The Surgical Treatment of Three Young Chronic Subdural Hematoma Patients with Different Causes

Kun Hou, M.S., Chen G Li, M.S., Yang Zhang, Ph.D., Bo X Zhu, M.D.

Department of Neurosurgery, The First Affiliated Hospital of Jilin University, Changchun, China

INTRODUCTION

Chronic subdural hematoma (CSDH), which rarely happens in the young, is thought to be a disease of the elderly. Whereas unspecific symptoms and insidious onset in juveniles and young adults, as a result of its relative low morbidity, CSDH is usually neglected even undertreated in the young. Through the three cases and review of the current literature on this subject, we tried to illustrate the clinical and etiopathological characteristics of this entity and find out the most appropriate treatment strategy. We report three young CSDH patients with different but similar symptoms. The present histories, tests and examinations revealed different predisposing factors accounting for the genesis of CSDH. Their preoperative symptoms were all resolved with burr hole and drainage operation. Juveniles and young adults suffering from CSDH differ from that of their elderly counterparts in their clinical and etiopathological characteristics. Although trauma is the most important risk factor in young and old CSDH patients, some other predisposing factors may exist. Burr hole and drainage surgery could resolve the problem most of the time. But further tests and examinations even specific management should be made in some cases.

Key Words : Chronic subdural hematoma · Young adult · Cerebrospinal fluid leakage · Intracranial hypotension · Arachnoid cyst.

CASE REPORT

Case 1

A 17-year-old boy was admitted to our hospital with a global headache and dizziness accompanied by mild fever for 5 days. The neurological examination did not show any positive signs except for mild somnolence. CT-scan showed an isodense subdural hematoma in the left frontal and parietal region with an obvious compression of the left lateral ventricle and evident midline shift to the right (Fig. 1A). He preferred playing basketball in his spare time but denied recent head trauma. The blood count and coagulation panel revealed nothing remarkable. A burr hole and irrigation surgery was performed under local anaesthesia.

CT images one day after operation showed a complete evacuation of the subdural hematoma and slight shift of the midline structures with the residual hematoma space occupied by low density fluid and air (Fig. 1B). However, the interesting finding in the postoperative CT was that an arachnoid cyst was located in the tip of the middle fossa. A retrospective analysis of the preoperative CT images displayed the bony indentation and thinning of the peak of the left middle fossa, which implied a pre-existed arachnoid cyst. Postoperative cerebral angiography did not reveal arteriovenous malformation or other vascular abnormalities. The previous symptoms were completely resolved after surgery and the patient was immediately engaged in daily life after discharge.
Case 2
A 27-year-old male complained of intermittent distending headache for one month without head injury history. The headache was not deteriorated progressively, but with no evident remission. He then went to the local hospital 2 days before admission. The MRI (Fig. 2A) revealed a half-mooned high intensity effusion on T1 and T2 weighted imaging in the right hemisphere with compressed ipsilateral ventricle and midline shift, which implied a CSDH. Physical examination the day on admission was unremarkable. Coagulation panel and blood count of the patient showed no abnormal findings.

A burr hole and irrigation operation was conducted one day after admission. Postoperative CT one day after surgery showed complete evacuation of the hematoma and restoration of the compressed brain tissue (Fig. 2B). Considering complete resolution of the preoperative symptoms, the subdural catheter was withdrawn subsequently. A computed tomography angiography, which revealed nothing remarkable, was conducted to rule out any vascular anomaly of the brain and dura. Follow-up CT imaging taken 3 months after surgery showed no novel collection of CSDH.

Case 3
A 31-year-old female complained of a frontal and parietal headache for 10 days with aggravation for 2 days following a mild head trauma one month previously. The headache was slightly aggravated with orthostatic position. The day before admission she vomited once and suffered right hemiparesis. CT showed an isodense subdural hematoma in the left frontal and parietal region, with compressed ipsilateral ventricle and midline shift (Fig. 3A).

Without any hemostatic disorder and surgery contraindication, the patient underwent a burr hole and irrigation operation. Her intracranial pressure was not so high as was seen in the patients alike. Postoperative CT (Fig. 3B) one day after operation showed a subtotal evacuation of the subdural hematoma and restoration of the midline structures with the residual hematoma cavity replaced by low density fluid and air. With an apparent relief of her preoperative symptoms she was discharged 8 days after admission. She was readmitted 15 days later, complaining of severe headache. Her headache was slightly aggravated with orthostatic position. CT images the day on admission showed a small amount of subdural hematoma in the left frontal region without compression of the ventricles or shift of...
the midline structures. Headache derived from intracranial hy-
potension was suspected.

She underwent a lumbar puncture with the opening pressure 
below 50 mmHgO in the lateral decubitus position. A jugular 
vein compression maneuver was used to rule out the possi-
blity of obstruction in cerebral spinal fluid (CSF) circulation. Bio-
chemical examination and microorganism culture of her CSF 
were unremarkable. With no operation indication, she received 
intravenous saline hydration, bed rest and oral analgesics. As 
her headache resolved gradually, she refused to undergo MRI 
or cisternography. She was discharged with a slight intermittent 
headache. Outpatient follow-up revealed complete resolution of 
her headache. She reengaged in daily work and study.

