Case Report

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Subarachnoid Hemorrhage Following Spinal Anesthesia: Two Case Reports

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ABSTRACT

Spinal anesthesia has been performed on patients who undergo cesarean section, for years. A variety of complications are reported which are followed by spinal anesthesia; but subarachnoid hemorrhage is not one of them. In this study, we present two cases of Subarachnoid hemorrhage resulting from spinal anesthesia. In both cases, patients suffered from a thunderclap sudden-onset headache after undergoing cesarean section. Imaging and laboratory investigations were performed in order to determine the reason contributing to the headache, which revealed subarachnoid hemorrhage. After investigation and excluding other underlying causes, normal imaging studies suggested that the occurrence of subarachnoid hemorrhage as a possible complication of spinal anesthesia should be considered.

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Introduction

Spinal anesthesia, due to its benefits and low complications, has become the most favorite type of anesthesia for cesarean section since 1990s(1). Around 85% of the cesarean section cases undergo spinal anesthesia.(2) Some complications have been reported for regional anesthesia; Headache is one common complication with a variety of differential diagnosis. Postdural puncture headache (PDPH) which happens following the cerebrospinal fluid (CSF) loss, mostly resolves after a week but can be consistent in fewer cases(1). Pre-eclampsia is one life threatening cause of headache which must be diagnosed and managed immediately to prevent further deterioration(3).

Subarachnoid hemorrhage (SAH) is one of the most critical situations presenting by a sudden onset thunderclap headache, expressed as "the worst headache of one's life". The incidence of SAH following by spinal anesthesia is considered extremely rare(4).

Two cases of SAHs occurring after spinal anesthesia are reported here

Case Presentation

Case 1

A patient in their 30s, gravida three, para two, at 38 weeks of gestation was admitted for an elective cesarean section(CS). The patient arrived at the operating room. She had no obstetric comorbidities. Past medical history was clear. Her vital signs were a heart rate (HR) of 92-95 bpm with normal sinus rhythm, 175/110 mmHg of blood pressure (BP), and 98% of oxygen saturation (SpO2). In addition, preoperative coagulation test results were all within normal limits. Spinal anesthesia was planned considering the patient's preferences. She underwent spinal anesthesia after obtaining consent. Spinal anesthesia was induced in the sitting position, using a 25-gauge pencil-point spinal needle. The needle was inserted into the L3–L4 space and, after withdrawal of the cerebrospinal fluid, 3 mL of 0.5% bupivacaine was injected. Following needle removal, her position was immediately changed to the supine position. After induction of spinal anesthesia, the patient complained of headache as well as nausea and vomiting. Headache was located in the right parietal lobe and the patient described the pain as sudden onset and thunderclap. The lab data investigation was within normal limits. After the cesarean section and recovery from spinal anesthesia, patient's BP was maintained at 170/110 and the headache was consistent. In physical examination there was no evidence of any focal neurologic deficits. The patient was given Diclofenac suppository for pain relief. The headache continued for the next day, and yet, physical examination was clear. Due to the consistency of the headache, Computed Tomography (CT) imaging was done. CT scan images reported local cortical SAH at the left hemisphere. Following the CT scan findings, the patient was transferred to Quaem hospital- the neurology tertiary center of the eastern Iran. Magnetic resonance imaging (MRI) was performed at Quaem hospital which reported local hemorrhage at the left hemisphere. A CT angiography (CTA) was performed to rule out aneurysms as the most common cause of SAH. CTA was reported to be normal (*figure-1*). During admission, we put the patient at complete bed rest position. Valsalva maneuver was prohibited. An angiography was performed at the second day of admission. The angiogram was negative for vasospasms and aneurysms. She was prescribed Nimodipine 60mg every 4 hours, phenobarbital 60mg daily and dexamethasone 8mg twice a day. Within admission, the headache continued to improve gradually. Repeat Ct scan at day 3 showed that the blood was absorbing progressively. SAH as a result of the spinal anesthesia was considered after exclusion of every other diagnosis. The patient was discharged home 7 days after admission in good condition.

Case 2

An adult patient in their 20s, was admitted to hospital at 38 weeks of gestational age for elective CS. Her past medical history and family history were clear. She underwent spinal anesthesia after gaining consent. For inducing spinal anesthesia, the patient was put in the lateral decubitus position, using a 25-guage needle. After obtaining clear CSF, 2.5 mL of 0.5% bupivacaine was injected. Her vital signs retained stable during the operation. Three days after discharging from hospital, she experienced thunderclap sudden onset headache on her parietal lobes. The headache was followed by two episodes of tonic-clonic generalized seizure occurring an hour apart. The patient was conscious in between the seizures. She was transferred to the hospital and was admitted in gynecology. Lab results came back normal. Blood pressure was 155/80. Brain CT scan was performed. CT scan images reported local cortical SAH at the left hemisphere. MRI showed hemorrhage in left frontoparietal and right parietal lobes. Magnetic Resonance Venography (MRV), CTA and angiography demonstrated no abnormalities (*figure-1*). She was prescribed Nimodipine 60mg 6 times a day, phenobarbital 60mg per day and dexamethasone 8mg every 12 hours. A repeated CT scan on day 4 came back normal.

