

Supratentorial extradural hematoma secondary to intracranial hypotension following spinal cerebrospinal fluid release: A case report and review of literature

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Abstract

Closed continuous lumbar subarachnoid drainage is an accepted strategy in the management of cerebrospinal fluid (CSF) leaks. Post lumbar drain haematoma as a complication has been reported in various planes including intraventricular, subdural, subarachnoid, intraparenchymal and spinal extradural locations, most often in patients receiving anticoagulants. Supratentorial extradural haematoma secondary to intracranial hypotension due to spinal CSF drainage are extremely rare and have been reported in a few cases. We present a rare case of near fatal fronto-temporo-parietal extradural haematoma following a lumbar CSF drain and review the literature. We report a 50 year old lady who developed CSF rhinorrhea following trans-sphenoidal decompression of non-functioning pituitary macroadenoma. A lumbar CSF drainage was placed to manage the CSF leak. She became unconscious within 24 hours of placement of lumbar drain and an urgent CT scan demonstrated a large supratentorial extradural hematoma which required an emergency evacuation. A review of the five previously reported similar cases was performed in the light of the present case and salient features highlighted. The present report emphasizes the fact that a simple procedure like lumbar CSF drainage can have rare life threatening complications and needs immediate recognition and management.

INTRODUCTION

Cerebrospinal fluid (CSF) rhinorrhoea is a known complication following trans-sphenoidal surgery. The management strategy includes placement of a lumbar subarachnoid drain, bed rest and sometimes re-exploration and packing of the sella using fibrin glue and fat-muscle graft.^{1,2} Lumbar CSF release either for therapeutic drainage or for spinal anaesthesia sometimes causes intracranial hypotension manifesting as postural headache. Hematomas have been rarely reported in subdural, subarachnoid and intraparenchymal compartments following lumbar CSF drainage.³⁻⁵ In patients on anticoagulation therapy, spinal epidural hematomas with neurological deficits requiring surgery have been documented.⁶⁻⁸ Supratentorial extradural hematoma (EDH) secondary to intracranial hypotension due to spinal CSF drainage are extremely rare and have been reported in a few cases.^{9,10} We present a rare case of near fatal fronto-temporo-parietal extradural hematoma following a lumbar CSF drain and review the literature of this rare phenomenon.

CASE REPORT

A 50 year old lady was diagnosed to have a sellar-suprasellar tumour and planned for surgical management.(Figure 1 A, B) She had diabetes, hypertension and hypothyroidism which were treated with medications. Her coagulation profile including prothrombin time, international normalized ratio (INR) and activated partial thromboplastin time (APTT) were normal. She underwent endoscope assisted microscopic transnasal near total decompression of pituitary adenoma. A Mayfield's clamp was used for head fixation during surgery. There was no CSF leak intra-operatively. She withstood the procedure well. Post-operative CT scan on the first day following surgery showed good decompression of tumour with a small parasellar residue. (Figure 2) She developed CSF rhinorrhoea on the first postoperative day, which was managed with the placement of lumbar CSF drain. Around 300 ml of CSF drained over the next 24 hours in the lumbar drain and the patient developed severe headache, but was conscious and had no

