

Epidural hematoma following the use of an epidural catheter for continuous postoperative analgesia: A case report and review of the literature.

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ABSTRACT

Spinal epidural hematoma is a rare but a serious condition, with high morbidity and mortality, leading to significant neurological deficiencies. One of the main causes of spinal epidural hematoma is spinal puncture during anaesthetic procedures. We report an interesting case of an epidural hematoma following the use of an epidural catheter of continuous postoperative epidural analgesia (CPEA), following a Whipple procedure. This case is particularly interesting, due to the delayed onset of the hematoma, the total absence of predisposal factors and the uneventful patient's recovery following immediate surgical intervention.

KEYWORDS: Epidural anaesthesia, Epidural Haematoma

Introduction

The epidural space is the area defined centrally by the spinal sac and distally by the spinal canal; its anterior wall is considered to be the bodies of the vertebrae, whereas the posterior walls are the vertebral arches along with ligamentum flavum. Traditionally, the epidural space has been described as a consistent compartment surrounding the spinal sac. However, recent anatomical studies report that epidural space with its contents forms circular discontinuous compartments separated by zones where the dura mater comes into direct contact with the walls of the spinal canal [3,4].

A spinal epidural hematoma is characterized by

the rarity of its occurrence but also its severity, as it is considered as an emergency medical condition [5]. To a great extent, its clinical presentation is characterized by pain at the site of the injury radiating distally to the extremities, progressing in most of the cases to various degrees of neurologic deficits. The first report in the literature was published by Jackson in 1869, describing the case as "spinal apoplexy" [6]. In 2017, Domenicucci et al. published an extensive review of the literature trying to gather all the reported cases of spinal epidural hematomas published between the years 1869 and 2012 [7]. As it is evident from the above extensive literature review, one of the main causes

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Fig. 1. MRI T2 Sagittal

of spinal epidural hematoma is spinal puncture during anaesthetic procedures [8,9].

The incidence of serious complications after the induction of neuraxial anaesthesia, such as an epidural hematoma or abscess, seems to be larger than that estimated during the past decades: According to Horlocker and Wedel (1998) [10], the incidence of neurologic complications vary from 1 / 220.000 to 1 / 150.000 following spinal and epidural anaesthesia, respectively. In the last few decades, the indications for performing epidural anaesthesia have changed and expanded, patient's characteristics have been modified and of course the awareness of this serious complication has grown; today, it is estimated the incidence of occurrence of serious complications after epidural anaesthesia in non - obstetric patients varies from 1 / 6.000 up to 1 / 1000 cases [13,14]. On the other hand, this complication seems to be much less frequent in procedures performed in obstetric patients, with the incidence of epidural hematoma reported to be in 1 / 154.000 cases [15].

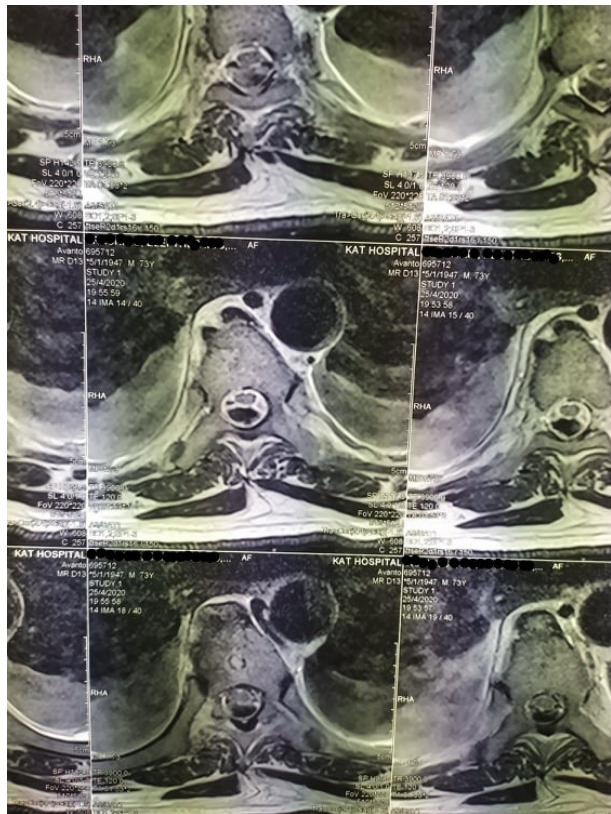


Fig. 2. MRI T2 Coronal

Case presentation

A patient aged 73 with a clear personal health record was admitted at the Department of Scoliosis and Spinal Cord of the Hospital on the 4th day following a Whipple procedure due to sudden onset incomplete paraplegia. The patient received no anticoagulants since he was fully-mobilized on the 2nd postoperative day. Clinical examination did not reveal any pathological findings in the left lower limb, Muscle strength of 0/5 was recorded in the respective right lower limb in all muscle groups, while sensitivity of 1/2 in the whole area was encountered. Anal sphincter tone was absent and the patient showed signs of saddle-like sensory loss. He urgently underwent a CPEA MRI and a lumbar spine MRI. MRI showed a hematoma in the posterior epidural space extending from T4 to T8. The patient was urgently taken to the operation and underwent, under general anesthesia and in prone position, T4-T8 central laminectomy, as well as drainage of the epidural hematoma.

