

# Acute Interdural Hematoma Mimicking Epidural Hematoma: A Case Report

## *Epidural Hematoma Benzeyen Akut İnterdural Hematom: Bir Olgu Sunumu*

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### ABSTRACT

Intracranial hematoma rarely presents between two dural layers of pachimeninges. Here, we present a case of an interdural hematoma with similar appearance to an epidural hematoma. A 51-year-old man presented with a left temporal contusion following a motor vehicle accident. After craniotomy and contusion removal, the post-operative CT scan showed a parietal intracranial hematoma located posterior and superior to the bone flap. The CT scan appearance of the new hematoma was similar to the CT scan appearance of an epidural hematoma. Upon operation, we determined that the hematoma was located between two layers of dura mater, i.e., an interdural hematoma. We removed the hematoma and sutured the two layers of dura to each other at multiple sites. Interdural hematoma is a rare entity. Its appearance in a CT scan can be mistaken for an extradural hematoma.

**KEYWORDS:** Craniotomy, Epidural hematoma, Interdural hematoma, Intracranial hematoma

### ÖZ

Intrakraniyal hematom nadiren pakimeningeslerin iki dural tabakası arasında oluşur. Burada epidural hematoma benzer görünümü olan bir interdural hematom vakası sunulmuştur. 51 yaşında bir erkek hasta bir trafik kazası sonrası sol temporal kontüzyonla gelmiştir. Kraniotomi ve kontüzyonun giderilmesi sonrasında postoperatif BT taraması kemik flepine posterior ve superior olarak bulunan bir parietal intrakraniyal hematom göstermiştir. Yeni hematomun BT taraması bir epidural hematomun BT taraması görünümüne benzer bulunmuştur. Ameliyatta hematomun dura materin iki tabakası arasında olduğu yani bir interdural hematom olduğu görülmüştür. Hematom çıkarılmış ve duranın iki tabakası birbirine çok sayıda yerde dikilmiştir. Interdural hematom nadir görülen bir olaydır. BT taramasında görünüm ekstradural hematom ile karışabilir.

**ANAHTAR SÖZCÜKLER:** Kraniotomi, Epidural hematom, Interdural hematom, Intrakraniyal hematom

### INTRODUCTION

Although intracranial hematomas are a common event following trauma or neurosurgical operation in adulthood, they rarely present between two layers of dura mater. We present a case of interdural hematoma (IDH) that developed after craniotomy together with its clinical features and management.

### CASE REPORT

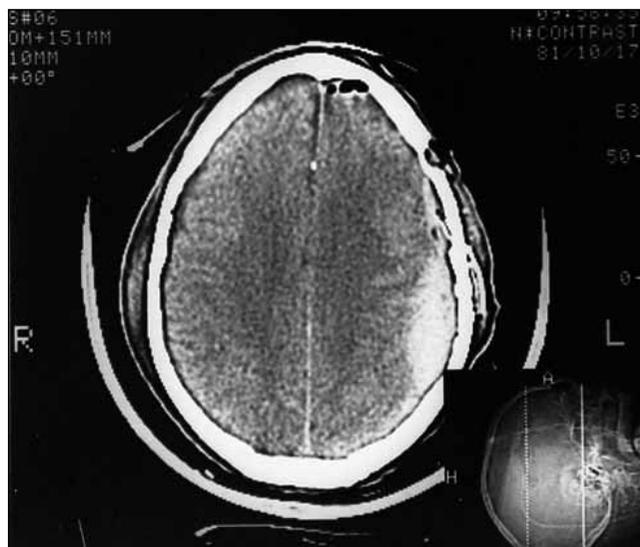
A 51-year-old man presented with loss of consciousness following a motor vehicle accident. Upon admission he had a GCS of 11. The pupils were reactive and symmetric, and the rest of the neurological exam was normal. Computed tomography (CT) scan showed a contusion in the left temporal lobe (Figure 1). A left temporal craniotomy was performed, and the contusion was completely removed. During craniotomy, the posterior branch of the middle meningeal artery was incised

to create a dura mater opening. The bleeding from this artery was controlled by bipolar coagulation. Postoperatively, the patient became alert.

