



Case Reports

Remote cerebellar hemorrhage following supratentorial cerebrovascular surgery

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ABSTRACT

Three patients with remote cerebellar hemorrhage following supratentorial cerebrovascular surgery are presented. Remote cerebellar hemorrhage is a rare surgical complication that is most often associated with aneurysm clipping or temporal lobectomies. Bleeding occurs on the superior cerebellar cortex and is believed to be venous in origin. The precise pathogenesis of remote cerebellar hemorrhage has yet to be fully elucidated but is generally considered to be a consequence of intraoperative cerebrospinal fluid loss causing caudal displacement of the cerebellum with resultant stretching of the supracerebellar veins. This case series will hopefully shed further light on the incidence, presentation, workup, and treatment of this particular complication of supratentorial surgery.

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1. Introduction

Remote cerebellar hemorrhage (RCH) is a rare complication of supratentorial surgery with a reported incidence of less than 0.6% [1]. It most commonly follows aneurysm clipping and temporal lobe epilepsy surgeries. RCH occurs in the superior cerebellar cortex facing the tentorium and often gives off the characteristic “zebra sign” due to the presence of subarachnoid hemorrhage (SAH) in the cerebellar sulci [2]. RCH is generally believed to be a consequence of damage to the supracerebellar veins from caudal displacement of the cerebellum due to intraoperative or postoperative cerebrospinal fluid (CSF) loss. While RCH is often self-limiting, early recognition and treatment are imperative as the condition can result in severe disability or death. We present three patients with RCH following supratentorial craniotomies. The literature on this topic is then reviewed.

2. Patient 1

2.1. Preoperative history

A 59-year-old man with a history of hypertension presented with left hemiparesis and facial droop. MRI revealed an acute right periventricular infarction as well as a grossly stable asymptomatic 7 mm left middle cerebral artery (MCA) saccular aneurysm. The patient was not a tissue plasminogen activator candidate so he

was admitted for supportive care and then discharged to physical therapy. Elective aneurysm clipping was scheduled.

2.2. Operation

Patient 1 underwent a left pterional craniotomy. The Sylvian fissure was split and microdissection of the distal MCA branches revealed the proximal and distal necks of the aneurysm. A temporary clip was placed followed by two Yasargil clips. Temporary clipping time was 7 minutes and did not cause any significant events according to intraoperative electroencephalogram and somatosensory evoked potentials. The temporary clip was removed, hemostasis was obtained, the dura was closed, and the bone was plated. A flat Jackson-Pratt drain (Cardinal Health, Dublin, OH, USA) was placed to bulb suction. Perioperative coagulation parameters and blood pressures were all within normal limits.

2.3. Postoperative course

A head CT scan without contrast on the first postoperative day revealed new hemorrhage along the superior cerebellum with mild adjacent edema typical of postoperative RCH (Fig. 1). Serial CT scans over the next 2 weeks demonstrated evolution of the RCH with effacement of the fourth ventricle and perimesencephalic cisterns (Fig. 2, 3). The patient required intubation on the first postoperative day for altered mental status and respiratory distress. Postoperative hydrocephalus developed and an external ventricular drain (EVD) was placed on the fourth postoperative day. On the seventeenth postoperative day, a subdural-to-peritoneal shunt was placed due to extra-axial hydrocephalus with subdural hematomas. The patient was eventually discharged in stable condition. He was doing well at his 3 month follow-up.

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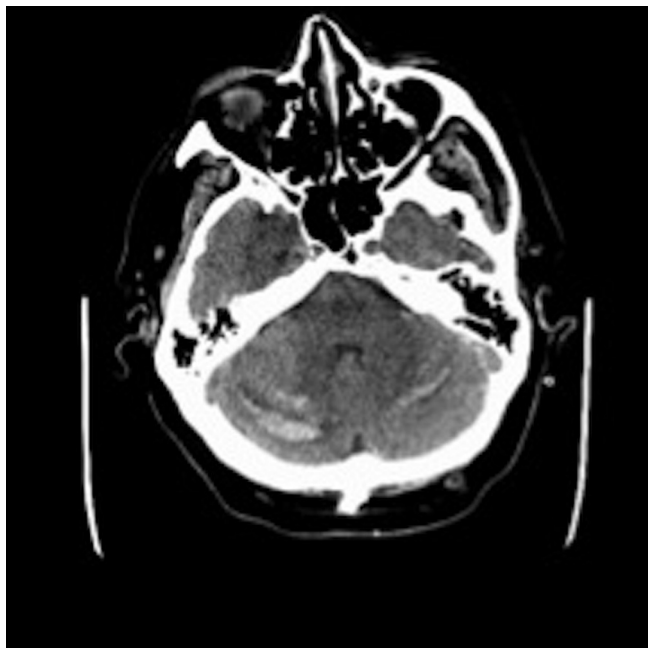


Fig. 1. Patient 1. Axial head CT scan on the first postoperative day showing new hemorrhage along the superior cerebellum with mild adjacent edema typical of postoperative remote cerebellar hemorrhage.

