Case report

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A CASE REPORT ON TRAUMATIC DELAYED EPIDURAL HEMATOMA WITH ATYPICAL PRESENTATION

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Vertex epidural hematoma (EDH) is an uncommon type of EDH. The management of vertex EDH is a challenge for neurosurgeons, as there is no proper consensus on the proper treatment modality. Our patient had delayed clinical deterioration with the development of paraparesis and deep somnolent state. After an immediate head CT was performed, which showed massive delayed EDH at the vertex, the patient underwent an urgent operation. The postoperative course went satisfactorily with the complete withdrawal of all neurological deficits and control head CT scan showed the complete evacuation of the hematoma. Vertex EDH represents an urgent neurosurgical pathology, which should not be diagnostically overlooked, and by need treated urgently in the operating room.

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Key words: *epidural hematoma, superior sagittal sinus, trauma, dural tenting suture, epidural hemostasis*

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Introduction

Epidural hematoma (EDH) represents an urgent neurosurgical pathology and accounts for less than 4% of traumatic brain injuries (TBI) (1). Approximately 60% of traumatic EDHs originate from arterial injury. Data on the occurrence and proportion of traumatic EDH, which are of nonarterial origin, differ to a significant extent and have not been sufficiently reported. Some authors indicate that in about 9.7% of cases the source of bleeding were diploic veins or other venous vessels (2). Regarding other potential causes of nonarterial traumatic EDH, the most common is bleeding from emissary veins, venous dural sinuses, dural venous lakes and rarely, bleeding from arachnoid granulations (2, 3).

Vertex EDHs are recognized as a special entity because they can manifest with an unusual clinical presentation, followed by delayed diagnosis, as well as special consideration for neurosurgical treatment (4, 5). Furthermore, it can be clinically manifested by altered consciousness, headache, unilateral or bilateral weakness of lower limbs, acute intracranial hypertension and hydrocephalus due to blockage of arachnoid granulations and the superior sagittal sinus (SSS) (3).

The management of vertex EDH is a challenge for neurosurgeons, as there is no proper consensus on when to operate and when the supportive care is satisfactory. Furthermore, potential injury and bleeding from the SSS increases surgical risks, which requires careful operative planning and strategy (3, 4, 5).

In this case report, we present a patient with traumatic delayed bifrontoparietal EDH, producing mass effect on the underlying brain parenchyma, emphasizing precaution when operating in the area of the SSS.

Case Report

A 35-year-old male was admitted during early morning hours due to injuries he previously sustained, allegedly at a football match, as a result of hitting his forehead and vertex accidentally on a blunt object. The patient was previously examined in the local hospital, where the head CT was performed, on which the presence of the fracture on the frontal parasagittal right and along sagittal suture

was recorded, measuring 10 cm in length, as well as the presence of a small layer of vertex EDH (Figure 1). After being examined by the neurosurgeon at the admission, it was decided that the patient was going to be treated with supportive therapy. The patient allegedly did not have comorbidities, based on the anamnesis and available medical documentation, and there was allegedly no significant hereditary disease in the family history.

He reported nausea immediately after the injury, and did not vomit or lose consciousness. At the admission to the hospital, clinical examination determined that the patient was conscious, oriented to time, space and person, cardiopulmonary stable, without any recorded gross neurological deficit. Swelling at the site of injury was detected, as well as the presence of subgaleal hematoma.

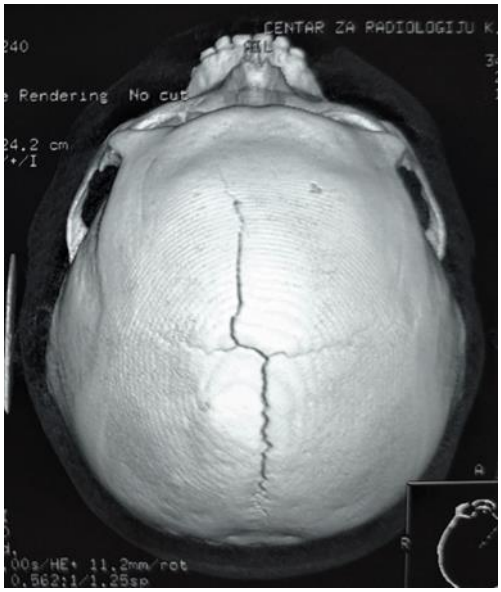

Figure 1. Volume rendering display of calvary with a linear fracture of the frontal bone that continues along the sagittal suture.

