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Case report

Immediate aneurysm rupture after pipeline embolization: A new complication of flow diversion

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1. Introduction

The pipeline embolization device (PED; ev3, Plymouth, Minnesota, USA) has demonstrated clinical success in the treatment of complex intracranial aneurysms. Although it has maintained a favorable safety profile, PED usage has been associated with thromboembolic and hemorrhagic complications occurring both periprocedurally and in a delayed fashion [1–7]. We present a novel case of immediate aneurysmal rupture following uncomplicated pipeline embolization, a theoretical complication not yet reported in the literature.

2. Case report

The patient is a 54 year old female presenting with headache who was found to have a 5.5 mm partially calcified, wide-necked left posterior paraclinoid aneurysm (Fig. 1). After a discussion with the patient about the risks, benefits, and alternatives, she underwent uneventful elective treatment of this aneurysm with a pipeline device. Multiple angiographic views immediately after PED placement showed proper positioning of the stent, preservation of afferent and efferent vessels, normal mean transit time, and expected contrast stasis within the aneurysm (Fig. 2). The patient tolerated the procedure well and remained neurologically intact following extubation. Her neurophysiological monitoring was normal and stable throughout the procedure. Therefore she was extubated in the operative theater, where she was found to be neurologically intact and hemodynamically stable. The patient Glasgow coma scale (GCS) was 15 with symmetric strength 5/5. The pupils were 4 mm and reactive to light bilaterally when she woke up from surgery. She was transferred then stable for recovery neurosurgical intensive care unit (NICU) for observation.

Twenty minutes upon arrival to the NICU, the patient became acutely obtunded with agonal respirations. The patient was extensor posturing with a left pupil of 8 mm in size and nonreactive, the right pupil was 3 mm in size and also nonreactive (GCS 4T). She was emergently intubated, and a head CT revealed diffuse subarachnoid hemorrhage (Fig. 3). Protamine was administered, and a right frontal ventriculostomy was placed. Emergent catheter angiography was performed which confirmed excellent placement of the PED, with proper apposition along the parent vessel, no intrastent thrombosis, and no identifiable inflow jet. All afferent and efferent vessels remained patent. Multiple views showed near complete obliteration of the aneurysm with thrombosis at the dome and no evidence of active extravasation (Fig. 4).

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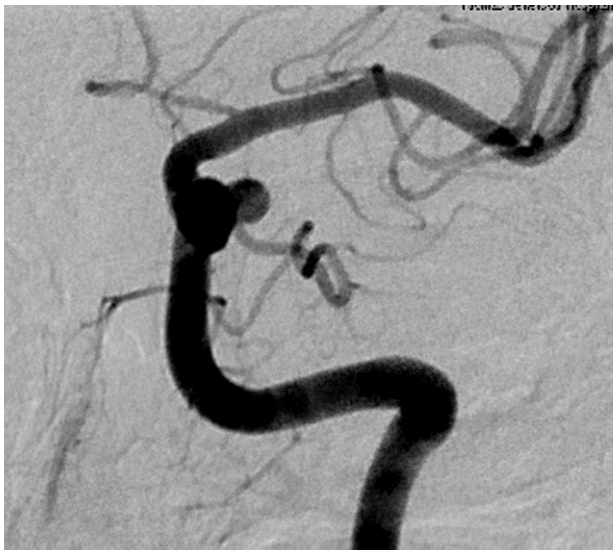

Fig. 1. Angiogram showing the ophthalmic aneurysm.

