

Spinal Epidural Hematoma Following Epidural Catheter Removal in a Patient with Postoperative Urgent Coronary Intervention and Intra-Aortic Balloon Pumping (IABP): A Case Report

Authors' Contribution:
Study Design A
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Patient: Male, 72
Final Diagnosis: Spinal epidural hematoma
Symptoms: Paralysis
Medication: Heparin
Clinical Procedure: Laminectomy
Specialty: Anesthesiology





Objective: Rare disease
Background: It is still challenging to remove an epidural catheter in a postoperative patient receiving urgent antiplatelet and anticoagulation therapy for acute coronary syndrome.

Case Report: While under general anesthesia combined with thoracic epidural anesthesia, a 72-year-old male patient underwent right radical nephrectomy for renal cell carcinoma. On postoperative day 1 (POD1), the patient experienced bradycardia and a decrease in blood pressure, and he was diagnosed acute myocardial infarction. Intra-aortic balloon pumping (IABP) was induced for cardiogenic shock, and urgent thrombus aspiration and coronary balloon angioplasty were performed. On POD3, the surgeon removed the epidural catheter under both antiplatelet and anticoagulation therapy. At that time, the platelet count was $45 \times 10^9/L$ and the activated partial thromboplastin time (APTT) was 72.2 seconds. Four hours after the epidural catheter was removed, the patient complained of bilateral fatigue in legs and developed a loss of sensation. Six hours after the epidural catheter was removed, he developed motor paralysis and became completely paralyzed in both limbs after 9 hours. At 19 hours after the epidural catheter was removed, emergency magnetic resonance imaging detected a spinal epidural hematoma at the level of Th9-11 with compression of the spinal cord. Emergency laminectomy was performed to decompress and remove the spinal epidural hematoma at 18 hours after the onset of sensorimotor symptoms. After surgery and rehabilitation, these symptoms had only slightly improved.

Conclusions: In patients with urgent antithrombotic therapy for urgent percutaneous coronary intervention (PCI) with an IABP for acute coronary syndrome, the epidural catheter should not be removed until the IABP and heparin are discontinued, and platelet counts have recovered.

MeSH Keywords: Anesthesia, Epidural • Anticoagulants • Hematoma, Epidural, Spinal • Platelet Aggregation Inhibitors

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Background

In patients with anti-thrombotic therapy, the removal of the epidural catheter is associated with a high risk of spinal epidural hematoma, and it is recommended that anticoagulation therapy should be transiently stopped during this procedure [1]. However, in postoperative urgent anti-thrombotic therapy for acute coronary syndrome, it is difficult to stop therapy. It therefore remains challenging to remove an epidural catheter in a postoperative patient receiving urgent anti-platelet and anti-coagulation therapy.

Case Report

A 72-year-old male patient underwent right radical nephrectomy for renal cell carcinoma. He had a medical history of hypertension, type 2 diabetes mellitus, chronic renal disease, and bronchial asthma. In addition, he was prescribed an angiotensin 2 receptor antagonist, a calcium antagonist, a dipeptidyl peptidase-4 (DPP-4) inhibitor, insulin therapy, and a beta-2 stimulant inhalation drug.

Surgery was performed under general and epidural anesthesia. The epidural anesthesia was performed at the Th11-12 level with the patient in the lateral position using an epidural catheter inserted 5 cm toward the head. During the procedure, there were no complications, such as bleeding or aspiration of cerebral spinal fluid. After administration of a test dose of 3 mL of 0.75% ropivacaine, the epidural catheter was fixed. General anesthesia was induced with intravenous fentanyl (100 µg), propofol (100 mg), and rocuronium (36 mg) and maintained with 1.5–2% sevoflurane with intermittent injections (every 2 hours) of an epidural bolus of 5 mL of 0.75% ropivacaine with 50 µg of fentanyl. After surgery, the patient was continuously infused with local anesthetic (200 mL of 0.2% ropivacaine containing 500 µg of fentanyl) at a rate of 5 mL/hour. The platelet count was $118 \times 10^9/L$ before surgery and $86 \times 10^9/L$ after surgery.

On postoperative day 1 (POD1), the patient experienced bradycardia and a decrease in blood pressure and was diagnosed with acute myocardial infarction. Intra-aortic balloon pumping (IABP) was induced for cardiogenic shock, and urgent thrombus aspiration and coronary balloon angioplasty were performed for the right coronary artery (segment 2). Anti-platelet therapy aspirin (100 mg/day) and anti-coagulant therapy (heparin 300 units/hour) were immediately started. The dose of heparin was adjusted to an activated clotting time (ACT) of 160 seconds.

On POD3, the surgeon removed the epidural catheter while both antiplatelet agent and anticoagulation therapy were ongoing. At that time, the platelet count was $45 \times 10^9/L$ and activated partial thromboplastin time (APTT) was 72.2 seconds. Four hours after



Figure 1. Magnetic resonance images in T2 sagittal images revealed a hyper-acute epidural hematoma over the T10 vertebra extending to the T12 vertebra.