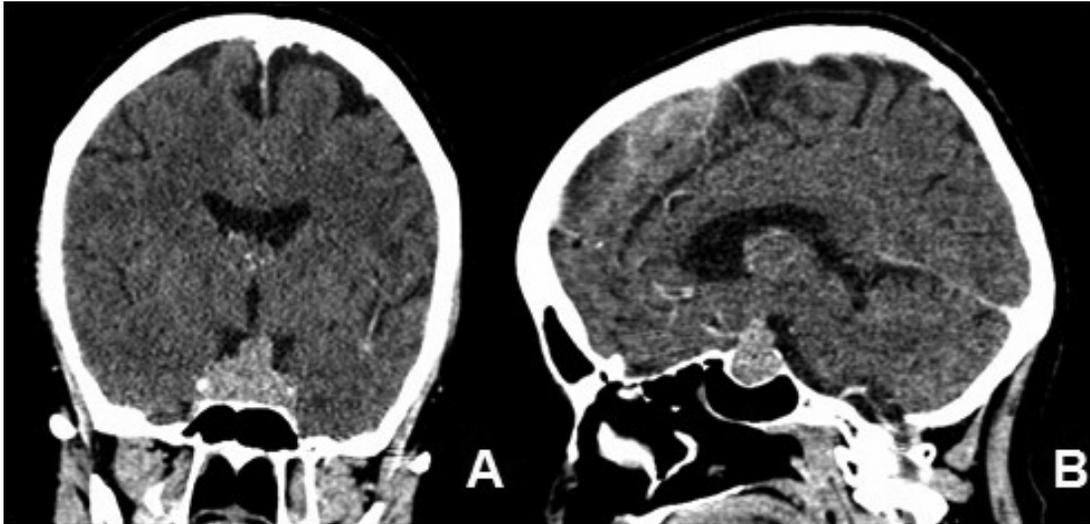


Figure 1A, B. Contrast enhanced CT scan of brain showing a well defined enhancing mass lesion occupying the sellar suprasellar region suggestive of pituitary adenoma.

focal motor deficits. She suddenly deteriorated in sensorium an hour later and became unconscious. On examination, she was decerebrating, had small and nonreacting pupils. She was intubated and an emergency CT scan revealed a large left fronto-temporo-parietal extradural hematoma causing mass effect and midline shift. (Figure 3 A, B) The hematoma had hypo dense component suggesting its hyper acute nature. The immediate post op scan was reviewed, which did not show any pin induced fracture. She underwent emergency evacuation of EDH. There was diffuse ooze from the dura and the EDH was evacuated. No fracture was noted per operatively. A CT scan brain post op demonstrated complete evacuation of EDH.

(Figure 4) She recovered well from the surgery and was discharged from the hospital without any fresh deficits after a few days.

DISCUSSION

Closed Lumbar drainage of CSF is an accepted strategy in the management of CSF leaks. The indications may include CSF rhinorrhoea following trans-sphenoidal pituitary surgery, traumatic basilar skull fractures, iatrogenic CSF leaks following cranial surgery and others.^{1,3} Lumbar CSF diversion is no doubt a safe method but also has some complications which need to be kept in mind during the management, the

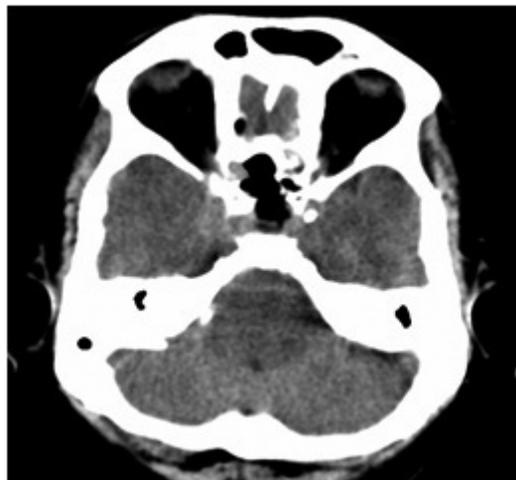


Figure 2. Post operative day 1 contrast CT scan axial image of brain showing good decompression of tumor with small parasellar residue.