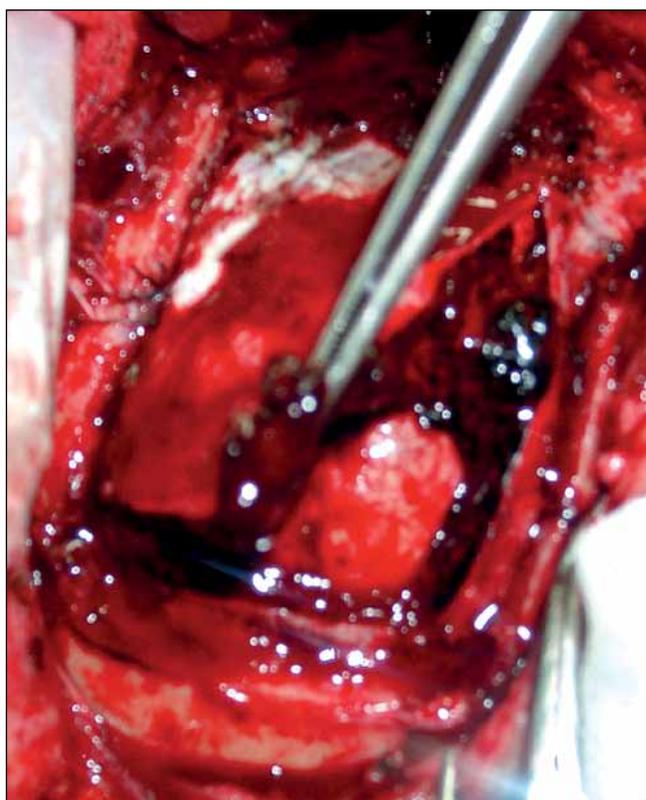
Postoperative CT scan showed the total removal of the contusion and a new left parietal intracranial hematoma, which had an appearance similar to that of an epidural hematoma (EDH) (Figure 2) and was misdiagnosed as EDH before surgery. The new hematoma was located superiorly and posteriorly to the temporal bone flap. The patient was operated upon for a second time. A left parietal craniotomy was performed. No hematoma was found in the extradural space. Upon opening the outer layer of dura mater, the hematoma was found to be located between the two layers of the dura mater (Figure 3). The subdural space was free of hematoma. No vascular malformation was found in the dura mater. After evacuation of the hematoma, the two layers of dura mater were sutured to each other at multiple sites. The



**Figure 1:** On admission, the CT scan showed a contusion in the left temporal lobe.



**Figure 2:** After the first craniotomy, the CT scan showed an intracranial hematoma with an appearance similar to an epidural hematoma.



**Figure 3:** During the second operation, the hematoma was found between the two layers of dura mater.

post-operative CT scan revealed the complete removal of the hematoma. The patient died 10 days after the second operation, due to aspiration pneumonia.

### DISCUSSION

The cerebral dura mater consists of two layers, an inner or meningeal and an outer or periosteal layer (8). These two

layers are jointed together except where they are separated to form large dural sinuses. Therefore, the structures in the cavernous sinus and Meckel's cave are located in interdural space (7). Although interdural tumors or hematomas can sometimes develop in the dural sinuses, as falxian hematoma in the perinatal period or brain tumors (meningiomas) in the cavernous sinus (5, 6), the interdural presentation of blood or tumors in the convexity of brain is challenging and rarely reported (3). Interdural hematoma is a very rare entity in adulthood and we found only three cases of IDH reported in the literature, two in the supratentorial convexity and one in the posterior fossa (1, 2, 4).

