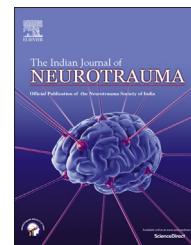


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## Review Article

# Contralateral development of massive acute subdural hematoma occurrence during decompressive craniectomy and surgery for evacuation of ipsilateral acute subdural hematoma: Literature review

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## ABSTRACT

Contralateral massive acute subdural hematoma (ASDH) developing acutely during decompressive craniectomy for severe head injury with ASDH evacuation is very rare occurrence. Till date about seven cases are published in the western literature with outcome varying from death, vegetative existence and severe disability. Interestingly all seven cases were operated at varying time-interval following first surgery varying from 0.5 to 3 h following initial surgery. Current case is the first case in the best of knowledge of authors in western literature, who was diagnosed even got operated in continuity with good neurological outcome. Awareness of intraoperative brain swelling is important. Author presents a case occurring in a 45-year old male, developed acute subdural hematoma on contralateral side during decompressive surgery, causing sudden brain bulge, refractory to medical management, however, wound was closed rapidly and urgent CT scan carried out, revealed massive acute subdural hematoma, requiring immediate decompressive surgical intervention. In the immediate postoperative period, he required ventilatory support and discharged after two weeks following surgery. High degree of suspicion, brain bulge during surgery not relieving with routine measure warrants immediate CT scan and a rapid return to the operating room for immediate surgical intervention for acute SDH evacuation can provide good outcome.

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## 1. Introduction

Development of extraxial hematoma during surgery for severe head injury is rare, but represents a potential life threatening complication if not recognized.<sup>1</sup> It can occur as extradural, subdural or intracerebral hematoma. Development of extradural or intracerebral hematoma on contralateral side following surgery is well documented in literature.<sup>2</sup> However, Acute subdural hematoma (ASDH) development over contralateral side during surgical evacuation of ASDH is very rare, although reported.<sup>1–5</sup> To the best of author's knowledge only seven such cases have been reported in western literature. A patient with post-traumatic ASDH undergoing decompressive craniectomy can develop brain bulge during surgery due to contralateral development of acute subdural, acute epidural, intracerebral hematoma or aggravation of hydrocephalus.<sup>1,6–8</sup> Intraoperative brain swelling not responding to routine measure directed to relieve intracranial pressure eg. head elevation to encourage venous drainage, securing air way patency, correction over-rotation of head, intravenous osmotic agent administration, correction of air way obstruction like endotracheal tube kinking, hyperventilation, stopping inhalation anesthetic agent, switching over to total intravenous anesthetic management regimen and possibility of hematoma development on contralateral side should be kept as potential cause, requires urgent attention, necessitating immediate CT scan for correct diagnosis with emergency planning of management.<sup>1,3,5,7</sup> Authors report an interesting case of severe head injury with acute ASDH, who developed acute brain bulge intraoperatively, NCCT head showed contralateral massive ASDH, which needed emergency surgical evacuation. This case emphasizes getting immediate CT scan directly from operating room and return to carry out evacuation of contralateral ASDH.

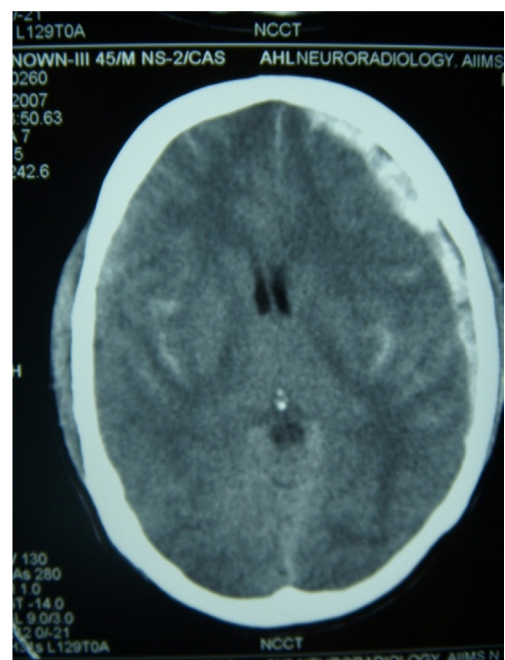
## 2. Case report

A 45-year old man was brought to our emergency services following road traffic accident and in state of altered consciousness. On physical examination, pulse rate of 110 per minute and blood pressure of 136/80 mm Hg. His Glasgow Coma Scale (GCS) score, on admission, was 8. Left pupil was dilated sluggishly reacting in size; right was normal size and reacting to light. Patient was intubated immediately. X-rays of the chest and cervical spine were normal. Focused abdominal sonogram for trauma was also negative. NCCT head (Fig. 1) showed thick left sided acute subdural hematoma with midline shift with effacement of basal cisterns. The patient was immediately shifted to operating room for emergency decompressive craniectomy and evacuation of ASDH. He underwent left frontotemporoparietal scalp flap and decompressive craniectomy was carried out. Brain was lax after hematoma evacuation, but at time of dura closure suddenly brain bulge was observed, which was refractory to routine medical management. In view of above possibility of development of intra-parenchymal contusions or fresh contralateral extraxial hematomas formation was considered as possible causes. After rapid wound closure following securing

