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CASE REPORT **OLGU SUNUMU**

DELAYED NEUOROLOGICAL DETERIORANTION AND INTRACRANIAL HEMATOMA CAUSED BY TRAUMATIC PERICALLOSAL ARTERY ANEURYSM: A CASE REPORT

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ABSTRACT

Traumatic aneurysm formation due to closed head trauma is a very rare condition. Here, we present a case of pericallosaltraumatic aneurysm, which showed no signs of an aneurysm on initial cranial imaging, and presented with neurologic deterioration and intracranial hematoma 3 weeks later. The aneurysm was clipped with a surgical approach. Due to the development of hydrocephalus in the follow-up, firstly external ventricular drainage surgery and then ventriculeperitoneal shunt surgery was performed.
Keywords: pericallosalarteryaneurysm, aneurysm, traumatic, subarachnoid hemorrhage.

TRAVMATİK PERİKALLOSAL ARTER ANEVRİZMASININ NEDEN OLDUĞU GECİKMİŞ NÖROLOJİK BOZULMA VE İNTRAKRANİYAL HEMATOM: OLGU SUNUMU

ÖZ

Kapalı kafa travmasına bağlı oluşan travmatik anevrizma oluşumu oldukça nadir görülen bir durumdur. Biz burda başlangıç kranial görüntülemelerinde her hangi bir anevrizma lehine bulgusu olmayan 3 hafta sonra nörolojik dezoriyantasyon ve intrakranialhematom ile kendisini gösteren perikallosal travmatik anevrizma vakası sunuyoruz. Cerrahi yaklaşım ile anevrizma kiliplendi. Takipinde hidrosefali gelişmesi üzerine öncelikle eksternalventriküler drenaj cerrahisi daha sonra ventrikülöperitoneal şant cerrahisi yapıldı.
Anahtar Sözcükler: perikallosal anevrizma, anevrizma, travmatik subaraknoid kanama.

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INTRODUCTION

Traumatic aneurysm formation due to closed head trauma was mentioned for the first time in 1829. As a result of a 12-year-old pediatric case autopsy, an aneurysm thought to be due to trauma was found in the middle cerebral artery (1). Although intracranial aneurysm occurring after trauma is quite rare, it constitutes one percent of all intracranial aneurysms (2). Aneurysms may not be detected with the first cranial imaging performed after trauma. It may show itself as delayed subarachnoid hemorrhage, parenchymal hematoma, epidural, subdural hemorrhage. It can also be detected incidentally, rarely. Therefore, the incidence of post-traumatic aneurysms is not known exactly (3). If a traumatic aneurysm is detected, it should be intervened immediately. It is a type of aneurysm with a high probability of rapid growth and rupture in case of delayed diagnosis or surgical intervention (4). The mortality rate in traumatic intracranial aneurysms is as high as 50%. Traumatic aneurysms appearing due to closed head trauma are seen peripherally.

Surgical treatment of traumatic aneurysms is challenging because these aneurysms are usually pseudoaneurysms (5).

CASE REPORT

An 18-year-old male patient is brought to the emergency department after a motorcycle accident. The patient was evaluated by us in the emergency department. The patient's glaskow coma scale was evaluated as e2m5v (non-testable). He was unconscious, had no orientation and cooperation, direct and indirect light reflexes were evaluated as positive, pupillary isochoric. He could open his eyes with painful stimuli and localize the pain. It was learned that there was a femoral shaft fracture and a bicortical fracture in the mandibular parasympi. A treatment plan was made by the Orthopedic and Plastic Surgery Department without considering emergency surgery. No epidural, subdural, parenchymal hematoma, or midline shift was observed in the brain computed tomography performed in the emergency department. However, there was an appearance in the interhemispheric fissure, which we thought was compatible with traumatic subarachnoid hemorrhage (Figure 1). We did not consider vascular pathology primarily because of the appearance of traumatic subarachnoid hemorrhage. Therefore, we did not perform computed tomography angiography. No surgical intervention was considered for the patient and supportive treatment was started by hospitalizing the patient in the intensive care unit.

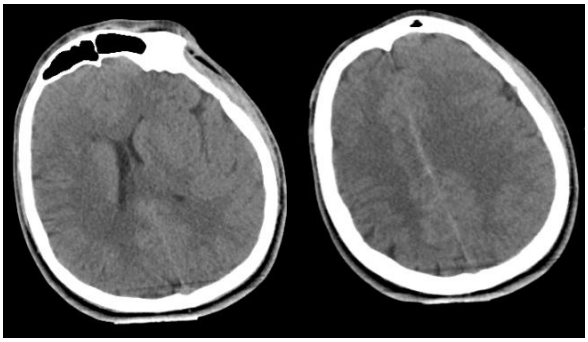

Figure 1. The patient's brain computed tomography performed in the emergency department does not show epidural or subdural hemorrhage due to trauma. There is subarachnoid hemorrhage in the interhemispheric fissure, which is thought to be due to trauma.

