Treatment of a bihemispheric posterior inferior cerebellar artery aneurysm: a case report

Authors: Chin Lik Tan, Anil Gopinathan, Tseng Tsai Yeo, Ning Chou

National University Hospital, Singapore

Poster ID: 41293
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Introduction

Bihemispheric posterior inferior cerebellar artery (PICA) is a rare (<0.1%) anatomical variant whereby a single PICA supplies both cerebellar hemispheres, with the absence of a contralateral PICA. We present here a case of a ruptured aneurysm arising from a bihemispheric PICA, which was treated successfully with endovascular treatment.
Methods

Review of patient’s medical notes and images
Results

A 54 year-old man presented to the Emergency Department with giddiness and nausea. His GCS was 15 on arrival with no focal neurological deficits or cerebellar signs. Blood pressure on arrival was 170/110.

**CT brain:** Right cerebellar hematoma with peri-lesional edema and intraventricular hemorrhage (IVH). No hydrocephalus. *(Figure A)*

**CT angiogram (CTA):** A small 1.5mm outpouching in right PICA suggestive of an aneurysm. *(Figure B)*

**Cerebral angiogram:** A bihemispheric right PICA harboring a dissecting aneurysm with a saccular component just proximal to the choroidal point. *(Figures C, D)*
The patient was counselled for surgical or endovascular treatment. However, the patient declined intervention and was thus managed conservatively.

**Repeat angiogram (day 11):** Interval increase in size of the aneurysm. The patient was re-counselled on the treatment options, and he agreed to endovascular treatment with coil embolization of the aneurysm but declined the risk of parent vessel occlusion. The aneurysm was coil embolized with good occlusion of the aneurysm and parent artery still widely patent. *(Figures E, F)*

**Repeat cerebral angiogram (day 7 post-coiling):** stable appearance of the coiled aneurysm.

Since this treatment was unlikely to be durable, we decided to follow up with an MR angiogram (MRA) in one week.
Follow up MRA (2 weeks post-coiling): significant recurrence of the aneurysm. 
(Figure G)
Before we could address this early recurrence, patient arrived in the ED with a fall, reduced consciousness and generalized tonic-clonic seizure. His GCS was E3V4M6.

CT brain: acute cerebellar hematoma and IVH, with hydrocephalus and posterior fossa crowding. (Figures H, I)
The patient was promptly intubated and emergency EVD insertion was performed. Following the rebleed, the family consented for parent vessel occlusion (PVO), as well as suboccipital craniectomy and evacuation of cerebellar hematoma.
The recurrent sac (Figure J) was coil embolized with occlusion of the aneurysm-bearing segment of parent artery. (Figures K, L)

Following successful endovascular treatment, the patient underwent suboccipital craniectomy and evacuation of cerebellar hematoma. The patient stayed in the ICU for 16 days, followed by another week’s recuperation and physical therapy in the hospital. He was then discharged to the community hospital for rehabilitation. On discharge, his GCS was 15 with no significant focal neurological deficits.
Parent vessel occlusion (PVO) is the conventional treatment for mid to distal PICA aneurysms, which is usually well tolerated due to collateral supply from contralateral PICA or ipsilateral AICA. However, with a single bihemispheric PICA, there is extreme unpredictability on how well the patient compensates after occluding that vessel. Adequacy of vertebral artery perforators in perfusing the brainstem is unpredictable. This was our dilemma while offering the definitive treatment of PVO when this patient was still well and averse to accept the unpredictable risk of occluding the bihemispheric PICA. Mid or distal PICA aneurysms, are usually dissecting or mycotic aneurysms; hence it is just not the sac but the vessel wall itself that is unhealthy and vulnerable. Treating the sac alone with coiling/ clipping without addressing the parent vessel carries higher risk of early recurrence and rebleed. Being cognizant of patient’s preference, we tried the option of occluding the aneurysm without PVO and did close interval follow up imaging for recurrence. However, with early recurrence and rebleed, eventually we had to do PVO to definitively treat the aneurysm. We believe, the immediate posterior decompression that followed the PICA occlusion, benefitted the patient by preventing significant mass effect on the brainstem from a large cerebellar infarct.
Summary points

It is important for neurosurgeons and neurointerventionists to be aware of rare anatomical variants of intracranial vessels such as bihemispheric PICA to facilitate treatment planning, be it surgical or endovascular.

If required, a parent vessel occlusion may be done for treating dissecting aneurysms arising from a bihemispheric PICA, as a life saving measure; however, subsequent threshold for decompression should be low.