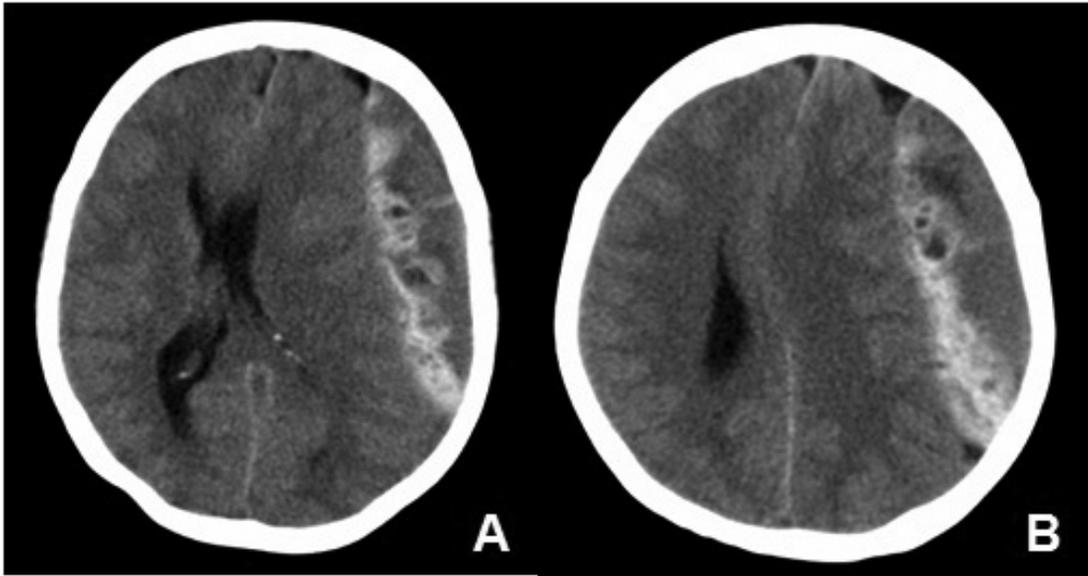


Figure 3 A, B. Plain CT scan brain done 24 hours after lumbar drain placement show a large left fronto-temporo-parietal extradural hematoma causing mass effect and midline shift.

commonest being infections. Acikbas *et al.* reported complications of closed continuous lumbar drainage of CSF in a series of sixty three patients who had lumbar subarachnoid catheter placed for treatment of a cranial or a spinal CSF fistula. Seven of them had headache due to over drainage and three had pneumocephalus. One had transient blindness which improved on closing the drain. None had any hematoma reported secondary to intracranial hypotension.¹ Governale *et al.* reported a complication rate of 3% due to lumbar drainage in 233 patients of normal

pressure hydrocephalus. It included subdural or subarachnoid haemorrhage in 1.7%, meningitis in 0.8%, retained catheter in 0.4%, and minor complications like nerve root irritation and low pressure headache in 5.2% of patients.¹¹

Continuous drainage of CSF can sometimes result in intracranial hypotension and subsequent neurological deterioration due to transtentorial brain herniation or hematoma formation within the cranial cavity.^{11,12} Hematomas secondary to CSF drainage have been reported in various planes including intraventricular,

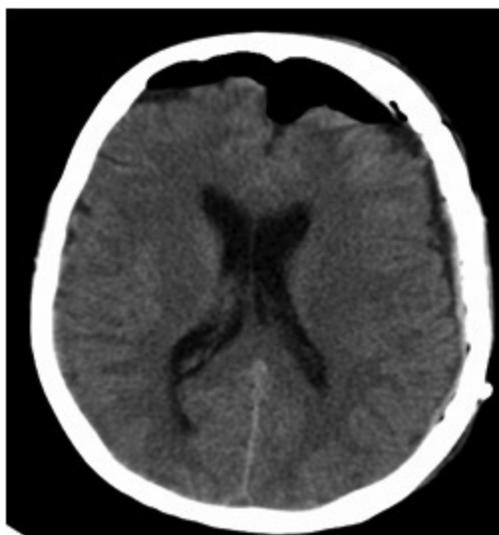


Figure 4. Post op CT scan following an emergency surgery demonstrating good evacuation of EDH and mild pneumocephalus.

