Case lesson 44-2026

Management of Intracranial Perforator Aneurysms: Report of Two Cases

Eugen Enesi *, Arben Rroji, Vojsava Leka, Stela Dodaj, Aida Agastra, Oneda Cibuku, Entela Basha, Mirel Grada, Mentor Petrela

Abstract: Intracranial perforator artery aneurysms are rare vascular entities and are often challenging to diagnose using standard imaging modalities. We report two cases: a perimesencephalic subarachnoid hemorrhage caused by a basilar artery perforator pseudoaneurysm, and a parenchymal hematoma secondary to a recurrent artery of Heubner pseudoaneurysm. The aim of this report is to highlight the diagnostic value of cone-beam CT (CBCT) and to review current management strategies based on the available literature.

KEYWORDS: aneurysm; subarachnoid hemorrhage; perimesencephalic; perforator; cone-beam CT; DynaCT; high-resolution imaging; anatomy; vascular disorders; endovascular neurosurgery

Introduction: Intracranial perforator aneurysms account for a very small proportion of all cerebral aneurysms but carry significant clinical relevance due to their atypical presentation and diagnostic difficulty. Perimesencephalic subarachnoid hemorrhage (pmSAH) is generally associated with a benign clinical course and negative angiographic findings. However, increasing evidence suggests that rupture of basilar artery perforators may represent an underrecognized cause of pmSAH [1,4]

Case 1: A 49-year-old female presented to the emergency department with a sudden onset of severe headache, described as maximal intensity (10/10) at onset, holocephalic in distribution, and associated with cervicalgia. The headache was followed by two episodes of vomiting. She also reported photophobia.
On admission, arterial blood pressure was markedly elevated, with a systolic value of 200 mmHg. Her past medical history was significant for known but untreated arterial hypertension and hyperthyroidism under medical treatment.
Neurological examination revealed Hunt & Hess (H&H) grade 1 with minimal nuchal rigidity, without Kernig's or Brudzinski's signs. No focal neurological deficits were observed, and the patient was fully conscious presented with a GCS score of 15. Routine laboratory and biochemical investigations were within normal limits. A non-contrast cranial computed tomography (CT) scan demonstrated subarachnoid hemorrhage localized to the perimesencephalic cisterns, consistent with a peri-mesencephalic pattern of SAH Modified Grade Fisher 2. No intraventricular extension or parenchymal hemorrhage was noted. The patient had had the negative results of the computed tomography angiography (CTA) for this reason underwent to catheter angiography and cone-beam CT (CBCT) using a 10-second DCT protocol technique under general anesthesia with breath-hold during contrast injection. In terms of postprocessing, creation of secondary volumes and maximum intensity projection (MIP) reformats are usually paramount to obtaining good image quality. Perforant aneurysm of basilar artery was noted in correspondence of pmSAH Fig.1.