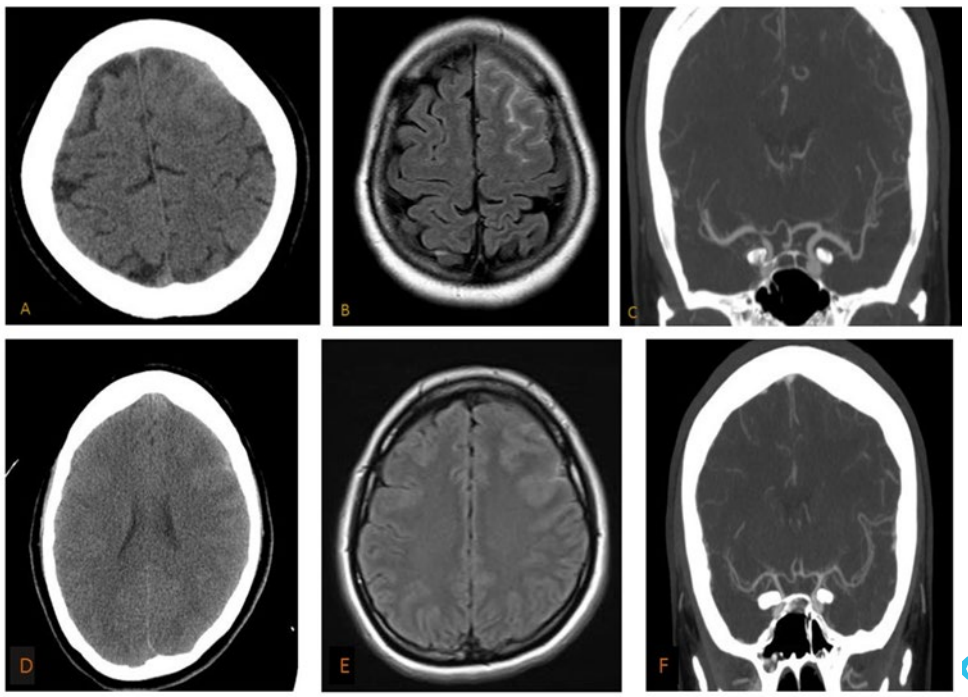

Figure 1A,B,C) Brain CT, MRI, CTA of case#1. D, E, F) Brain CT, MRI, CTA of case#2

Discussion

The pathogenesis of SAH as an unlikely diagnosis, is mostly aneurysmal (85%), which has the poorest prognosis of all other underlying causes. 10% of SAHs are followed by arteriovenous malformations and the other 5% have different causes.(5). As a result of the coagulopathies and changes in BP throughout pregnancy, the risk of stroke rises. During pregnancy or post-delivery period, hemorrhagic neurological incidences occur more frequently than ischemic ones(6, 7). A study performed by Lanska et al shows the close association between post-delivery stroke and C-section and pregnancy-related hypertension as well(8). The risk of SAH during delivery is only 2%(9). The treatment in pregnant women and non-pregnant women involves the same principles: preserving the undamaged parts of brain as well as treating the underlying causes and easing the patient's recovery(7).

In our first case, headache started ten minutes after the spinal anesthesia was induced. No signs of focal neurological deficit were observed. The most crucial differential diagnosis was pre-eclampsia. Although hypertension was reported, she did not have proteinuria. As there was no significant CSF loss during the procedure, PDPH was excluded. The severe thunderclap pain and BP of 170/100 remained for the next day, despite prescribing antihypertensive and pain relieving drugs. After ruling out other more common causes of headache, SAH was reported by the performed CT scan.

In the second patient, the headache occurred three days after the CS. The thunder clap headache which was followed by a generalized tonic-clonic seizure, was considered as eclampsia. Although BP was 155/80, eclampsia was excluded in the absence of proteinuria. Brain CT scan was performed which revealed SAH.

In 1992, Böttiger BW et al. reported a case of SAH followed by repeated spinal anesthesia in a 71-year-old man. They declared that the leak of CSF from the puncture site might lead to the aneurysmal rupture. Although SAH is not a common complication of spinal anesthesia, Böttiger BW et al. believed that it should be considered(10). In our first case, the probability of CSF leak is not strong due to the brief interval between lumbar puncture and the onset of the headache. Nevertheless, the three-day interval between spinal anesthesia and headache in our second case strengthens the possibility of CSF loss development. However, the aneurysmal rupture was excluded by normal angiography of the case#1 and case#2.

Eggert S.M. et al. reported a 29-year-old patient diagnosed with SAH following spinal anesthesia. The brain CT revealed SAH and the angiogram reported tortuous vasculature(11). Although there are still disagreements, most researches show the correlation of pregnancy status with aneurysmal rupture leading to intracerebral hemorrhage(11). In our case#1 and case#2 the angiogram demonstrated no abnormalities.

Eggert S.M. et al. claims that there is a possibility that the accompaniment of SAH and pregnancy and spinal anesthesia is quietly accidental(12).

Conclusion

There is various pathogenesis for SAH as a rare condition; but imaging studies of our cases demonstrated no abnormalities. Although spinal anesthesia has not been mentioned as a predisposing factor for occurrence of SAH, there is a possibility that SAH happened as the complication of spinal anesthesia in our cases. More investigations are required.

Ethical Considerations

Compliance with ethical guidelines

Informed consent was obtained from patients. The confidentiality of patients' information was maintained.

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Conflict of interest

The authors declared no conflict of interest.

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