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Case Report

CASE REPORT

Supratentorial acute subdural haematoma during microvascular decompression surgery: report of three cases

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Abstract

Supratentoiral haemorrhage during posterior fossa surgery is very rare. Authors report three cases of acute subdural haematoma occurred during microvascular decompression (MVD). Bleeding was observed in the suboccipital surgical area during operation but the origin of the bleeding was not confirmed intraoperatively in all cases. Decompression procedure was completed and immediate postoperative computed tomography revealed supratentorial subdural haematoma. This complication was observed during MVD in healthy young patients with hemifacial spasm in our cases. Flexion of the head with reduction of cerebrospinal fluid may have induced rotational movement of the cerebrum resulting in rupture of bridging veins, but no definitive mechanism that fulfils the clinical characteristics was clearly determined.

INTRODUCTION

Microvascular decompression (MVD) is widely accepted as an effective method to treat hemifacial spasm (HFS), trigeminal neuralgia (TN) and glossopharyngeal neuralgia (GPN), but the morbidity and mortality must be minimised because these conditions are not life-threatening. Unfortunately, serious complications can still occur in some patients, of which haemorrhagic event is one of the most dangerous complications and may result in significant morbidity and mortality. Intraoperative bleeding at a remote site is extremely rare, although some haemorrhagic complications following MVD have been reported [1–5]. We report three cases of intraoperative haemorrhage in the surgical field with unclear origin during MVD for HFS, in which computed tomography (CT) after the surgery confirmed supratentorial acute subdural haematoma (ASDH).

CASE DESCRIPTION

The three reported cases occurred among 1259 MVD procedures performed from 2006 to 2015, 852 for HFS, 386 for TN, 17 for GPN and 4 for tic convulsif, in 392 male and 867 female patients aged 19–86 years (mean age at operation 55.2 years). All operations for HFS were performed with a method described previously [6].

The patients' clinical characteristics are summarised in Table 1. In Case 1, bloody cerebrospinal fluid (CSF) was observed in the subdural space after opening the dura mater

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Table 1 Summary of three patients with postoperative supratentorial ASDH

Case no.	Age (yrs)	Sex	Side of HFS	Dependent side at operation	Site and side of ASDH	Dominant side of venous drainage	Outcome
1	37	M	R	L	Bilateral (L > R)	R	Gerstmann's syndrome (incomplete), epilepsy
2	33	M	L	R	L and interhemi.	R	No deficit
3	25	F	L	R	R	L	No deficit

Note: interhemi., interhemispheric fissure; L, left; R, right.

and the CSF continued to appear bloody throughout the operation. After removal of the bloody CSF, decompression of responsible arteries was completed. Immediate postoperative CT revealed bilateral supratentorial subdural haematoma predominantly on the left side (Fig. 1A and B). The patient was neurologically intact after the surgery, therefore treated conservatively. However, in 2 weeks, the patient underwent removal of the haematoma because the patient exhibited aphasia and left hemiparesis. During the surgery, no definitive origin of the subdural haematoma was identified. After the removal, the patient suffered from status epilepticus that was properly treated. Thereafter, the patient exhibited incomplete Gerstmann's syndrome but gradually improved and was discharged. In Cases 2 and 3, sudden bleeding occurred and stopped in the operative field during microscopic procedure. Removing the blood in the surgical area did not reveal the origin of the bleeding, and decompression of responsible arteries was completed. Postoperative CT revealed supratentorial subdural haematoma (Fig. 1C–F). Both patients awakened from anaesthesia normally with no neurological deficit, and postoperative course was uneventful. All patients had no history of hypertension, coagulopathy and other systemic diseases. No remarkable hypertensive episode occurred during anaesthesia and surgery. Postoperative magnetic resonance (MR) imaging was performed in all the patients, but there was no parenchymal and vascular pathology was found.

