Three Cases of Spinal Hematoma Developing During Cardiovascular Treatment

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ABSTRACT
Spinal epidural and subdural hematomas are rare spinal pathologies. However, these pathologies must be remembered beside cranial pathologies in motor function disorders that develop in patients with coagulopathies or patients using anticoagulant and antiplatelet medications. In the current paper, three spinal hematoma cases that developed as the complications of a primary cardiovascular pathology have been presented. This article particularly indicates that the duration between the setting of the neurological status of the patient and the surgical treatment is the most important factor affecting the recovery of neurological functions.

Keywords: Acute spinal epidural hematoma, acute spinal subdural hematoma, cardiovascular disease, complication

A cutaneous spinal epidural hematoma (ASEH) and acute spinal subdural hematoma (ASSH) have rarely been reported in the relevant literature. Spinal hematomas are spinal pathologies that require early diagnosis and treatment to improve neurological function. The incidence of spinal hematoma is estimated to be 0.1% for 100 000 individuals (1). It is associated with trauma, coagulopathy, arteriovenous malformation, Paget disease, tumor, infection, malignancy, disc herniation, and postoperative complications (2). Interventions such as lumbar and cervical cerebrospinal fluid (CSF) punctures, the insertion of continuous lumbar CSF draining catheters, and spinal surgery (tumor, instrumentation, etc.) have been reported as iatrogenic causes (3). Most of the spontaneous spinal hematoma cases developed in the setting of coagulopathy or the use of anticoagulant and antiplatelet medications (4). Cases with
spinal hematomas may manifest clinical findings characterized by motor and sensory deficits specific to the spinal cord or cauda equina level they are compressing on. Spinal hematomas are among neurosurgical emergencies. However, cases of spontaneous regression have also been reported in the literature (4–8).

Early diagnosis and treatment of spinal hematomas that are caused by anticoagulant and antiplatelet drugs used during cardiovascular treatment are especially important for the prevention of permanent deficits. In this article, three cases of spinal hematoma, which were operated as soon as the diagnosis was made, were presented and the timing of the surgical treatment was emphasized.

Case Reports

Case 1

The 56-year-old female patient was admitted to the intensive care unit after a percutaneous transluminal coronary angioplasty (PTCA) and stenting procedure. Having sudden-onset back pain and progressive weakness in the legs that developed seven hours after the procedure, the patient was required to be evaluated by a neurologist. The cranial and spinal MRI studies of the patient revealed a spinal epidural hematoma and medullary compression at the T4-T5-T6 levels (Figure 1. a, b) and a neurosurgery consultation was requested. Our evaluation of the patient revealed a sensory deficit at the T5 level and a motor deficit in the lower extremities. In this patient, the duration between the beginning of the motor deficit and the surgical treatment was 16 hours. The patient underwent emergency surgery and the epidural hematoma was drained by T4-T5-T6 total laminectomy. The patient was admitted to a rehabilitation program by the department of physical therapy and rehabilitation (DPT). Last follow-up, the patient hasn’t got any neurological deficit.

Case 2

A 53-year-old male patient with a thoracoabdominal aortic aneurysm underwent a tubular graft interposition surgery in the department of cardiovascular surgery. An intraoperative lumbar drain was placed to monitor the CSF pressure and the CSF was drained periodically to keep the CSF pressure under 10 mmHg. On post-operative day 1, the patient developed back pain, and shortly afterwards a transient monoparesis manifested; however, the monoparesis resolved the same day. On post-operative day 2, the clinical picture of progressive paraparesis sets in. Therefore, the cranial and spinal MRI was performed. As an anterior epidural hematoma was identified at the T12-L1-L2-L3 levels (Figure 2 a, b), the patient was immediately evaluated by our clinic at the request of the department of cardiovascular surgery. The patient underwent emergency surgery and an L1-L2 total laminectomy was performed, and the epidural hematoma was drained. In this patient, the duration between the onset of the motor deficit and surgical treatment was 24 hours. The patient was mobilized with ambulatory support in post-operative month 1; however, he lost his life due to a sudden-onset cardiac arrest in post-operative month 2.

Figure 1. Sagittal (a) and axial (b) T2-weighted MR images demonstrate a posterior thoracic spinal epidural hematoma.

Figure 2. Sagittal (a) and axial (b) T2-weighted MR images demonstrate a anterior lumbar spinal epidural hematoma.

Case 3

During the follow-up period of a 67-year-old female patient after a PTCA and stenting procedure, weakness developed in both the upper and lower extremities of the patient. The patient was examined by the neurology department and cranial computer tomography (CT) was performed. No findings of ischemia or bleeding were detected on the cranial CT, and after being followed under intensive care for one day, the patient was referred to our intensive care unit. We performed a whole spinal magnetic resonance imaging (MRI) during our evaluation of the C6 quadriplegic patient. The spinal MRI revealed an acute subdural hematoma between C6-T3 and severe edema in the cord between C3-C7 (Figure 3 a, b). A T1-T2-T3 total laminectomy was performed immediately on the patient,
and the subdural hematoma was drained under micros-
copy (Figure. 4a). During the intraoperative observation,
the cord was contused and edematous (Figure 4b). For
this patient, the duration between the beginning of the
clinical picture and the surgery was 25 hours. On post-
operative day 1, minimal recovery of the paresis in the
patients’ upper extremity was observed; and on the same
day, the patient was admitted to a rehabilitation program
by the DPT. In post-operative month six, the patient was
still T1 quadriplegic.