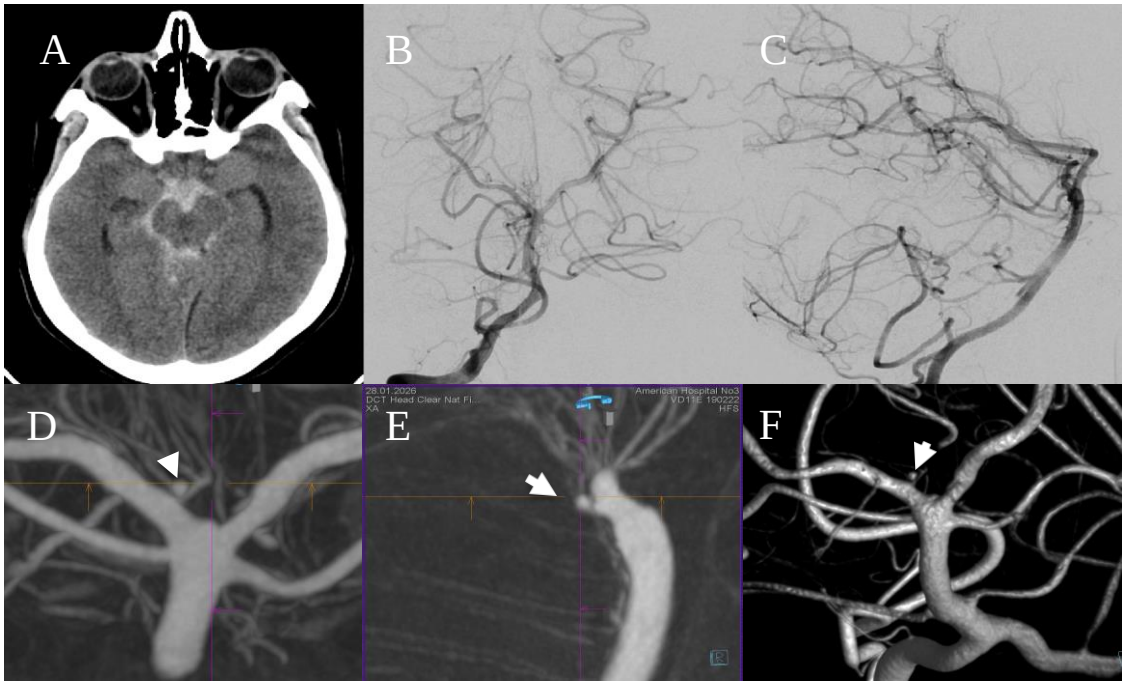

FIG. 1. *Basilar perforator pseudoaneurysm in pmSAH.*
The axial (A) CT images demonstrate SAH around the ambient cistern and prepontine area. DSA in Townes (B) and lateral (D) views showed no evidence of an aneurysm or vascular malformation. CBCT performed on a Siemens Artis Q machine using a 10-second DCT protocol with coronal (D), sagittal (E), MIPs as well as volume-rendered reconstruction (F) clearly showed an outpouching (arrows) arising from a rostral basilar perforator, centered in the region of the pmSAH.

Case 2: A 45-year-old male presented to the emergency department with a sudden onset of severe thunderclap headache, described as maximal intensity (10/10), and right hemiparesis. On admission, arterial blood pressure, laboratory, biochemical and cardiac investigations were within normal limits. His past medical history was without any clinical significance.

Neurological examination revealed right peripheric facial nerve palsy, right hemiparesis 4/5, and nuchal rigidity with positive Brudzinski, NIHSS of 5 and GCS score of 15. A non-contrast cranial computed tomography (CT) scan demonstrated left seeded periventricular parenchymal hematoma with minimal intraventricular extension. The patient had had the negative results of the computed tomography angiography (CTA). According to his yang age and in absence of other comorbidities he underwent to catheter angiography and cone-beam CT (CBCT) using a 10-second DCT protocol technique under general anesthesia with breath-hold during contrast injection. In terms of postprocessing, creation of secondary volumes and maximum intensity projection (MIP) reformats are usually paramount to obtaining good image quality. Perforant aneurysm of left Recurrent Artery of Heubner is noted in correspondence of hematoma Fig.2.