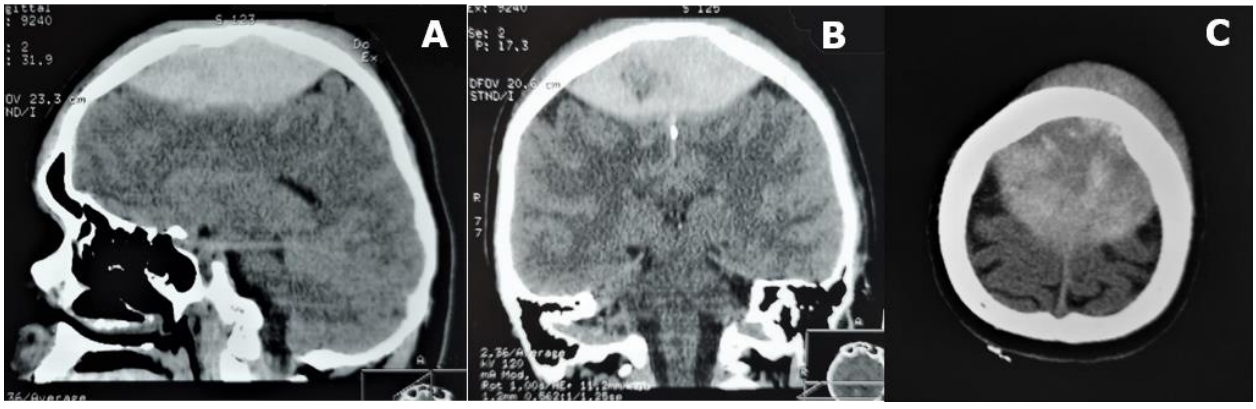

Figure 2. The sagittal (A), coronal (B) and axial (C) CT tomograms show a hyperdense convex collection corresponding to acute bifrontoparietal EDH. The cerebral parenchyma and upper sagittal sinus are displaced caudally.

During the first day of hospitalization, he was treated with analgesics, symptomatic and prophylactic antiepileptic therapy with levetiracetam (Lyvam®) in the dose of 250 mg twice a day. About 20 hours after the admission, the clinical and neurological deterioration of the patient's condition was observed with the development of paraparesis and deep somnolent state. Afterwards, an immediate head CT was performed, which showed that initially seen EDH has enlarged significantly (Figure 2). After urgent preoperative examination, the patient was prepared for surgery.

The patient's head was positioned above the level of the rest of the body and attention was paid to the potential danger of air embolism. In the course of surgery, a linear frontoparietal incision was made sagittally in the length of 12 cm. After careful soft tissue preparation, a frontoparietal fracture was visualized sagittally. The bony lid was removed by 4 burr holes and a large vertex epidural hematoma was encountered. Bleeding from the fracture site was stopped by using a bone wax. Intraoperatively, the bleeding source corresponded to the SSS and the surrounding drainage veins. During the evacuation of the hematoma, the patient bleeded profusely from the torn arachnoid granulations and the SSS, which were tamponaded by using the hemostatic material Surgicel and Liostip. After hemostasis was achieved, an epidural drainage was placed, while the bone lid was fixed back with surgical sutures and returned to the appropriate place.