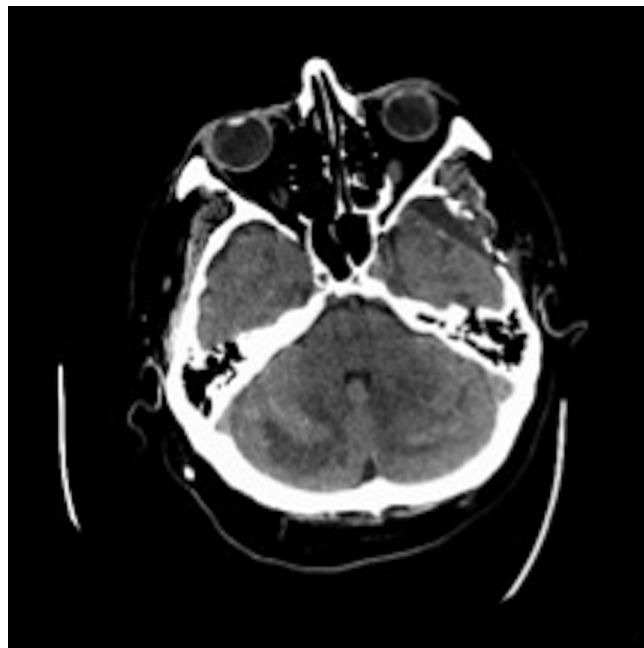


Fig. 3. Patient 1. Axial head CT scan on the eighteenth postoperative day showing evolution of the remote cerebellar hemorrhage with effacement of the fourth ventricle and perimesencephalic cisterns.

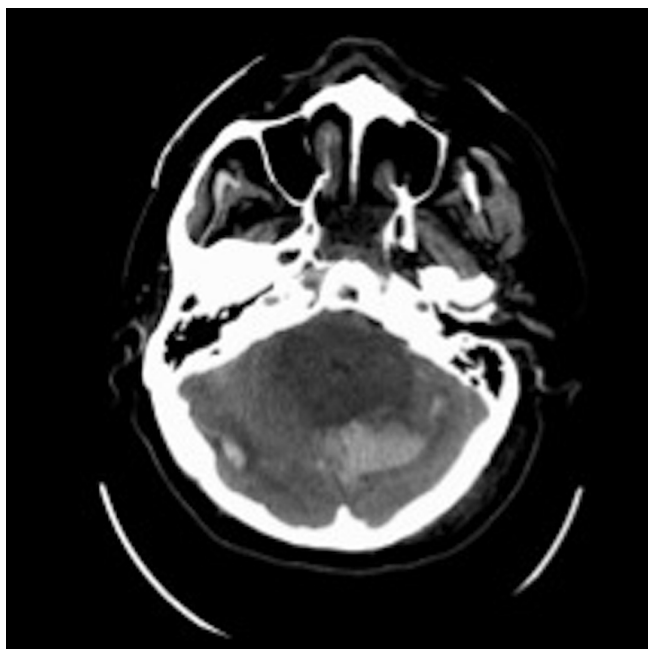


Fig. 2. Patient 1. Axial head CT scan on the fourth postoperative day showing evolution of the remote cerebellar hemorrhage with effacement of the fourth ventricle and perimesencephalic cisterns.

3. Patient 2

3.1. Preoperative history

A 56-year-old Caucasian man with a history of hemorrhagic stroke had a follow-up MRI concerning for a left distal anterior cerebral artery (ACA) arteriovenous malformation (AVM) and draining into the superior sagittal sinus. Given the patient's prior intracerebral hemorrhage and the location of the lesion, it was

determined that embolization and resection was likely to provide a better result than radiosurgery.

3.2. Operation

Patient 2 underwent Onyx 18 (ev3 Endovascular, Plymouth, MN, USA) embolization of the AVM. Post-embolization angiogram showed that there was still some flow into the AVM from a superior distal ACA branch. Resection was undertaken the following day via a paramedian craniotomy. Image-guided microdissection of the AVM was then accomplished with the use of multiple AVM clips to achieve hemostasis of perforators feeding into the AVM. After hemostasis was obtained, intraoperative angiogram confirmed there was no longer arteriovenous shunting. The patient was closed and a flat drain was placed to bulb suction. Perioperative prothrombin time, international normalized ratio, partial thromboplastin time, and blood pressures were all within normal limits.

3.3. Postoperative course

A head CT scan without contrast on the first postoperative day demonstrated a crescentic left cerebellar parenchymal hemorrhage that evolved over the next several days. Systolic blood pressure was strictly maintained between 90 and 110 mmHg. He experienced postoperative worsening of his existing right hemiparesis as well as new-onset right-sided spasticity. The patient was discharged to a rehabilitation center 2 weeks after surgery and left the rehabilitation center 3 months later. At 5 months postoperatively, he continued to have right hemiparesis along with spasticity of the right leg but was able to ambulate with a cane.

4. Patient 3

4.1. Preoperative history

Patient 3 was a 37-year-old man with a history significant for autosomal dominant polycystic kidney disease, repaired aortic dissection, and hypertension. Aneurysm screening revealed a

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