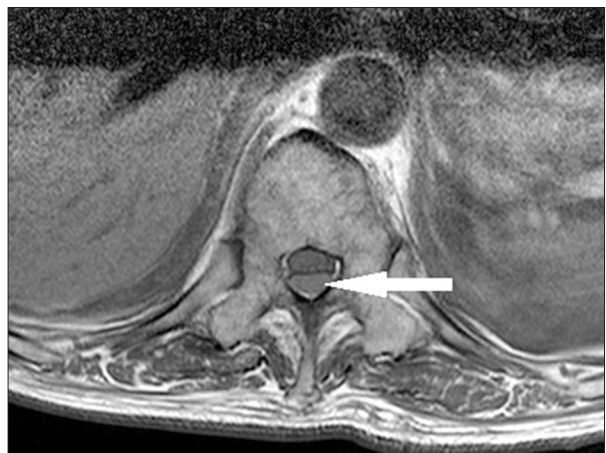


Figure 2. Magnetic resonance images in T1 axial cuts showing epidural hematoma compressing the spinal cord.

the epidural catheter was removed, the patient complained of bilateral fatigue in the legs and was developing loss of sensation. Six hours after the epidural catheter was removed, he developed motor paralysis, and after 9 hours, he had become completely paralyzed in both limbs. Because of concern about spinal epidural hematoma, the heparin and IABP were immediately stopped, and an emergency computed tomography (CT) scan was performed and examined. The CT and magnetic resonance imaging (MRI) performed at 19 hours after the epidural catheter was removed showed a spinal epidural hematoma at the level

of Th9-11 with compression of the spinal cord (Figures 1, 2). An emergency laminectomy was performed under general anesthesia to decompress and remove the spinal epidural hematoma at 21 hours after the epidural catheter was removed and 17 hours after the onset of sensorimotor symptoms. Manual muscle testing (MMT) was 0, and his sensory defect was below Th12 before surgery. After surgery and rehabilitation, the patient's symptoms slightly improved from MMT 0 to 2 in the right anterior tibialis muscle and the long toe long stretch muscle, but other lower limb muscles were not improved and remained at MMT 0. Sensory symptoms were lost below the right L5 and left L2 level, and the bladder rectal disorder remained.

Discussion

Spinal hematoma related to epidural anesthesia is rare, occurring at a rate of 1/168 000 [2]. Anticoagulants increase the risk of spinal epidural hematoma to a rate of 1/6600 [3]. Epidural catheter insertion with low-molecular-weight heparins is a risk factor for this event and increases it to a rate of 1/3100 [3], with most such cases occurring after the removal of the epidural catheter [4].

Cardiac complications are not rare, occurring at a rate of 0.5–9.1% [5]. However, urgent PCI and hemodynamic mechanical support, such as IABP after surgery, are not simple procedures. They require urgent anti-thrombotic therapy, such as anti-platelet and/or anticoagulant therapy, and these situations are especially challenging in postoperative patients with an epidural catheter. Anti-platelet therapy is recommended following urgent PCI. It prevents the procedure from increasing the risk for recurrence of myocardial ischemia. However, the risk of spinal epidural hematoma is increased in patients with anticoagulant therapy.

Current guidelines recommend that clopidogrel should be discontinued more than 7 days before a patient undergoes epidural anesthesia and the removal of an epidural catheter [1,6]. However, low-dose isolated aspirin (acetylsalicylic acid) does not increase the risk of spinal hematoma and does not need to be stopped before neuraxial blockade [1,6]. However, this remains controversial, and there is no consensus regarding whether anti-platelet therapy should be stopped or not used during urgent PCI when the epidural catheter is removed [7]. In some case reports, following urgent PCI, the removal of an epidural catheter during anti-platelet therapy was successful when transiently discontinued with aspirin and platelet transfusion [8]. However, in another case report, the removal of the epidural catheter was also successful when performed with monitoring of platelet aggregation and rotational thromboelastometry with continued anti-platelet therapy [9,10]. In the latter case, the patient underwent coronary artery balloon angioplasty because of postoperative periods of acute coronary

syndrome. The patient received only aspirin and was not treated with clopidogrel. However, because the patient's hemodynamic status was unstable, the patient needed IABP with anticoagulation therapy (heparin). The risk of spinal hematoma with both antiplatelet and heparin is 7.34 higher than that associated with heparin alone [11]. In the current case, the patient needed heparin because of IABP. If intravenous heparin alone is administered, the guidelines recommend that it should be stopped 4 hours before the removal of the epidural catheter.

The platelet count is also a risk factor for spinal hematoma. It is recommended that it should be above $70 \times 10^9/L$ before performing spinal or epidural anesthesia in obstetric patients [12]. In the current case, the platelet count was lower, at $45 \times 10^9/L$, because of IABP. Therefore, the recovery of the platelet count, platelet transfusion, or coagulation testing, such as a platelet aggregation or rotational thromboelastometry, should be performed before removing the epidural catheter.

Early surgical removal of a spinal epidural hematoma is critical, and surgical removal of the hematoma should be performed less than 8 hours after motor symptom appear, but only 38% of patients have a full recovery [13]. On the other hand, despite such a recommendation, it has been reported that good recovery can be achieved even if removal of an epidural hematoma is delayed 80 hours after the onset of sensorimotor symptoms [14]. However, the onset of complete paralysis before the removal of the hematoma, as occurred in this case, has a poor prognosis [15]. In this case, there were 2 reasons why the laminectomy was delayed. First, the laminectomy took a long time because paralysis developed in another hospital and the patient was urgently transported to our hospital. Second, the surgery had to be performed after IABP was removed. If the surgery was done a little earlier, the prognosis might be improved. Therefore, early diagnosis and surgical removal of the hematoma remains important.

Conclusions

In a patient undergoing urgent antithrombotic therapy for urgent PCI with IABP for acute coronary syndrome, the removal of the epidural catheter should be delayed until IABP with heparin is discontinued and the platelet count recovers.

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Conflicts of interest

None.

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