The postoperative course went satisfactorily with the complete withdrawal of the paraparesis within 6 days, as well as restoration of consciousness, measured by using Glasgow Coma Scale (GCS 15). Control head CT scan was performed after 3 days and showed complete evacuation of the hematoma and minimal gas inclusions in the operating area (Figure 3). At discharge, the patient has reached a full recovery. As for the therapy, he was prescribed with prophylactic anticonvulsant therapy (Levetiracetam-Lyvam® in the dose of 250 mg twice a day), oral analgesic (Metamizole-Analgin® in the dose of 500 mg twice a day) and gastroprotective therapy (Pantoprazole-Nolpaza® in the dose of 40mg once a day). The first check-up by a neurosurgeon was scheduled for 5 days after discharge, when the sutures were removed, and after that in 3 months, but later on every 6 months. During follow-up examinations, the wound healed properly and the patient reached a full recovery.

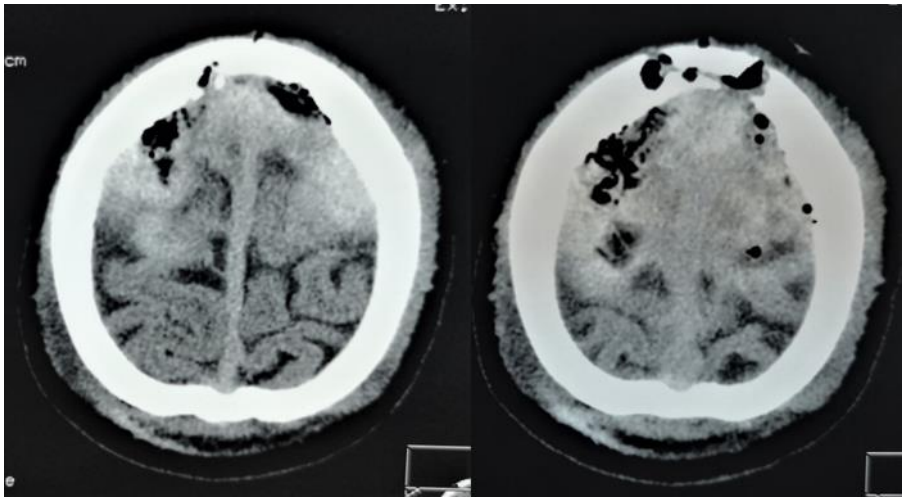

Figure 3. Postoperative axial CT tomograms show complete evacuation of the hematoma and minimal gas inclusions in the operating area.

Discussion

Only a few spontaneous hematomas of this localization have been described in the literature (5). Vertex epidural hematoma is sometimes difficult to detect on head CT with routine sections. The reasons for that might be the small size of hematoma on the initial head CT, the density of the acute hematoma, which is similar to the density of the bone on CT, and scanning plane level may sometimes exclude the vertex (6, 7). A more sensitive method in the detection of epidural hematoma, originating from SSS or dural venous vessels, is MR venography, which accurately detects SSS obstruction in comparison with axial section of CT. Therefore, some authors suggest performing initial CT scans with thinner sections, as well as MR scans (6, 7). In our patient, a layer of epidural hematoma below the SSS was clearly seen on the initial posttraumatic head CT in the sagittal plane.

The delayed deterioration of the clinical condition in our patient could be explained by the potential increase in intracranial pressure (ICP), as well as the mass effect of hematoma on the underlying brain tissue (8). Normal cerebrospinal fluid (CSF) flow involves outflow through arachnoid granulations into dural venous sinuses. When cerebrospinal fluid drainage in the SSS is obstructed, there is a consequent stagnation in the CSF flow, which increases ICP (7). Intense headache, which the patient experienced, could have been caused by stretching of the dura mater around the SSS, which is densely innervated, as well as by the dislocation of the SSS (5). When there is a reasonable suspicion that such condition may develop, attention should be paid to the possible occurrence of visual disturbances and edema of the optic papilla. Moreover; it is possible that patients experience cranial nerve deficits, especially the oculomotor nerve palsy, as well as weakness of the upper extremities and hemiparesis (3, 5), which was not recorded in our case. Paraparesis, which occurred in our patient, may sometimes require differential diagnostic approach for exclusion of potential spinal cord injury (3, 5, 7). Considering that the patient's level of consciousness was reduced and that he had a purely motor paraparesis, which indicates intracranial pathology of the vertex, due to the urgent need for surgery, no additional diagnosis of possible spinal cord injury was made.

