

## Spontaneous cervical epidural hematoma during pregnancy: case report and literature review

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**Abstract** Spontaneous spinal epidural hematoma (SSEH) during pregnancy is rare and may result in permanent damage if not promptly treated. There were few studies discussing the etiology, presentation and treatment of SSEH during pregnancy. The authors describe a case of spontaneous cervical epidural hematoma during pregnancy, which was diagnosed by magnetic resonance imaging (MRI) and managed with surgical evacuation. A retrospective review of a case of spontaneous epidural hematoma of spine during pregnancy was performed. The clinical features, diagnoses, treatments and outcomes of all cases were analyzed. Precise diagnosis without delay and rapid surgical treatment are essential for the management of SSEH during pregnancy.

**Keywords** Epidural hematoma · Spine · Spontaneous · Pregnancy

### Introduction

Spontaneous epidural hematoma of the spine is uncommon. Since Jackson [1] reported the first case of SSEH in 1869, approximately 400 cases have been reported [2], only 11 of which occurred during pregnancy. Because of its rarity and atypical symptoms, its prompt diagnosis is difficult and its etiology remains unclear.

We describe a rare case of acute SSEH during pregnancy, and discuss the etiology, presentation and management of this entity based on the histological findings of this patient and the retrospective review of other similar cases.

### Case report

A healthy 29-year-old woman was admitted at 40 weeks 2 days of gestation with a complete paraplegia and weakness of the upper extremities. Seventeen hours before her admission she noted the sudden onset of severe neck pain not associated with any physical activity. Nine hours before admission she developed progressive weakness in extremities along with sensory loss in her legs and torso extending from the nipple line downward. She was taking only prenatal vitamins before admission. Her past medical history was unremarkable.

On admission, the patient's neurological examination was remarkable for grade 3/5 weakness in deltoids, biceps, and grade 0/5 weakness in wrist extensors, finger intrinsics, triceps and lower extremities. The patient had a loss of sensation to pinprick and light touch below T4 level and a loss of proprioception in her lower extremities. She had no volitional rectal tone.

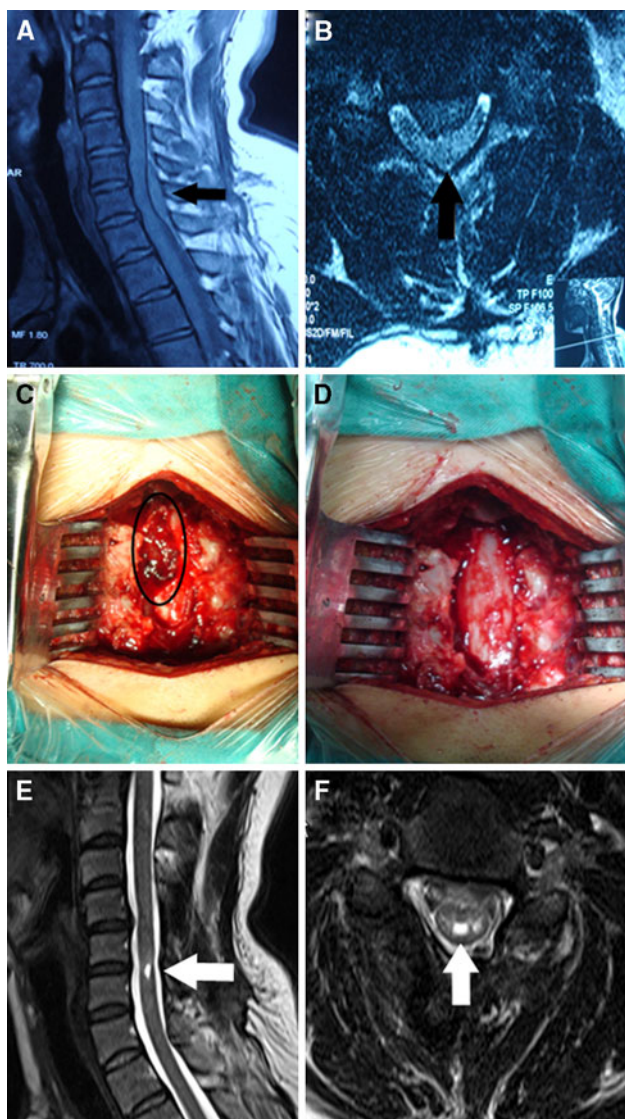
Laboratory studies, including platelet count, prothrombin time and protime, were all within normal limits. An urgent MRI of spine was performed, which demonstrated an intraspinal mass located within the posterior spinal canal at C5–C7 level. The signal characteristics of the mass suggested a well-defined epidural hematoma (Fig. 1a, b).