Interdural hematoma in the perinatal period may be related to intrauterine asphyxia or mechanical injury and is usually presented in the falxian space (6). However, it is commonly located in the convexity in adulthood and its pathogenesis is not well described. Miyajima and his colleagues did not find coagulopathy, vascular malformation, metastasis, or history of trauma in their patient, and they did not suggest any reason for IDH formation (4). Eom and colleagues also did not describe any cause for development of acute IDH after chronic subdural hematoma evacuation (2). In the last case, the dome of aneurysm positioned against the posterior wall of the cavernous sinus and penetrated the inner dural layer and caused interdural hematoma in the posterior fossa (1). In our patient, the meningeal artery was incised during durotomy to remove the contusion in the first operation. Insufficient coagulation may have led to an opening of the artery between the outer and inner layers of dura. The blood penetration separated the two layers from each other. Arterial pulsation enlarged the collection of blood and formed the IDH. Besides, postoperative inter-epidural hematomas may possibly develop by detachment of the dura mater from the skull following intracranial decompressive procedure or use of pin fixation of the head.

On CT scan, the appearance of IDH is similar to the appearance of EDH. IDH could therefore easily be misdiagnosed as EDH, which should be considered during craniotomy when extradural findings do not explain hematoma in the CT scan, and interdural exploration of the hematoma is mandatory. In the previous reports of IDH, MRI revealed the location of the hematoma between the outer and inner layers of dura (1, 4). Its MRI appearance was similar to that of a "Chinese dumpling" (4).

Miyajima and his colleagues removed the involved dural pouch, as well as the hematoma, to treat the IDH. In the present case, removing the hematoma and suturing the two layers of the involved dura to each other at multiple sites were sufficient to prevent the recurrence of hematoma.

#### **CONCLUSION**

IDH is a rare entity in adulthood and commonly presents in the convexity of brain. It can originate in branches of meningeal vessels, such as the middle meningeal artery. Preoperative CT scan is not sufficient for precise diagnosis due to the similarity in appearance of IDH and EDH. MRI findings provide a correct diagnosis. Removing the hematoma and suturing the dura layers to each other is sufficient to manage the condition.

#### **ACKNOWLEDGEMENT**

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#### **REFERENCES**

1. Brock S, Prada F, Maccagnano E, Giombini S: Interdural haemorrhage of the posterior fossa due to infraclinoidal carotid artery aneurysm rupture. *Acta Neurochir (Wien)* 152(9):1543-1546, 2010
2. Eom KS, Kim TY, Park JT: Contralateral acute interdural hematoma occurring after burr hole drainage of chronic subdural hematoma. *Br J Neurosurgery* 23: 213-215, 2009
3. Hyodo A, Yanaka K, Higuchi O, Tomono Y, Nose T: Giant interdural cavernous hemangioma at the convexity, case illustration. *J Neurosurg* 92: 503, 2000
4. Miyajima K, Hayashi N, Kurimoto M, Kuwayama N, Hirashima Y, Endo S: Idiopathic interdural hematoma looking like a "Chinese Dumpling", Case report. *Neuro Med Chir (Tokyo)* 44: 75-76, 2004
5. Pamir MN, Kilic T, Özek MM, Özdoğan K, Türe U: Non-Meningeal tumours of the cavernous sinus: A surgical analysis *J Clin Neurosci* 13: 626-635, 2006
6. Ragland K, Ahmadi J, Colletti P: Radiological case of the month. Sequential magnetic resonance imaging of a falx interdural hematoma. *Arch Pediatr Adolesc Med* 150: 545-546, 1996
7. Sekhar LN, Burgess J, Akin O: Anatomical study of the cavernous sinus emphasizing operative approaches and related vascular and neural reconstruction. *Neurosurgery* 21: 806-816, 1987
8. The meninges. In: Williams PL, Warwick R, Dyson M, Bannister LH, (eds), *Gray's Anatomy*. Norwich: Churchill Livingstone, 1989: 1086-1092