Discussion

The spinal epidural hematoma (SEH) occurs in 0.1% to 3% of patients, and is characterized as an event requiring urgent surgical intervention [1,2]. The clinical factors which may impact the outcome are: patients' age and gender, the cause and location of the hematoma (arbitrary, postoperative or post traumatic), the early onset and degree of neurological deficit during treatment, the treatment as well as the availability of postoperative rehabilitation [2]. Patients with medium or mild neurological deficits prior to surgery are most likely to achieve better results from those with complete sensory and motor paraplegia, as well as from those who had been under anticoagulants or presented various comorbidities [2]. Among those who suffered from epidural hematoma and an accompanying neurological disorder, 47% of recorded patients recovered fully, 28% recovered partially and 25% did not show signs of recovery [3].

The main factors determining the long-term outcome were the degree of neurological deficit during treatment and the timing of the surgical intervention (decompression within 12 hours) [2].

The cause of spinal epidural hematomas is an injury to the posterior spinal and epidural vessels (in most of the cases the veins and less often the arteries), during an anaesthetic procedure (drug administration, epidural catheter removal). This hematoma may occur regardless of patient's history of coagulopathy [16]. According to Han et al. (2010) [17], in many cases, a small hematoma is produced forming a clot during the placement of the catheter, which is then dislodged during catheter removal. The volume and the location of the hematoma, as well as the extent of compression of the thecal sac play an important role in the clinical presentation of the neurological deficit [18]; thus, even small bleeds can produce particularly severe symptoms, depending on the local diameter of the spinal sac [19]. Additional risk factors include pre-existing coagulopathy, or anticoagulation therapy, older age, female sex, chronic renal disease, anatomical abnormalities of the lower thoracic and lumbar segment, osteoporosis and usage of large needle size.


The clinical presentation of an epidural hematoma is characterized most of the times by pain in the site of the injury, radiating distally to the extremities, progressing in most of the cases to various degrees of neurologic deficits [21]. Domenicucci et al. (2017) [7] in their case series used a modified Neuro - Grade scale consisting of 4 grades (Grade 0: no deficit, up to Grade 3: paraplegia or tetraplegia) [22] to clinically assess patients at initial presentation and follow-up assessments. The vast majority of the patients (84%) presented with serious neurologic symptomatology (NG score 2-3), whereas only 2% demonstrated NG score 0. The main factors determining a good functional outcome include the severity of the clinical condition and the timing of evacuation of the hematoma (it is evident that the earlier surgical intervention leads to better clinical and functional results, with the optimal time being the first 12 hours after the initiation of the symptoms) [5,23].

The findings of the current literature show that treatment of spinal epidural hematomas remains controversial. According to Domenicucci et al., (2017), [6] the most important, probably, factor which will determine whether the hematoma's treatment will be conservative or surgical, are the laboratory findings regarding the coagulation state of the patient. In all cases, bleeding diathesis should be treated pharmacologically. Surgical intervention should be performed immediately in cases where the neurologic symptoms are severe (for example for grade 2 of the modified Neuro-Grade (NG) scale, meaning para - or tetraparesis [7]), or when there is an obvious clinical deterioration. Characteristic is a case report by Umegaki et al., (2016) [27] of a rapid developed spinal epidural hematoma in a 68 - year old male just 15 minutes after the removal of a spinal epidural catheter, who was treated successfully after an emergent evacuation of the hematoma, which was spreading between T3 - T6, just three hours after the onset of the symptoms. In the present case report, the immediate performed MRI scan which proved the diagnosis of an epidural hematoma between T4 - T8, along with the emergent surgical intervention resulted in the

excellent post-operative outcome.

Conclusions

In the present case surgical intervention was immediate, and that is the reason why the postoperative recovery was smooth. However,

this case is particularly interesting due to the delayed onset of the hematoma, the total absence of predisposition factors (no signs of a pre-existing spinal stenosis) to justify its onset, as well as the fact that no anticoagulants had been administered during the first surgery (Whipple). 

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