Discussion
Spinal hematomas are one of the rare causes of spinal
cord compression. As MRI has started to be used as a ro-
ute radiological procedure, the number of cases report-
ted has increased. Spinal epidural hematomas were first
described in 1869 and first treated surgically in 1897 (9).
Spinal MRI is still the gold standard in the diagnosis of spi-
nal hematomas. Spinal hematomas may be spontaneous,
traumatic or iatrogenic. However, in most cases, there is
usually an underlying hematological coagulopathy or a
bleeding diathesis induced by an anticoagulant or anti-
pilatelet agent. Spinal hematomas are most common at the
levels of the thoracolumbar and lumbar regions (10). The
clinical findings of the patients vary depending on the
spinal level of hematomas. In addition to sudden-onset
of severe back pain radiating to paraparesis and quadri-
paresis, varying degrees of motor and sensory deficits are
particularly among the typical symptoms of spinal hema-
tomas. The progressive motor deficit that develops follo-
wing the pain may manifest itself as quadriplegia, quadri-
paresis, paraplegia, paraparesis, sensorial deficit, or cauda
equina syndrome (4–6,8,11,12). The clinical findings may
be hemiparesis or hemihypesthesia due to unilateral cord
compression (5). The cause of bleeding in the literature is
both venous and arterial origin. Since the spinal epidural
and subdural veins do not contain sphincters and there-
fore do not provide protection against pressure changes,
the hypothesis commonly accepted for the origin of the
hematoma is venous bleeding.

In the literature, several cases that recovered spontane-
ously with palliative treatment have been reported to date.
(4,6,7,10,13) The patient may be a candidate for conserva-
tive treatment if there is no neurological deficit or mini-
mal neurological deficit. However, these patients should
be followed up with close neurological examination and
early control MRI (OR: early MRI scan). Any neurological
derioration or the onset of new symptoms requires sur-
ical intervention in those patients. On the other hand,
the current study is in favor of immediate operation (OR:
surgical procedure) for the patients who develop motor
deficits unless there is a serious contraindication for gene-
ral anesthesia application. In two of our cases (Case 2 and
3), the time between the diagnosis and surgery exceeded
24 hours. These patients benefitted minimally from this
surgery, and therefore, the motor deficits were irrevers-
ble. Despite the fact that the time lapse between the onset
of motor deficit and the surgical treatment was 16 hours
in the thoracic epidural hematoma case (Case 1), the mo-
tor deficit fully recovered.
Case 1 and case 3 are cases of spinal hematoma due to anticoagulant use. Although neurological deterioration was noticed in case 3 of these patients, only cranial CT examination was inadequate. When quadriplegia develops in a conscious patient, research on cervical spinal pathologies should be performed. Case 2 is a case of iatrogenic spinal hematoma after lumbar drainage attempt on the patient under anticoagulant treatment. Three patients had bleeding time values above normal values. Patients were operated immediately after the diagnosis of spinal hematoma without waiting for bleeding time values to return to normal limits. Fresh frozen plasma was transfused to the patients before and during the surgery. There was no massive bleeding during the operation.

Spinal hematomas are neurosurgical emergencies if the patients have a deteriorated neurological state. The duration between the development of the motor deficit and surgical treatment is the most important factor affecting the recovery of neurological functions.

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References
1. Baek BS, Hur JW, Kwon KY, Lee HK. Spontaneous spinal epidural hematoma. J Korean Neurosurg Soc 2008;44:40–2. [CrossRef]
2. Fukui MB, Swarnkar AS, Williams RL. Acute spontaneous spinal epidural hematomas. AJNR Am J Neuroradiol 1999;20:1365–72. http://www.ajnr.org/content/20/7/1365.long
3. Russell NA, Benoit BG. Spinal subdural hematoma. A review. Surg Neurol 1983;20:133–37. [CrossRef]
4. Oh SH, Han IB, Koo YH, Kim OJ. Acute spinal subdural hematoma presenting with spontaneously resolving hemiplegia. J Korean Neurosurg Soc 2009;45:390–93. [CrossRef]
5. Bruce-Brand RA, Colleran GC, Broderick JM, Lui DF, Smith EM, Kavanagh EC, Poynton AR. Acute nontraumatic spinal intradural hematoma in a patient on warfarin. J Emerg Med 2013;45:695–97. [CrossRef]
6. Liao CH, Chang FC, Hsu SPC, Hung YC, Chen HH, Liang ML et al. Spinal subdural hematoma following posterior fossa surgery. Formosan J Surg 2013;46:52–5. [CrossRef]
7. Park YJ, Kim SW, Ju CJ, Wang HS. Spontaneous resolution of nontraumatic cervical spinal subdural hematoma presenting acute hemiparesis: a case report. Korean J Spine 2012;9:257–60. [CrossRef]
8. Yang NR, Kim SJ, Cho YJ, Cho do S. Spontaneous resolution of nontraumatic acute spinal subdural hematoma. J Korean Neurosurg Soc 2011;50:268–70. [CrossRef]
9. Jackson R. Case of spinal apoplexy. Lancet 1869;94:5–6. [CrossRef]
10. Chung J, Park IS, Hwang SH, Han JW. Acute spontaneous spinal subdural hematoma with vague symptoms. J Korean Neurosurg Soc. 2014;56:269–71. [CrossRef]
11. Dampeer RA. Spontaneous spinal subdural hematoma: case study. Am J Crit Care 2010;19:191–93. [CrossRef]
12. Kim HY, Ju CI, Kim SW. Acute cervical spinal subdural hematoma not related to head injury. J Korean Neurosurg Soc 2010;47:467–69. [CrossRef]
13. Morandi X, Riffaud L, Chabert E, Brassier G. Acute nontraumatic spinal subdural hematomas in three patients. Spine (Phila Pa 1976) 2001;26:E547–51. [CrossRef]