in which the coagulopathy was known before the block, factor levels were replaced to 50% before needle insertion and no hemorrhagic complications were reported. Only 2 neuraxial techniques were performed in patients with undiagnosed hemophilia prior to needle insertion, one of which resulted in a catastrophic epidural haematoma.[4,5]

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There is no literature offering any guidelines for the management after performing neuraxial anesthesia in patients with unrecognized coagulopathy, including hemophilia. However, the experts believe that the coagulopathy must be rapidly corrected with replacement therapy in order to minimize risk of epidural hematoma. Patient should be treated as having central nervous system hemorrhage. Most recent guidelines recommended initial raising the patient's factor level to 100% for 1-3 days and maintaining factor level greater than 50% for 5-7 days, respectively.[6] From guidelines published by the World Federation of Hemophilia, they stated that no need to wait for further symptoms to develop or radiologic evaluation.[7]

Furthermore, it is very important to diagnose epidural hematoma early on so that prompt investigation and treatment are initiated. The extent of motor block should be assessed frequently, and these examinations should continue until after the anesthetic has worn off and the catheter has been removed. Meikle and colleagues[8] recommended that patients should receive neurological observations at least every 4 hours and that these observations should continue for at least 24 hours after removal of the epidural catheter. In this way, if the patient develops a motor block out of proportion to what one would expect, or if the anesthetic has a seemingly prolonged duration of action, the patient can be immediately assessed with magnetic resonance imaging (MRI) for the development of epidural hematoma.[9]

Epidural hematoma may also occur at the time of removal of the epidural catheter. Therefore, if the patient with coagulopathy has an epidural catheter placed, the catheter should be removed only after the coagulation status is corrected.

This case also shows the necessity of preoperative coagulation tests when an epidural anesthesia is planned. However, the British Committee for Standards in Haematology (BCSH) has recently published guidelines on the use of the PT and aPTT in the preoperative setting based on a systematic review of the literature.[10] They found that the perioperative bleeding rates were similar in patients with and without abnormal coagulation tests. These implied that perioperative coagulation tests have poor positive predictive values. A similar conclusion was reached in a review of studies of patients undergoing invasive procedures for example angiography, central venous catheterization, liver and kidney biopsy.[11] Nevertheless, this review did not include studies of neurosurgical procedures due to a higher risk from bleeding, the arguments regarding poor sensitivity and specificity of these tests remain controversy in these procedures including epidural anesthesia.

The use of a standardized bleeding questionnaire has been suggested as being better than indiscriminate coagulation testing as a screening tool for perioperative bleeding,[12] and there are suggestions that in patients with congenital bleeding disorders, a structured history is at least as informative as laboratory testing to predict bleeding.[13,14] Therefore, based on the available evidence, a reasonable approach to assessing the perioperative bleeding risk is that a structured bleeding history is taken and coagulation testing is undertaken only if there is concern about a bleeding tendency arising from the history.

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