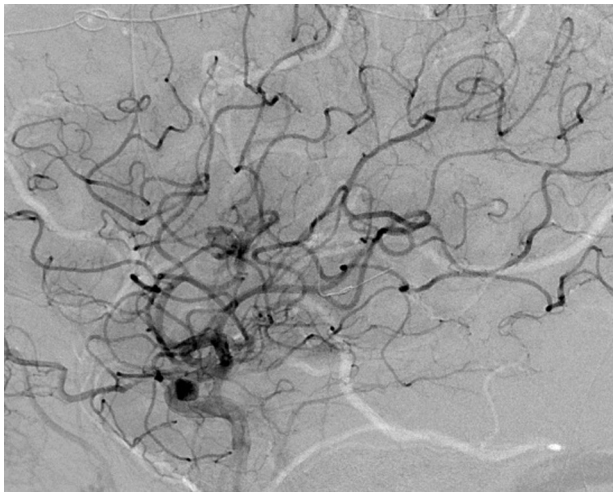

Fig. 2. Post embolization angiogram showing stasis of contrast inside the aneurysm.

Fig. 4. Angiogram showing exclusion of the aneurysm from the circulation.

After deteriorating during her stay in the NICU, the patient continued to have sustained elevated ICP (>30 mm Hg) and was managed with osmotic agents, loop diuretics and hyperventilation to keep PaCO2 <35 mm Hg. The ventriculostomy drained bloody CSF. There has been significant decompression of the system after catheter placement, but the neurological exam remained unchanged. The patient remained in pentobarbital coma with a left pupil of 4 mm non reactive, and a right pupil of 3 mm non reactive.

On day 2, the patient's ICP became intractable suddenly despite maximal medical management with pentobarbital coma. A repeat head CT showed extensive hemorrhage centered in the left Sylvian fissure with 1.6 cm midline shift, suspicious for re-hemorrhage of the aneurysm (Fig. 5). The blood pressure and heart rate of the patient remained stable. The external ventricular drain (EVD) fluid was blood tinged cerebrospinal fluid. The drainage was averaging 5–10 cc/h to keep the ICP below 20 mm Hg, but eventually it failed to achieve this target. After failing medical management for elevated intracranial pressures with pentobarbital and hyperosmolar therapy, the patient eventually required a decompressive hemicraniectomy. The patient had no clinical improvement. After

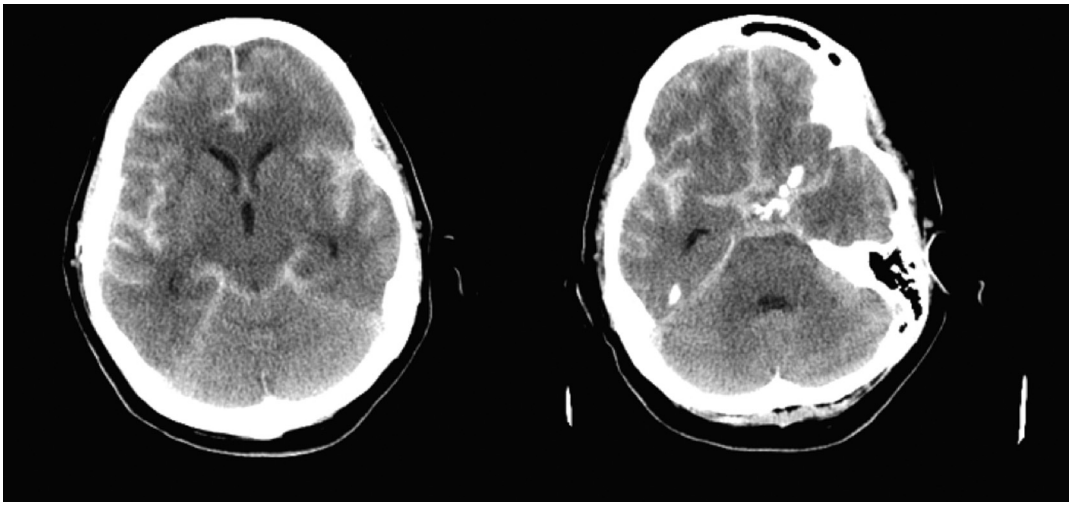

Fig. 3. CT scan showing diffuse SAH shortly after embolization.