



## Case Reports &amp; Case Series

## Endovascular management of basilar artery perforator aneurysm – Insights

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## ABSTRACT

Basilar artery perforator aneurysm (BAPA), are rare (< 1%), and with poorly defined natural history and management. BAPA was first reported by Ghogawala et al. (1996) and surgically obliterated. The management strategies are varied with 15% surgical and 52% by endovascular techniques. Notably 33% adopted conservative management. In the endovascular group direct coiling has been reported in only 3 cases. We report another case of BAPA managed by super-selective direct coil obliteration and the technical challenges associated with coiling of these aneurysms.

## 1. Introduction

Basilar artery perforator aneurysm (BAPA), are rare (< 1%), and with undefined natural history and management [1]. They are small, < 3 mm, located in the rostral/mid basilar levels. Other locations include superior cerebellar and posterior choroidal artery [2]. BAPA was first reported by Ghogawala et al. [3] and surgically obliterated. Since then, the strategies are varied with 15% treated using surgical and 52% by endovascular techniques. Notably 33% adopted conservative lines of management [4]. In the endovascular group direct coiling has been reported in only 3 cases. We report another case of BAPA managed by super-selective direct coil obliteration and the techniques associated.

## 2. Case report

An elderly healthy lady with no co-morbidities, presented with a thunderclap headache and vomiting. She was neurologically intact and plain CT brain showed thick peri-mesencephalic subarachnoid hemorrhage. A 4 vessel DSA done elsewhere was normal. She was managed medically and due to persisting headache, DSA was repeated 7 days later, which showed a 2.5 mm size aneurysm arising from one of the parapontine perforators at mid basilar trunk. The aneurysm was about 5 mm distal to the basilar and pointing caudally. After multidisciplinary review, the decision was made for endovascular treatment. In view of a small though visible neck, a super-selective direct catheterization and coiling of the aneurysm was planned for. Flow diversion was also kept as a standby plan in case of inability to coil.

Through a right femoral approach, a 6F Envoy (Cordis Inc.) guiding

catheter was parked in the distal left vertebral artery after heparinization. A Vasco 10 microcatheter was used for the procedure with a 1214 Hybrid wire (Balt). Although the proximal portion of the basilar perforator was entered distal negotiation was impossible. This was replaced with a Marathon microcatheter (EV3) with a 0.008" wire. This permitted super selective catheterization of the perforator and a single 4 mm × 1 cm Barricade coil was placed inside the aneurysm and detached. Immediate DSA showed complete obliteration of the aneurysm. An MRI brain done 3 days later showed a small pontine tegmental focus of diffusion restriction although patient was asymptomatic.

She was seen 6 months later and was independent but refused a check DSA.

## 3. Discussion

BAPA are rare posterior circulation aneurysms with unclear pathogenesis, progression, angioarchitecture and management options. They occur predominantly in the fifth decade with a slight male predominance [5].

## 3.1. Challenges during diagnosis

Almost 85% of the aneurysms are < 3 mm in size rarely exceed 7 mm. Small size, sluggish filling and spontaneous thrombosis makes it difficult to diagnose during initial angiography and can be easily missed [6]. Almost 1/3 of cases were occult during initial angiography necessitating repeat DSA. Buell et al. [1] in their review of BAPA recommend a repeat angiogram within 7 days. All these suggest BAPA

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maybe under diagnosed. Routine use of 3-dimensional angiography and repeat angiograms is recommended. Even in the current report the initial angiography was normal and she was diagnosed during a repeat angiography about a week later.

### 3.2. Location of BAPA

Among the three perforator groups arising from the basilar BAPAs were frequently located at the rostral mesencephalic group of perforators [63%] located between PCA and SCA, followed by mid basilar pontine group of perforators located between SCA and AICA origin. There are no cases reported from the perforators proximal to the AICA [5]. The current report belonged to the midbasilar variety with aneurysm arising from one of the large pontine perforator.

### 3.3. Classification system

In a recent paper by Satti et al. [2], a three point classification system proposed was dependent on the anatomical origin of the aneurysm:

- Type 1 – aneurysm arising from the basilar artery adjacent to a perforator artery without involving it.
- Type 2 – aneurysm arising from the base of perforator artery.
  - o A – including the origin of the perforator.
  - o B – perforator arising from the dome of the aneurysm.
- Type 3 – are fusiform and beyond the parent vessel.

Although this classification doesn't help in understanding the progression of the disease or define clear management options, it helps in future reviews [2].

The BAPA which we treated was a true saccular aneurysm and fit into the present classification system as a Type 2B.

### 3.4. Therapeutic modalities

The available literature is divided between active management and conservative management. About 33% [18 cases] of the cases were managed conservatively without any active intervention. There is an estimated 60% spontaneous thrombosis of the aneurysm with observation alone in a case series published by Forbrig et al. [6]. Based on this they have suggested conservative management can be tried as first line of management for these cases. It has been advised to add anti-fibrinolytic therapy for 72 h either tranexamic acid or aminocaproic acid as an additional treatment modality. A recent review by Bhogal et al. has mentioned that 6 patients presented with ischemic complications secondary to spontaneous thrombosis of the aneurysm [4]. Although there is clear evidence of spontaneous obliteration of the aneurysm on follow-up there is an estimated 11% to 15% chance of rebleeding in conservatively managed patients. Given this is a significant number, treatment is recommended for these aneurysms. [2].

A total of 8 cases of BAPA are managed by open surgical exclusion of the aneurysm. 6 of them were in the distal basilar artery. Although

perforator artery could not be preserved in 6 of the 8 cases only one ischemic complication was mentioned with no recurrent subarachnoid hemorrhage [4].

Majority of the cases [52%] were managed by the endovascular route. Small vessel size, unfavorable anatomy, relationship of the perforator artery to the aneurysm usually precludes the decision making in endovascular management. The options for treatment include direct coiling, onyx embolization, telescopic stenting and flow diversion. In the 2 cases in which onyx embolization was used both patients developed ischemic complications from perforator sacrifice. Telescopic stents and flow diverter are used in the rest of the cases. There have been concerns regarding use of dual antiplatelets along with stenting in acute phase after SAH. Direct coiling of the aneurysm although straight forward has been described in 3 cases only. The main reason precluding coil occlusion of aneurysm is difficult catheterization of the perforator artery and stability of microcatheter. The two cases reported by Chen et al. [5] one of the cases from pontine circumferential artery, a perforator at the mid basilar region and the other one was a flow aneurysm in relation to cerebellar AVM. The perforators could be preserved in both cases because of large diameters of the perforators. The report by Forbrig et al., mentioned coiling of aneurysm arising from the rostral perforator group, in this group perforator artery was sacrificed with persistent mild hemiparesis at follow-up [4–6].

In our case the aneurysm was arising from the midbasilar region with an acceptable diameter of the perforator artery and aneurysm arising distal to the origin of the perforator giving extra stability to the microcatheter which helped in coiling the aneurysm.

## 4. Conclusion

In BAPA's with SAH direct coiling of the aneurysm should be attempted in suitable cases instead of conservative management or routine use of flow diversion strategies. Directly coiling these rare aneurysms is a cost-effective approach and avoids long term dual anti platelet usage. The strategies should be individualized.

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