Table 1: Extradural hematoma following lumbar CSF drainage – reported cases in literature

Author	Year	Age	Sex	Diagnosis	Procedure causing CSF drainage	CSF released (ml)	time to deteriorate (hrs)	Features of EDH on CT scan	Location	Management	Result
Mohanty <i>et al.</i> ⁸	1998	10	F	Intraventricular cysticercosis-post op	Lumbar puncture and drainage	Not available	NA	NA	Right frontal	Conservative	improved
Samadani <i>et al.</i> ¹⁰	2003	40	F	Periophthalmic aneurysm surgery	Intra operative lumbar CSF drainage	50	5	NA	Right fronto-temporal	Surgical evacuation	improved
Jeong <i>et al.</i> ⁷	2009	35	M	Thoraco abdominal Aortic Aneurysm repair	Intra operative lumbar CSF drainage	230	8	NA	Multiple	Surgical evacuation	improved
Surash <i>et al.</i> ¹⁴	2009	15	F	Thoracic intradural extramedullary tumor	Dural opening during surgery	NA	Immediate post op	hypodense	Bi-frontal	Surgical evacuation	improved
Grahovac <i>et al.</i> ¹²	2011	58	F	Lumbar discectomy (L3-L4)	Dural tear during surgery	100 (wound drain)	4	hypodense	Right parieto-occipital	Surgical evacuation (twice)	improved
Present case	2013	50	F	Pituitary adenoma	Lumbar drainage for post op CSF rhinorrhoea	300	24	hypodense	Left fronto-temporal	Surgical evacuation	improved

subdural, intraparenchymal and spinal extradural location.^{6,8,11-13} The etiology for hematoma secondary to intracranial hypotension has been considered to be rupture of bridging veins, thus commonly resulting in subdural bleed.¹⁴

Supratentorial EDH after spinal CSF drainage, a literature review

There are only five cases of supratentorial extradural hematoma secondary to lumbar CSF drainage reported in literature, to the best of our knowledge.^{7, 8,10,12,14} (Table 1).

Samadani *et al.* in their review of 75 patients, described a patient who developed extradural hematoma secondary to intracranial hypotension complicating lumbar CSF drainage during surgery for cerebral aneurysm. The patient was managed with evacuation of extradural hematoma and administration of lumbar blood patch.¹⁰ Grahovac *et al.* reported on non-traumatic cranial spontaneous extradural hematoma that occurred after lumbar discectomy in a 58-year old woman.¹²

The review of all these cases demonstrates that three of the six cases, including the present case, had hypodense component suggestive of hyper acute EDH. Further, five out of six cases required emergency evacuation of EDH, underscoring the importance of early recognition of the condition and prompt management. The development of extradural hematoma may not be dependent on the volume of CSF drained, since as low as 50 ml drainage caused EDH in a patient.

The etiology of EDH secondary to lumbar CSF drainage has been hypothesized in previous reports.¹⁴ In the absence of pre-existing risk factors like coagulopathy, the possibility of stripping of dura secondary to intracranial hypotension resulting in EDH appears to be the most plausible explanation. Hypothetically, this may be easier in children, in whom the dura is not very adherent. Two of the six tabulated cases occurred in children. Our patient was in the fifth decade of life, when the dura is expected to be adherent to the calvarial bone making it extremely difficult to strip off. The rate of CSF drainage and consequentially the rate of development of intracranial hypotension may contribute to the development of EDH, while the actual amount of CSF drained seemed to vary significantly among the reported cases. Most of the patients have developed this dreaded complication within 24 hours of CSF drainage.

Any patient with altered sensorium after a lumbar puncture needs urgent evaluation with CT head. Intermittent CSF removal may be preferred

over continuous CSF drainage. Also the rate of CSF drainage may be controlled with a drain valve or monitored to avoid excess or rapid CSF drainage.

In conclusion, the present report emphasizes the fact that a simple procedure like lumbar CSF drainage can have rare life threatening complications. An immediate recognition and consideration of this rare possibility and prompt management is mandatory.

DISCLOSURE

Conflict of interest: None

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