hemostasis, patient was shifted for NCCT head (Fig. 2), which showed thick right sided acute subdural hematoma with gross midline shift. In view of large size of hematoma, significant mass effect with midline shift, plan was made for decompressive craniectomy over right side and immediately shifted back to operating room from CT room followed by decompressive craniectomy and evacuation of hematoma was carried out. He was electively ventilated, intracranial pressure (ICP) was monitored in the postoperative period for five days and was within normal limits and gradually weaned off the ventilatory support. He received cerebral decongestants, antiepileptics and antibiotics during the postoperative period. His postoperative course was uneventful and discharged on seventeenth postoperative day. At the time of discharge, the patient's neurological response was E3V2M5 (GCS = 10). The patient recovered over due course of time and recovered to GCS of 14 at six-month follow-up visit.

## 3. Discussion

Contralateral epidural hematoma formation during surgery for traumatic severe head injury is rare.<sup>7,8</sup> However ASDH development is very rare and only seven cases are reported in the form of isolated cases report.<sup>1–6</sup> (Table 1) Either it may occur immediately after ASDH removal<sup>1–5</sup> or very rarely in delayed manner.<sup>6</sup> Exact mechanism of contralateral ASDH development is unknown. Various postulates are put forward to explain the intraoperative development of contralateral ASDH. Tomycz et al postulated rapid brain shift caused by craniotomy, lead to shear stress on bridging veins of contralateral side, which might get torn and lead to ASDH formation,



**Fig. 1 – Initial CT scan head showing thick acute subdural hematoma over left frontotemporoparietal region causing subfalcine herniation and effacement of basal cistern with significant mass effect.**



Management of such cases depends upon size, mass effect, rate of progression. A large acute SDH requires evacuation; perhaps have been managed by delayed evacuation using burr-holes/twist drill once it became chronic. However a moderate or small contralateral ASDH collection developing or detected in postoperative period can be observed and can be evacuated by twist drill or burr-hole, once it becomes chronic SDH or causes mass effect. However, our case needed urgent surgical intervention.

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### Conflicts of interest

All authors have none to declare.

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### REFERENCES

1. 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*. 2011;18:422–423.
2. Matsuno A, Katayama H, Wada H, et al. Significance of consecutive bilateral surgeries for patients with acute subdural hematoma who develop contralateral acute epi- or subdural hematoma. *Surg Neurol*. 2003;60:23–30.
3. Tomycz ND, Germanwala AV, Walter KA. Contralateral acute subdural hematoma after surgical evacuation of acute subdural hematoma. *J Trauma*. 2010;68:E11–E12.
4. Takeuchi S, Takasato Y. Contralateral acute subdural hematoma after surgical evacuation of the initial hematoma: two case reports and review of the literature. *Turk Neurosurg*. 2013;23(2):294–297.
5. Shen J, Fan Z, Ji T, Pan J, Zhou Y, Zhan R. Contralateral acute subdural hematoma following traumatic acute subdural hematoma evacuation. *Neurol Med Chir (Tokyo)*. 2013;53(4):221–224.
6. Ban M, Agawa M, Fukami T. Delayed evolution of post-traumatic contralateral hematoma after evacuation of initial hematoma. *Neurol Med Chir (Tokyo)*. 1991;31:927–930.
7. Feuerman T, Wackym PA, Gade GF, Lanman T, Becker D. Intraoperative development of contralateral epidural hematoma during evacuation of traumatic acute subdural hematoma. *Neurosurg*. 1988;23:480–484.
8. Singh M, Ahmad FU, Mahapatra AK. Intraoperative development of contralateral extradural hematoma during evacuation of traumatic acute subdural hematoma: a rare cause of malignant brain bulge during surgery. *Indian J Neurotrauma (IJNT)*. 2005;2:139–140. *Br J Neurosurg*. 2005 Dec;19(6):490–4.
9. Mohindra S, Mukherjee KK, Gupta R, Chhabra R, Gupta SK, Khosla VK. Decompressive surgery for acute subdural haematoma leading to contralateral extradural haematoma: a report of two cases and review of literature. *Br J Neurosurg*. 2005;19(6):490–494.