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Case Report

# Contralateral Acute Subdural Hematoma after Surgical Evacuation of the Initial Hematoma: Two Case Reports and Review of the Literature

## *İlk Hematomun Cerrahi Boşaltılmasından Sonra Kontralateral Akut Subdural Hematom: İki Olgu Sunumu ve Literatürün Gözden Geçirilmesi*

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**ABSTRACT**

Remote intracranial hemorrhages after craniotomy or craniectomy may rarely develop. As the sparse literature on this phenomenon has focused on contralateral intraparenchymal and epidural clots, only seven cases of postoperative contralateral acute subdural hematomas have been reported in the literature. We presented two patients who developed contralateral acute subdural hematomas after surgical evacuation of their initial hematomas. Case 1: A 19-year-old male fell from a height. CT scan revealed a left parietal acute epidural hematoma. A left craniotomy and epidural hematoma evacuation were performed; however, the brain expanded towards the craniotomy site. Dural incision revealed a thick subdural hematoma. Evacuation of the subdural hematoma was performed. The bone flap was not replaced. An emergency CT scan revealed a right acute subdural hematoma, and a right decompressive craniectomy and hematoma evacuation were performed. Case 2: A 7-year-old boy was hit by a motor vehicle. CT scan revealed a right frontotemporal acute subdural hematoma. A right decompressive craniectomy and subdural hematoma evacuation were performed; however, the brain expanded towards the craniectomy site. An emergency CT scan revealed a left acute subdural hematoma. We also reviewed the literature and discussed about these characteristics.

**KEYWORDS:** Contralateral, Acute subdural hematoma, Decompressive craniectomy

**ÖZ**

Kraniyotomi veya kraniyektomi sonrasında uzak intrakraniyal kanamalar gelişebilir. Bu konudaki az sayıdaki makale kontralateral intraparankimal ve epidural pıhtılar üzerine odaklanmıştır ve literatürde sadece yedi postoperatif kontralateral akut subdural hematom vakası bildirilmiştir. İlk hematomun cerrahi boşaltılmasından sonra kontralateral akut subdural hematom gelişen iki hastayı sunuyoruz. Vaka 1: 19 yaşında bir erkek yüksekten düşmüştü. BT tarama sol parietal akut epidural hematom gösterdi. Sol kraniyotomi ve epidural hematom boşaltılması yapıldı; ancak beyin kraniyotomi bölgesine doğru genişledi. Dural insizyon kalın bir subdural hematom gösterdi. Subdural hematom boşaltıldı. Kemik flepi geri konmadı. Bir acil BT tarama sağ akut subdural hematom gösterdi ve sağda kompresif kraniyektomi ve hematom boşaltılması yapıldı. Vaka 2: 7 yaşında bir erkeğe bir motorlu araç çarptı. BT tarama sağ frontotemporal akut subdural hematom gösterdi. Sağ dekompresif kraniyektomi ve subdural hematom boşaltılması yapıldı;ancak beyin kraniyektomi bölgesine doğru genişledi. Bir acil BT tarama sol akut subdural hematom gösterdi. Literatürü gözden geçiriyor ve bu özellikleri sunuyoruz.

**ANAHTAR SÖZCÜKLER:** Kontralateral, Akut subdural hematom, Dekompresif kraniyektomi

### INTRODUCTION

Remote intracranial hemorrhages after craniotomy or craniectomy may rarely develop. As the sparse literature on this phenomenon has focused on contralateral intraparenchymal and epidural clots (4,6), only seven cases of postoperative contralateral acute subdural hematomas (ASDH) have been reported in the literature (1-3,5). We present two patients who developed contralateral ASDH after surgical evacuation of their initial hematomas.

### CASE REPORTS

#### *Case 1*

A 19-year-old male was referred to our hospital after falling from a height. His GCS score on admission was 10. A head computed tomography (CT) scan obtained 2 h after injury revealed a left parietal acute epidural hematoma (Figure 1A). A left craniotomy and epidural hematoma evacuation were performed 3 h after injury; however, the brain expanded towards the craniotomy site. Dural incision revealed a thick ASDH. Evacuation of the subdural hematoma was performed and the dura mater was loosely approximated using Goa-Tex®.

The bone flap was not replaced. An emergency head CT scan revealed a right frontotemporoparietal ASDH with a severe right-to-left midline shift (Figure 1B). The patient was urgently returned to the operating room, where a right frontotemporal decompressive craniectomy and hematoma evacuation were performed (Figure 1C). Postoperative hypothermic therapy was performed, followed by cranioplasty 7 weeks after admission. The patient was discharged to a rehabilitation facility 10 months after admission, with residual right-sided weakness.