The decision about suitable treatment modality should be based upon the characteristics of hematoma, clinical presentation, coronal plain CT scan and neurosurgical assessment. Some authors consider that small hematomas, which do not cause neurological deficits in patients, should be treated conservatively (3, 5, 7). The team of neurosurgeons from our hospital came to the same conclusion, based on the initial clinical presentation of the patient. However, the delayed deterioration of the patient's clinical condition required an urgent surgery.

Special attention in vertex EDH surgery should be redirected to proper hemostasis of the SSS. Bleeding from the SSS can be stopped by applying hemostatic material, reconstruction or ligation. Surgeons avoid ligation of the middle third of the SSS, because the outcome is usually fatal, due to the development of venous obstruction and ICP (7, 9). Surgery in the area of the SSS can trigger the development of SSS thrombosis, a potential life-threatening condition (10).

Dural tenting (DT) around SSS is often used in practice, in order to limit the space for the growth of an epidural hematoma in the event of rebleeding. Moreover, there are disagreements about the benefits of DT and the justification for its use (11, 12). According to some studies, the frequency of epidural rebleeding after DT is between 0.2% and 2.6% for EDH with thickness greater than 3 mm. Furthermore, the risk of formation of subdural hygroma and rebleeding is increased after DT. The enlargement of the subdural space can later lead to stretching and bleeding from the dural bridging veins (11). Proper DT can be a challenge, even for experienced neurosurgeons, with emphasis on visualization of the underlying cortex, in order to avoid dural bridging veins injury. Therefore, according to some authors, it is recommended to use an operating microscope when performing DT (11). In our case, after adequate hemostasis of bleeding from the calvaria, SSS and bridging veins, we decided not to place DT, guided by the above mentioned recommendations and our clinical experience. Postoperative head CT showed that the most of the hematoma was evacuated, and that the small rest was in resorption.

Conclusion

Vertex EDH originating from SSS represent an urgent neurosurgical pathology, which should not be diagnostically overlooked, and if needed, should be treated urgently in the operating room. During the operation, the neurosurgeon must be prepared to prevent potential massive bleeding and the development of air embolism, and to spare the dural bridging veins from Rolandic outflow area.

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PRIKAZ SLUČAJA TRAUMATSKOG ODLOŽENOG EPIDURALNOG HEMATOMA ATIPIČNE LOKALIZACIJE

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Epiduralni hematom (EDH) verteksa predstavlja retku i atipičnu lokalizaciju EDH. Lečenje EDH verteksa predstavlja izazov za neurohirurge, pošto ne postoji ustaljeno mišljenje i konsenzus o odgovarajućem modalitetu lečenja. Nakon što je prošlo 20 časova od prijema, stanje bolesnika počelo je klinički da se pogoršava, praćeno razvojem parapareze i dubokim somnolentnim stanjem. Ubrzo je izveden CT endokranijuma, pomoću kojeg je primećen veliki bifrontoparijetalni EDH, te je bolesnik podvrgnut hitnom operativnom lečenju. Postoperativni tok prošao je zadovoljavajuće, sa potpunim povlačenjem svih neuroloških deficita, a pomoću CT endokranijuma evidentirana je potpuna evakuacija hematoma. Verteks EDH predstavlja urgentno neurohirurško stanje, koje se ne sme dijagnostički prevideti, sa pripravnošću za hitnim operativnim lečenjem, ukoliko dođe do progresije hematoma.

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Ključne reči: *epiduralni hematom, gornji sagitalni sinus, trauma, duralna suspenzija, epiduralna hemostaza*