Control brain computed tomography was performed on the patient 6 hours later. No new radiopathological finding was found in the new cranial imaging. The patient was followed up under intensive care conditions. After 2 weeks, the patient was evaluated as extubated conscious open oriented, and cooperative. In this process, it was seen that the necessary procedures were performed for the patient's femoral fracture. When the brain computed tomography image performed 2 weeks later was examined, it was seen that there was an enlargement in the subdural distance but no new bleeding. Considering that the enlargement in the subdural distance was caused by the mannitol in the crush fluid suggested by the orthopedics department, it was recommended to stop the crush fluid. It was observed that the patient showed neurological improvement during the treatment and follow-up 2 weeks.

Three weeks after the trauma, the patient has consulted again because of neurological regression. Brain computed tomography showed that there was a hematoma area (Figure 2), reaching the size of 37x24 mm in the widest part, extending from the level of the interhemispheric fissure to the bilateral brain parenchyma, and pressing the corpus callosum body part inferiorly. In addition, hemorrhagic leveling was observed in both lateral ventricles.

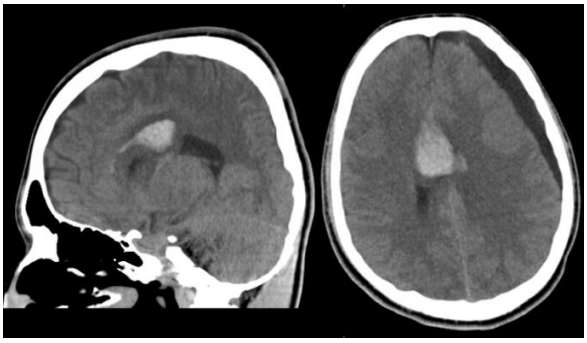

Figure 2. Cranial imaging due to the development of neurological detorientation, the image of interhemispheric hematoma on the corpus callosum.

When we compared the previous images, we observed that interhemispheric subarachnoid hemorrhage seen in the first cranial imaging and intraparenchymal hematoma formed in the same region. With these findings, we suspected that there might be a vascular pathology, and cerebral computed tomography angio imaging was performed. Cerebral computed tomography angiography showed an aneurysmatic dilatation of approximately 7 mm in diameter, suspicious for an aneurysm, just posterior to the hematoma area in the interhemispheric fissure (Figure 3). Surgical treatment was planned by confirming the diagnosis of an aneurysm located in the pericallosal artery (Figure 4) by digital subtraction angiography.

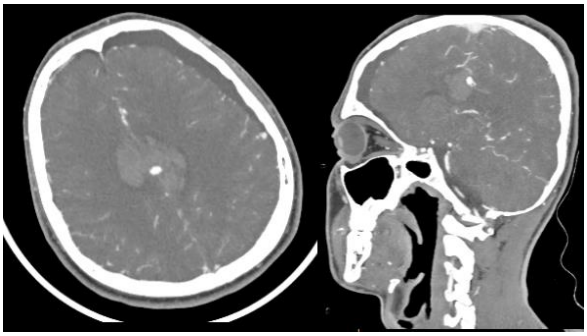

Figure 3. Brain computed tomography angiography image shows aneurysmatic enlargement in the distal pericallosal artery adjacent to the hematoma.

A right frontal paramedian craniotomy was performed with a right frontoparietal incision. The dura was opened in a U shape and the dural flap was lifted as a base of the superior sagittal sinus to reach the interhemispheric fissure. The interhemispheric fissure was dissected by following the falx cerebri downwards. Hematoma

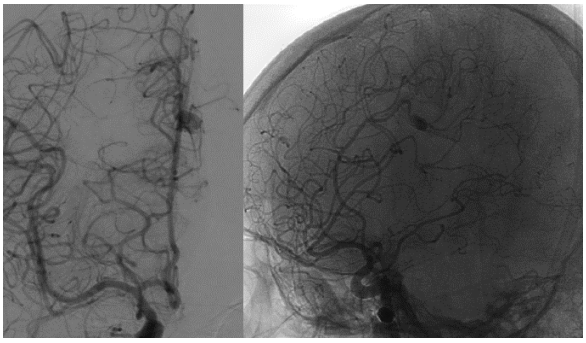

Figure 4. Digital subtraction angiography image of traumatic distal pericallosal artery aneurysm.

encountered was suctioned. Pericallosal artery was reached by dissecting the arachnoid adhesions around the cingulat gyrus. The aneurysm was reached by following the pericallosal artery distally. The size of the aneurysm was found to be larger than that measured by digital subtraction angiography. The periphery of the aneurysm was dissected and 1 clip was placed in the aneurysm. Dura was sutured after providing hemostasis in the operation area. The bone flap was replaced with a miniplate and screws. Subcutaneous and skin were closed in accordance with the anatomical folds. No new neurological deficit was detected in the postoperative follow-up. No new bleeding was detected in the cranial imaging performed after surgery. It was observed that the bleeding in the lateral ventricles was resorbed, but enlargement and periventricular interstitial edema were observed in the lateral ventricles compatible with hydrocephalus. Thereupon, extra ventricular drainage was placed on the patient first. However, a ventriculoperitoneal shunt was placed, considering that he became dependent on ventriculoperitoneal hut in the later cranial imaging. Of note, informed consent was signed by the patient for this report