***Case 2***

A 7-year-old boy was referred to our hospital after being hit by a motor vehicle. His GCS score on admission was 4. A head CT scan obtained 1 h after injury revealed a right frontotemporal ASDH with a severe right-to-left midline shift (Figure 2A). A right decompressive craniectomy and subdural hematoma evacuation were performed 2 h after injury; however, the brain expanded towards the craniectomy site. An emergency head CT scan revealed a left frontotemporal ASDH with a severe left-to-right midline shift (Figure 2B). Bilateral pupils were fixed and dilated, and his blood pressure gradually decreased. The patient died 1 month after admission.

## DISCUSSION

The development of contralateral extra-axial hematomas after surgery is rare, but this represents a potentially life-threatening complication that most neurosurgeons are aware of. Although there have been several reports of the development of contralateral epidural or intraparenchymal hematomas (4, 6), only seven cases of postoperative contralateral ASDH have been reported in the literature (3-6). The characteristics of the 9 cases, including the present cases, are summarized in Table I.

Of the 9 patients, six were male and three were female, with an age range from 7 to 85 years (mean, 46.2 years). In all patients, initial hematomas included ASDH. Five patients underwent decompressive craniectomy with hematoma evacuation for initial hematomas, indicating that craniectomy might be one attributable factor of contralateral ASDH. Brain shift is thought to be responsible for remote bleeding after decompressive brain surgery (5). Decompressive surgeries may lead to rapid brain shift, causing shear stress to the contralateral bridging veins, which subsequently tear, resulting in the formation of contralateral ASDH (2). Furthermore, our review also showed that the interval between injury and initial CT scan

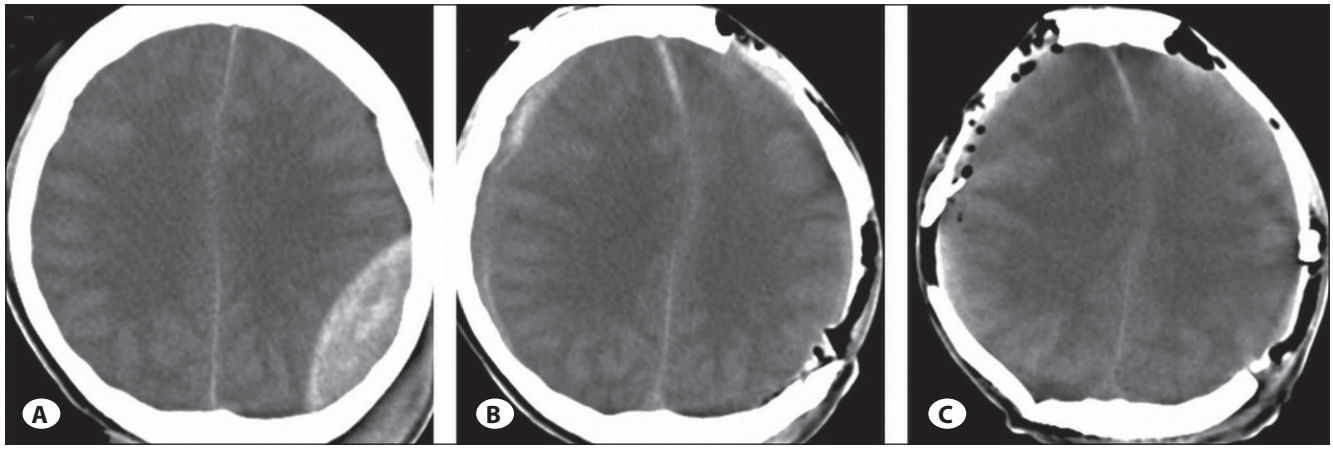


**Figure 1:** Case 1. **(A)** Initial CT scan revealing a left parietal epidural hematoma. **(B)** Emergency CT scan after the first operation showing a right frontotemporoparietal subdural hematoma. **(C)** CT scan after the second operation showing evacuation of a right hematoma.