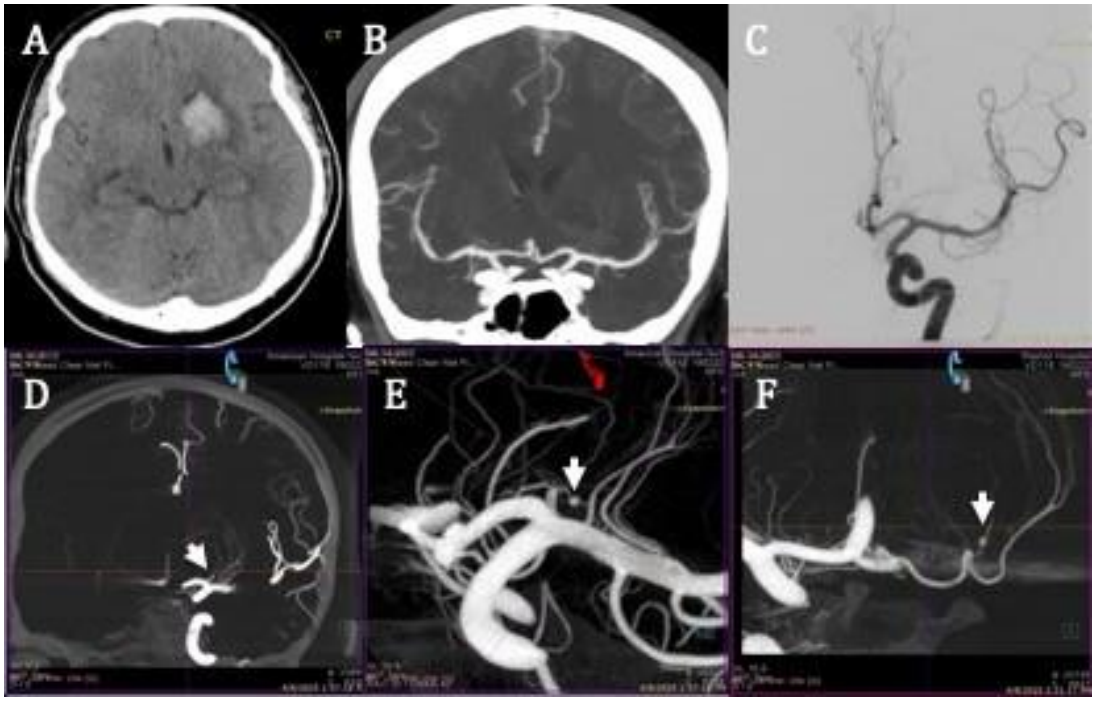

FIG. 2. *Recurrent artery of Heubner pseudoaneurysm*
The axial (A) CT images demonstrate periventricular hematoma. CTA MIP(B) showed no evidence of an aneurysm. DSA in Townes (C) view showed no evidence of an aneurysm or vascular malformation. CBCT performed on a Siemens Artis Q machine using a 10-second DCT protocol with coronal (D) right ACI, zoom (E) and left ACI (F), MIPs clearly showed an outpouching (arrows) arising from a perforator of Recurrent artery of Heubner.

Discussion: These cases emphasize the importance of considering perforator artery pathology in patients with hemorrhagic presentations and negative conventional angiography and the important role of CBCT using a 10-second DCT protocol technique under general anesthesia with breath-hold during contrast injection. Basilar artery perforator rupture has been increasingly reported as a cause of pmSAH, potentially related to focal dissection or pseudoaneurysm formation [1,2]. Similarly, aneurysms of the lenticulostriate arteries and the recurrent artery of Heubner are exceedingly rare and often only detected using advanced imaging techniques such as CBCT [6–10]. Management of perforator aneurysms remains controversial. Conservative treatment has been advocated by several authors, citing a tendency toward spontaneous thrombosis and the high procedural risk associated with surgical or endovascular intervention in small- caliber vessels [2–4]. Nonetheless, selected cases have been successfully treated endovascularly, particularly in the setting of recurrent hemorrhage or aneurysm growth [5,8].

Conclusion: Intracranial perforator aneurysms should be considered in cases of perimesencephalic subarachnoid hemorrhage or deep parenchymal hematoma with negative CTA and DSA findings. Cone-beam CT under general anesthesia represents a valuable diagnostic tool for detecting these lesions. Therapeutic decisions should be individualized, balancing the risk of rebleeding against the potential morbidity of intervention.

References

1. Raz E, Koneru S, Nossek E, et al. Basilar artery perforator rupture as the cause of perimesencephalic subarachnoid hemorrhage. J Neurosurg. 2026.

2. Venegas A, Zambrano K, Echeverria M, et al. Basilar artery perforator aneurysms: a single-center experience with conservative management. J Neuroendovasc Ther. 2025.

3. Papisetty K, Schulz SJ, Dharnipragada R, Venteicher AS. Management of intracranial perforator aneurysms. Stroke Vasc Interv Neurol. 2025.

4. Bhogal P, AlMatter M, Hellstern V, et al. Basilar artery perforator aneurysms: report of 9 cases and review of the literature. J Clin Neurosci. 2019.

5. Forbrig R, Eckert B, Ertl L, et al. Ruptured basilar artery perforator aneurysms—treatment regimen and long-term follow-up in eight cases. Neuroradiology. 2015.

6. Hinojosa-Gonzalez DE, Ferrigno AS, Martinez HR, et al. Aneurysms of the lenticulostriate artery: a systematic review. World Neurosurg. 2020.

7. Vargas J, Walsh K, Turner R, et al. Lenticulostriate aneurysms: a case series and review of the literature. J NeuroIntervent Surg. 2015.

8. Bechan RS, van Rooij WJ. Endovascular treatment of a ruptured flow aneurysm of the recurrent artery of Heubner. Interv Neuroradiol. 2014.

9. Khoo J, Khoo B, Alalade AF, Webster J. Recurrent artery of Heubner aneurysm masquerading as an A1 aneurysm radiologically. World Neurosurg. 2019.

10. Nakazaki A, Ito M, Isobe M, et al. Spontaneous obliteration of a dissecting aneurysm of the recurrent artery of Heubner. AJNS. 2022.