DISCUSSION AND CONCLUSION

Although it is known that traumatic aneurysms occur, they are not often the first pathology to be considered due to their rarity. In our case, there was interhemispheric subarachnoid hemorrhage on initial cranial imaging, but we evaluated it as it was due to trauma. We did not consider a traumatic aneurysm primarily because the incidence of subarachnoid hemorrhage due to trauma is between 32-61% (6).

However, unexplained neurological detorientation after 3 weeks and parenchymal hematoma in the interhemispheric region suggested that it might be a traumatic aneurysm. Traumatic aneurysm manifests itself with delayed intracranial hematoma and neurological detorientation, as in our case (7). The fact that the formed hematoma was in the same region as the subarachnoid hemorrhage in the first cranial imaging supported the possibility of a traumatic aneurysm. We also know that there may be minimal or even no subarachnoid hemorrhage on initial imaging (7). Traumatic aneurysm formation is a very rare condition. Its incidence is mentioned as 0.65 in a study. Empirical cerebral computed angiography is not routinely used to investigate traumatic aneurysms after head injury. The question began to be asked whether empirical cerebral computed tomography angiography should be performed in patients with traumatic subarachnoid hemorrhage (8). In addition, traumatic aneurysm occurs approximately 1-2 weeks after the trauma (4). Therefore, the aneurysm will probably not be visible in the cerebral computed tomography angiography that will be taken immediately after the trauma. It is very convenient for misdiagnosis and delayed diagnosis due to the fact that the formation time of traumatic aneurysms is not known exactly and its clinical presentation. Apart from all these, the patient who was evaluated as having traumatic subarachnoid hemorrhage may have had an accident as a result of the rupture of the cerebral aneurysm (9).

Depending on the localization of the aneurysm, its formation mechanism is explained depending on different anatomical structures. A traumatic aneurysm formed in the pericallosal artery is thought to be caused by shearing to the free edge of the vessel and falxcerebri (10).

Traumatic aneurysms can also occur with penetrating head trauma (11). Traumatic aneurysm can also occur iatrogenically after cranial surgery (12). Therefore, it should be considered that there may be traumatic aneurysms after recurrent or delayed bleeding after penetrating head trauma. Traumatic aneurysm surgery is challenging because the aneurysm localization is outside the most common places and is usually in the form of pseudoaneurysms (5). In our case, there is an aneurysm in the distal pericallosal artery, which is located outside the usual localizations. Pterional craniotomy and sylvian dissection are frequently performed for aneurysm surgery. However, as in our case, an interhemispheric approach is required for the approach to pericallosal aneurysm. However, the mortality and morbidity of distal anterior cerebral artery aneurysms due to trauma are higher than other anterior circulation aneurysms (13). Pseudoaneurysms do not have a full-layer wall structure. Therefore, it is very fragile and very prone to bleeding. Considering this in our case, we carefully dissected the neck of the aneurysm and placed an aneurysm clip. Up to 60% of this type of aneurysms may present with intraparenchymal hemorrhage and rarely spontaneous occlusion (14). Indeed, in our case, it showed itself with intraparenchymal hemorrhage. The most common forms are delayed neurologic deterioration and delayed intracranial hematoma. Symonds divided delayed intracranial hemorrhage into early and late. Early delayed intracranial hematoma is thinning of the arterial wall and subsequent rupture bleeding within a few weeks after trauma. We accept our case as early delayed hematoma (15). Surgical treatment options vary according to the localization of the aneurysm, whether it is a true or false aneurysm or doom-neck ratio. Surgical treatment options can be surgical clipping, endovascular coil-stent, trapping, bypass or combined treatment. We preferred the surgical approach. The reason is that we want to remove the intracranial hematoma and the doom-neck ratio of the aneurysm is suitable for clip placement. In case of rupture of a traumatic aneurysm, the prognosis is poor. Recognizing and treating the aneurysm before it ruptures is the main goal in the management of treatment. Digital subtraction angiography and computed tomography angiography can be used to diagnose aneurysm. Computed tomography angiography has started to replace digital subtraction angiography in recent years (16). However, it is still accepted as the gold standard conventional cerebral angiography (2). In the absence of any radiopathological finding in computed tomography angiography, we definitely recommend performing digital subtraction angiography in case of suspected traumatic aneurysm.

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Ethics

Informed Consent: The authors declared that informed consent form was signed by the patient.

Copyright Transfer Form: Copyright Transfer Form was signed by the authors.

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