DISCUSSION

CSDH is generally thought to be a disease of the elderly as it is 
well recognized and managed in the aged population. There are 
many hypotheses pertaining to the genesis of CSDH. Bridging 
vein tearing after a minor head injury and hemostatic disorder 
caused by blood effusion in the subdural cavity is widely accept-
ed as the pathogenetic mechanism in the formation of CSDH in 
aged people. However, it could not explain all the cases, espe-
cially those young patients without traumatic history and cere-
bral atrophy.

Coagulopathy, arteriovenous malformation and aneurysm have 
previously been reported to predispose to CSDH(4,7,10,11). Besides, 
arachnoid cyst, especially located at the middle fossa(2,23), has 
long been regarded as a promotive factor(2,22,26). The speculat-
ed mechanism may be that tearing of the outer wall of an arach-
noid cyst causes subdural and/or intracystic hemorrhage by 
breaking the bridging veins, unsupported blood vessels around 
the cyst wall and leptomeningeal vessels in the base of the cyst(10). 
As was illustrated by case 1, preferring playing basketball, though 
without definite head injury history, might have led to tearing 
of the wall of the arachnoid cyst and its ambient blood vessels. 
Then, a certain amount of cerebral spinal fluid (CSF) and/or 
bleeding into the subdural space induced the formation of the 
outer membrane under the dura mater. The fenestrated 
neovessels in the subdural outer membrane and the osmotic and 
hemostatic alterations induced by the subdural degradation prod-
ucts give rise to the gradual collection of subdural hematoma.

Intracranial hypotension (IH) has also been reported to be asso-
ciated with CSDH(4,14,19,20,28,30). IH is characterized as orthostatic 
headache, low CSF opening pressure at lumbar puncture, subdu-
ral collection, diffuse meningeal enhancement with gadolinium 
and caudal displacement of the brain on MRI imaging(5,9,13,17). 
CSF leakage caused by trauma, invasive craniocerebral and lum-
bar procedures or some inherited diseases as Marfan’s syndrome, 
Enlers-Danlos syndrome, etc. is the commonest pathological ba-
sis of IH (7,21,24,27). As was illustrated by case 3, head injury might 
have led to the intracranial hypotension and they collectively or 
respectively caused the CSDH. Also, there are reports of CSDH 
derived from IH with no evident reason(5,29).

Besides all reasons above, there are also some reports of CSDH 
in the young with no traced origin(4,19). Just as case 2 illustrated, 
no traumatic history and predisposing factor could be sought 
out. Anyway, early realization of the common symptoms and 
timely diagnosis and management would undoubtedly benefit 
the CSDH patients.

With different etiopathological mechanisms, the treatment 
strategies of CSDH differ greatly between the juvenile and young 
adult group and the elderly. As some of the young CSDH patients 
may predispose with one or more risk factors, e.g. arachnoid cyst, 
arteriovenous malformation, coagulopathy, aneurysm or intra-
cranial hypotension, the preferable choices would be taking ac-
count of CSDH and the promotive factors at the same time. In 
consideration of arachnoid cyst as a relatively convinced risk 
factor in the genesis of CSDH, we should inform patients with 
arachnoid cyst and their families of the possibility of complica-
tion with CSDH and advise care to avoid head injury in daily 
life(8). That does not mean that we should recommend surgical 
treatment for arachnoid cysts to patients without clinical mani-
festation to prevent CSDH. Surgery aiming at arachnoid cyst 
may also lead to CSDH formation(2,12,18). In fact, as was illustrated 
by case 1 and other cases(4,18), pure burr hole evacuation and drain-
age could yield satisfactory result most of the time.

While, the treatment of intracranial hypotension related CSDH 
consists of burr hole evacuation of the hematoma, sufficient 
bed rest, intravenous hydration, analgesics or epidural blood 
patch if CSF leakage is identified(19,25,28). Spontaneous IH usual-
ly resolves spontaneously in a certain period of time with con-
servative treatment including bed rest and intravenous hydration. 
So, the complicating CSDH may be treated with only burr 
hole and drainage surgery as case 3 showed. If remission could 
not be achieved with conservative management, radioisotope 
cisternography or CT myelography is recommended. Epidural 
blood patch is implemented when CSF leakage is located(19,26,30).

CONCLUSION

Juveniles and young adults suffering from CSDH differ from 
that of their elderly counterparts in their clinical and pathologi-
ical characteristics. Although trauma is the most common risk 
factor in young and old CSDH patients, some other predisposing 
factors may exist. Burr hole and drainage surgery can resolve 
the problem most of the time. But further tests and examina-
tions even specific management should be made in some cases.

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