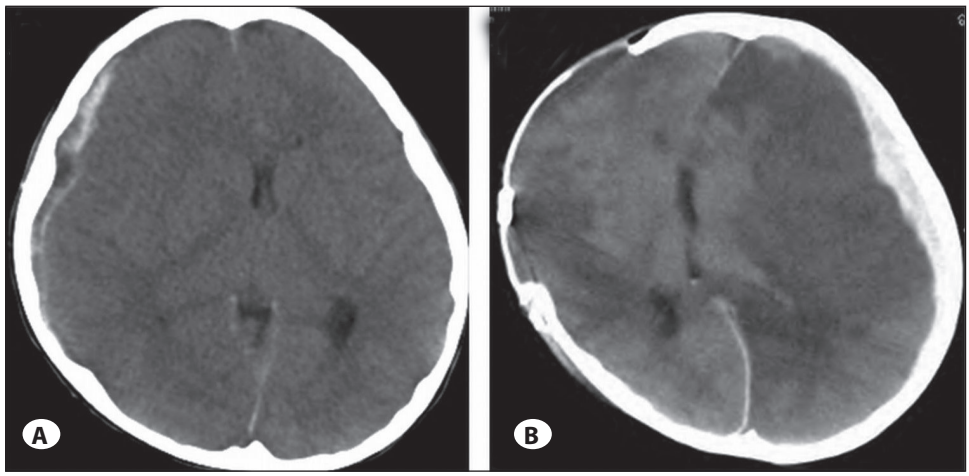


**Figure 2:** Case 2. **(A)** Initial CT scan revealing a right frontotemporal subdural hematoma. **(B)** Emergency CT scan after the operation revealing a left frontotemporal subdural hematoma.

**Table I:** Summary of Patients with Contralateral Acute Subdural Hematoma after Surgical Evacuation of the Initial Hematoma

| Author, year | Age (y) gender | GCS | Interval between injury and CT scan | Initial hematoma | Treatment for initial hematoma (timing) | Interval between initial surgery and development of contralateral ASDH | Treatment for contralateral ASDH | Outcome |
|---|---|---|---|---|---|---|---|---|
| Ban, 1991 | 62F | 7 | 3 h | AEDH, ASDH | HE with craniotomy (ND) | immediate | HE* | dead |
| | 72M | 5 | 0.5 h | AEDH, ASDH | HE* (ND) | immediate | HE* | dead |
| Matsuno, 2003 | 31M | 6 | ND | ASDH | HE with DC (1 h after admission) | immediate | HE with DC | MD |
| | 40M | 3 | ND | ASDH | HE with DC (within 3 h after injury) | immediate | HE with DC | SD |
| | 19M | 5 | ND | ASDH | HE with DC (within 5 h after injury) | immediate | HE with DC | VS |
| Tomycz, 2010 | 81F | 15 | ND | ASDH | HE with craniotomy (ND) | immediate | HE with craniotomy | MD |
| Fridley, 2011 | 85F | ND | ND | ASDH | HE with craniotomy (ND) | immediate | HE* | SD |
| Present cases, 2013 | 19M | 10 | 2 h | AEDH, ASDH | HE with DC (3h after injury) | immediate | HE with DC | SD |
| | 7M | 4 | 1 h | ASDH | HE with DC (2h after injury) | immediate | HE with DC | dead |

***AEDH*** *= acute epidural hematoma,* ***ASDH*** *= acute subdural hematoma,* ***DC*** *= decompressive craniectomy,* ***F*** *= female,* ***GCS*** *= Glasgow Coma Scale,* ***HE*** *= hematoma evacuation,* ***M*** *= male,* ***MD*** *= moderate disability,* ***ND*** *= not described,* ***SD*** *= severe disability,* ***VS*** *= vegetative state.*

** It is not available whether DC was performed.*

ranged from 0.5 h to 3 h. We can speculate that initial CT scan could not detect contralateral ASDH, and that contralateral ASDH developed during surgery as its natural course. Thus, we consider that early initial CT scan might be another attributable factor of contralateral ASDH.

Additionally, we found that favorable outcomes achieved in only two cases, indicating that high poor outcome rates may be one of the features of contralateral ASDH.

More attention should be paid to the development of contralateral ASDH, as well as to AEDH or intraparenchymal hematomas, when severe brain expansion towards the operative site occurs.

## REFERENCES

1. Ban M, Agawa M, Fukami T: Delayed evolution of post-traumatic contralateral extracerebral hematoma after evacuation of initial hematoma. Neurol Med Chir (Tokyo) 31:927-930, 1991
2. Fridley J, Thomas J, Kitagawa R, Chern J, Omeis I: Immediate development of a contralateral acute subdural hematoma following acute subdural hematoma evacuation. J Clin Neurosci 18:422-423, 2011
3. Matsuno A, Katayama H, Wada H, Morikawa K, Tanaka K, Tanaka H, Murakami M, Fuke N, Nagashima T: Significance of consecutive bilateral surgeries for patients with acute subdural hematoma who develop contralateral acute epi- or subdural hematoma. Surg Neurol 60:23-30, 2003
4. Panourias IG, Skandalakis PN: Contralateral acute epidural haematoma following evacuation of a chronic subdural haematoma with burr-hole craniostomy and continuous closed system drainage: A rare complication. Clin Neurol Neurosurg 108:396-399, 2006
5. Tomycz ND, Germanwala AV, Walter KA: Contralateral acute subdural hematoma after surgical evacuation of acute subdural hematoma. J Trauma 68:E11-12, 2010
6. Yonezawa K, Kim S, Tanaka M: Acute epidural hematoma following evacuation of chronic subdural hematoma with continuous closed system drainage. Neurol Surg (Tokyo) 20:1013-1016, 1992