An obstetrical consultation was obtained, and the gestational age of 40 weeks was confirmed. A decision was made to first proceed with a cesarean section under local

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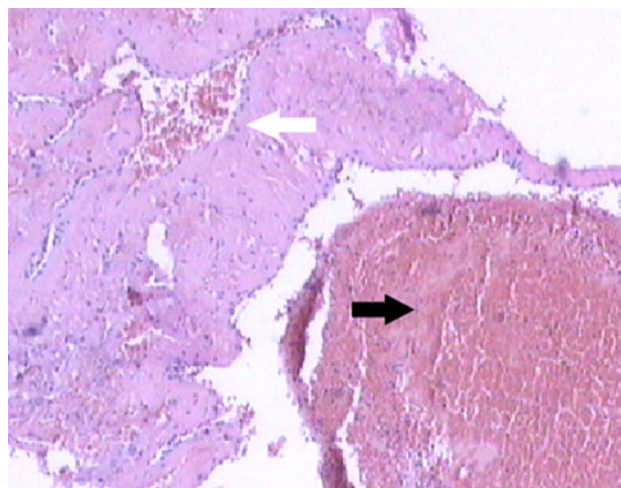
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**Fig. 1** Sagittal (a) and axial (b) T1-weighted MRI of the cervical spine showing an epidural hematoma (arrowhead) compressing the spinal cord from the C5 to the C7 level. c Intraoperative finding: a thick hematoma (ellipse) existed from the C5 to the C7 level under the lamina of vertebra. d The hematoma was completely removed, and the spinal cord was decompressed. Sagittal (e) and axial (f) T2-weighted MRI of the cervical spine obtained 6 months after surgery, demonstrating a small localized hyperintensity area suggestive of necrotizing cystic change (arrowhead) at C6 level. No spinal cord compression remains

anesthesia followed by a cervical laminectomy for removal of the epidural hematoma. The cesarean section was uneventful, and a healthy female infant was delivered. The patient was then turned into the prone position, and a laminectomy was performed at C4–C6 level. An acute hematoma was found, gently manipulated with a never hook and removed (Fig. 1c, d). No overt bleeding source was identified within the spinal canal. Histopathologic examination of the removed clot revealed “a simple



**Fig. 2** Histopathologic examination (Hematoxylin and Eosin stain  $\times 10$ ) of the surgical specimen showing hemorrhagic material (black arrow) and vascular cluster coagulation (white arrow)

hematoma” (Fig. 2). There was no evidence for a vascular malformation.

By postoperative day 1, the patient rapidly regained both superficial sensation and proprioception with some movement in her distal lower extremities. 2 months after surgery, she regained some movement in her wrist extensors, finger intrinsics, triceps and distal lower extremities. In follow-up 6 months post-surgery, MR imaging showed successful decompression of the spinal cord and revealed a spinal parenchymal change at C6 level (Fig. 1e, f). The patient still has impaired sensation in fingers, but is able to walk without assistance.

## Discussion

The SSEH is a rare but important neurological emergency, which represents 0.3–0.9% of all epidural space-occupying lesions [3]. The etiology of SSEH is generally unknown. Some predisposing factors include anticoagulant therapy [4], vascular malformation [5], hemophilia [6] and cocaine abuse [7], all suggested to be correlated with SSEH.

Spontaneous epidural hematomas of the spine during pregnancy have been infrequently reported. A PubMed review of the English literature from January 1966 to December 2009 for the terms “Spontaneous spinal epidural hematoma” and “Pregnancy” yielded only 11 reported cases (Table 1). The etiology in most cases remains unknown and may be multifactorial. However, the most widely accepted hypothesis is that of venous bleeding. Epidural veins belong to primitive valveless system. Sudden changes in central venous pressure, such as those that can occur with straining or coughing, can be transmitted directly from visceral cavities to epidural veins. Nystrom