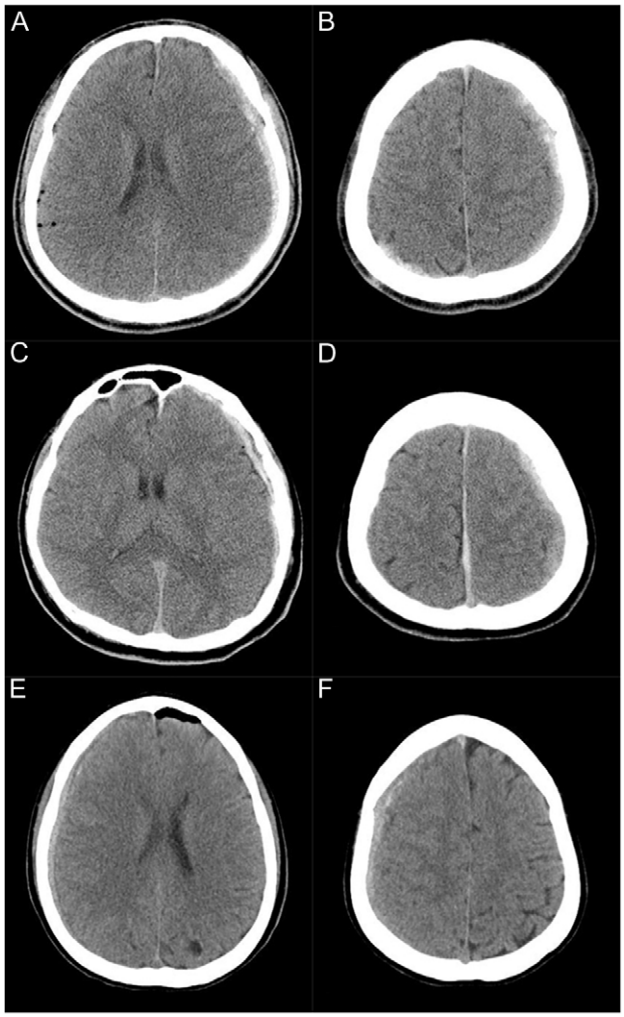

Figure 1: CT scans immediately after the surgery showing subdural haematoma in three cases (**A** and **B**: Case 1, **C** and **D**: Case 2, **E** and **F**: Case 3). (**A** and **B**) Subdural haematoma is present on the left supratentorial convexity as well as in the parieto-occipital area on the right side. (**C** and **D**) Subdural haematoma is present on the left supratentorial convexity and along the falx. (**E** and **F**) Subdural haematoma is present on the right supratentorial convexity.

DISCUSSION

Haemorrhagic events remoting from the craniotomy site can occur but the incidence across the tentorium cerebelli is rare. Remote cerebellar haemorrhage after supratentorial surgery is a rare but poorly understood complication [7]. The reverse phenomenon, such as supratentorial haemorrhage after infratentorial surgery, is even less common. A recent report documented four cases of supratentorial subdural haematoma following MVD [5]. In our cases, bleeding was observed during surgery, which is much more hazardous, and we could not find such a case in the literature. The report indicated that excessive CSF drainage and rotation and flexion of the neck in the lateral decubitus position should be considered as causative factors [5]. Slight vertex down is advantageous in MVD for HFS [4, 6], and the fact that this complication was observed in patients with HFS but not TN may support their discussion. On the other hand, CSF removal is usually dependent on the spontaneous excretion after the craniotomy; therefore, the rapidness of CSF removal rather than the amount may be related to this complication.

The haemorrhage must originate in either an artery or vein. A postmortem analysis of subdural haematoma revealed that the main bleeding points were either bridging veins draining into the superior sagittal sinus (SSS) or cortical arteries on the temporal lobes [8]. Surgical findings in Case 1 indicated no clear origin, suggesting that rupture of a cortical vein near the SSS was most likely because veins are more fragile than arteries and anatomically are exposed in the subdural space to the SSS [9]. Furthermore, a previous analysis of the mechanism of acute subdural haematoma suggested that rupture of bridging veins results from rotational acceleration [10].

The possibility of venous bleeding must consider intracranial venous pressure. Vertex down head position may alter the venous

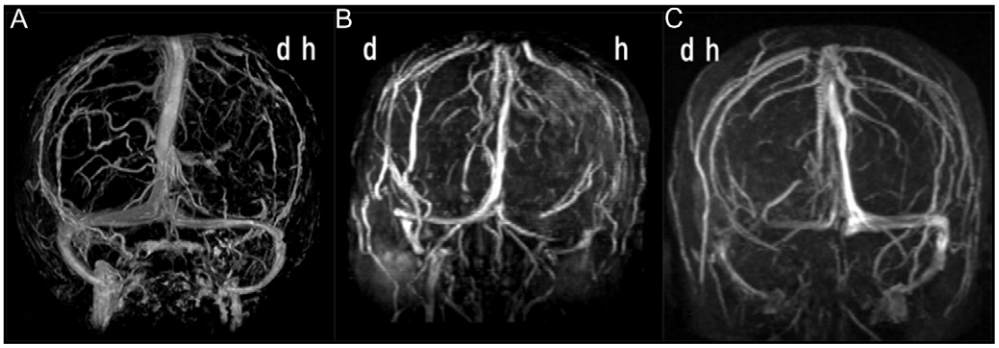

Figure 2: (**A**) Anteroposterior view of three-dimensional MR venogram after gadolinium enhancement of Case 1 showing the venous drainage is dominant on the right side. (**B**) MR venogram of Case 2 showing the venous drainage is dominant on the right side. (**C**) MR venogram of Case 3 showing the venous drainage is dominant on the left side. d, dependent side at operation; h, haematoma side.

return in the dependent side of the neck and disturb the venous drainage, which can result in elevation of intracranial venous pressure and venous bleeding. Therefore, we reviewed the venous drainage of our three cases (Fig. 2 and Table 1). The main subdural haematoma was observed on the non-dominant side of the venous drainage. Possibly, the increased venous pressure could affect either side of the cerebrum. However, the venous drainage was dominant on the dependent side only in Case 2 and on the non-dependent side in Cases 1 and 3. Therefore, no clear trend supported any relationship between the laterality of the venous drainage, which may affect intracranial venous pressure and bleeding. The recent reported cases also showed no clear direction in bleeding side [5].

Another important observation was that this complication occurred in younger patients in our series. The mean age of our patients with MVD was 55.2 years. The present three patients were younger. Previously, a 68-year-old patient presented with supratentorial acute subdural haematoma following MVD for HFS [1], and the recent reported cases were 49 years old and older. Despite the aetiology may be similar, the occurrence of this complication in only young patients remains unexplained. Accumulation of similar cases will be helpful for further understanding of the mechanism.

CONFLICT OF INTEREST STATEMENT

None declared.

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