**Table 1** Summary of report cases of spontaneous spinal epidural hematoma during pregnancy

Author	Gestation weeks	Initial symptom	Location of hematoma	Sensory level	Motor weakness	Time (h)	First procedure	Second procedure	Outcome
Bidzinski [12]	24	Pain	T2–T5	T4	Paraplegia	<31	Laminectomy	Vaginal delivery days later	Complete
Yonekawa et al. [9]	37	Pain	C4–C6	C5	Weak arms paraplegia	<17	Laminectomy	Vaginal delivery days later	Persistent paraplegia
Carroll [13]	35	Pain	T6–T7	T7	BLE	<24	CS	Laminectomy	Ambulatory
Steinmetz [14]	38	Pain	T1–T2	T4	BLE	>36	CS	Laminectomy	Ambulatory
Masski [15]	41	Pain	C7–T2	T2	Tetraplegia	<12	CS	Laminectomy	Persistent paraplegia
Cywinski [16]	38	Pain	T1–T2	T2	BLE	>36	CS	Laminectomy	Ambulatory
Szkup [17]	32	Pain	T1–T4	T4	BLE	<7	CS	Laminectomy	Ambulatory
Kelly [18]	32	Pain	T2–T4	T2	BLE	<8	CS	Laminectomy	Complete
Jea [19]	20	Pain	T1–T2	T1	Finger and BLE	<8	Laminectomy	Vaginal delivery days later	Complete
Doblar [20]	37	Pain	T6–T9	T8	BLE	<12	CS	Laminectomy	Ambulatory
Case and Ramsey [21]	37	Pain	T6–T9	T7	BLE	<24	CS	Laminectomy	Complete
Current study	40	Pain	C5–C7	T4	Tetraplegia	<18	CS	Laminectomy	Ambulatory

C cervical, T thoracic, BLE bilateral lower extremity, CS cesarean section, Time hours from onset to decompression

[8] found that increased intraabdominal pressure indeed elevates porcine epidural venous pressure. In the 12 reported cases (including current report), 10 cases occurred in the late stages of pregnancy. During the late stages of pregnancy, as the uterus and fetus enlarge, the abdominal/pelvic venous dynamics are altered. This fluctuation in venous pressures has been reported to potentially lead to a rupture of a preexisting pathologic venous wall [9].

In most SSEH cases, clinical manifestations typically include acute and significant back or neck pain with an associated progressive neurological deficit depending on the spinal level of involvement as well as the degree of neural compression. MRI is the diagnostic imaging modality of choice, which will provide information about location, extent of the hematoma and the degree of cord compression. The SSEH most often is located in the thoracic region because the epidural venous plexus is mostly prominent in the thoracic spine [10]. In our case hematoma located in cervical region, which is different from most other cases, may result in more serious damage.

Numerous studies have stated that only a short time interval from the onset of symptoms to the decompression of the spinal cord correlates with good neurological outcome. Groen [11] reviewed 330 cases of spontaneous epidural hematomas, and concluded that treatment outcome was favorable for patients with incomplete preoperative sensorimotor deficit, and recovery was significantly improved when decompression was performed within 36 h in patients with complete deficits and within 48 h in patients with incomplete deficits. Based on our

experience and the previously published case, no harm came to the fetuses despite the surgery for spinal cord decompression. Therefore, we advocate aggressive surgical management for SSEH during pregnancy as soon as possible. Surgical decision-making should involve a multidisciplinary team including members from obstetrics, anesthesia and spine surgery. Treatment decisions during pregnancy depend on the fetal maturity. Cesarean delivery followed by surgical spinal decompression may be advantageous because the early delivery of the fetus decreases epidural venous engorgement and facilitates the performance of decompression. In our opinion, if the gestational age of the fetus permits cesarean section, delivery of the fetus should be performed immediately prior to the spinal decompression. Otherwise, spinal decompression should be performed first without taking the consideration of fetus' age for cesarean operation. In the latter case, we would adopt a watch-and-wait policy in monitoring the fetus. The risk/benefit decision on whether steroids should be used to enhance fetal maturation should be made in close liaison between the spinal surgeons and obstetricians. Protocols for close monitoring of the patient's neurological status and the fetal maturity should be implanted. Once the fetal matures, vaginal delivery or cesarean section will be performed. In the 12 cases (including current report), 9 cases were performed cesarean section first, followed by laminectomy and evacuation of hematoma, resulting in improved neurologic status. However, all reported cases had not fully recovered neurologically at the time of discharge and required a long-term prognosis to rehabilitate.

## Conclusion

The SSEH during pregnancy is an acute neurologic emergency that mandates prompt recognition and treatment. The diagnosis should be suspected in the setting of acute and significant back or neck pain with an associated progressive neurological deficit. MRI plays an especially important diagnostic role. Functional recovery is related directly to the interval between symptom onset and surgical decompression. Emergent surgical decompression should be performed as rapidly as possible.

**Conflict of interest statement** None of the authors has any potential conflict of interest.

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