Basilar Artery Fenestration in Migraine Patient

Aneesh Rahangdale 1 and Kateryna Kurako 2

1 University of Central Florida
2 HCA Florida Capital Hospital GME/UCF

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Case Report

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Aneesh Rahangdale, MD a, Kateryna Kurako, MD a,b

a Departments of Psychiatry and Neurology, HCA Florida Capital Hospital, Tallahassee, FL, USA
b Southeast Neurology Specialists, 1401 Oven Park Drive, Tallahassee, FL 32308, USA

Short Title: Basilar Artery Fenestration in Migraine Patient

Corresponding Author:
Aneesh Rahangdale (ORCID 0000-0002-5864-4189)
E-mail address: Aneesh.rahangdale@hcahealthcare.com

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Abstract

Introduction:
Basilar artery fenestration is a rare vascular anomaly that can have clinical implications, particularly in patients with migraine headaches.

Case Presentation:
We present the case of a 35-year-old female presenting with frequent migraines, occurring 10-12 days per month, lasting 4-6 hours each time. The headaches were exacerbated by weather changes, strong smells, and menstrual cycles. She had been tried on various medications for migraine management without significant improvement. Her medical history was notable for recently starting an etonogestrel / ethinyl estradiol vaginal ring for birth control. Family history was significant for maternal great grandmother and grandmother passing away from a ruptured brain aneurysm. Diagnostic assessment revealed a proximal basilar artery fenestration measuring approximately 6 mm in craniocaudal diameter on MRI/MRA, with no other intracranial abnormalities. The patient’s migraines were likely multifactorial, with the fenestration potentially contributing to altered hemodynamics and triggering factors. The patient was advised to discontinue her vaginal ring due to the increased risk of clots and strokes with migraines. She was given rimegepant samples for abortive migraine care and galcanezumab injection for preventive treatment. Lifestyle modifications and healthy practices were encouraged. Follow-up MRI/MRA imaging was recommended annually to monitor the basilar artery fenestration.

Conclusion:
This case underscores the importance of considering and assessing for vascular anomalies like basilar artery fenestration in patients with migraines, especially when there is a family history of cerebrovascular disorders, and assessing birth control regimens of migraine patients. Monitoring patients with basilar artery fenestration with repeat MRI/MRAs annually seems like a reasonable plan balancing risks and benefits.

**Introduction**

Basilar artery fenestration is a rare vascular anomaly characterized by the division of the basilar artery into two parallel channels that subsequently rejoin that often remains asymptomatic and incidentally discovered during imaging studies for unrelated conditions. However, it can occasionally be associated with neurological symptoms such as headaches, vertigo, or transient ischemic attacks due to altered hemodynamics or microemboli within the duplicated segment. The incidence of basilar artery fenestration has been reported to range from 0.28% to 6% based on autopsy studies, and 0.02% to 2.07% based on angiographic and MRA studies.

Fenestration of the basilar artery is most commonly found in the proximal portion near the verteobasilar junction, while fenestration of the middle and distal portions is less common.

Basilar artery fenestration has been associated with various vascular pathologies, including aneurysms, arteriovenous malformations, and thromboembolic events. The formation of aneurysms at the site of basilar artery fenestration is a well-recognized complication, with an incidence ranging from 15% to 34%. The complex geometric structure of the fenestration, its proximity to vital structures, and the challenging nature of the region for surgical access increase the risks of morbidity and mortality associated with the treatment of these aneurysms. Accurate diagnosis through advanced imaging modalities such as MRI/MRA and DSA is essential for appropriate management and prognostication. Differential diagnoses may include vascular variants such as basilar artery dolichoectasia or aneurysms, necessitating thorough diagnostic evaluation.

The management of basilar artery fenestration depends on the clinical presentation, associated symptoms, and imaging findings. Long-term follow-up is crucial to monitor for any changes in clinical status or potential complications associated with this vascular anomaly. Asymptomatic cases typically require conservative management with close observation, while symptomatic cases may warrant further interventions such as antiplatelet therapy, surgical clipping, or endovascular procedures. Endovascular treatment has become the preferred approach for managing basilar artery fenestration aneurysms, as it offers a less invasive alternative to open surgical techniques. Various endovascular techniques have been employed, including coil embolization, stent-assisted coiling, and flow diversion. Studies have reported high technical success rates and favorable outcomes with endovascular management of these lesions.

However, the rarity of basilar artery fenestration aneurysms has limited the available literature, and experience with different endovascular treatment modalities remains relatively limited. Ongoing research and case reports continue to expand the understanding of the optimal management strategies for these complex vascular anomalies.

**Case Presentation**

A 35-year-old female presented with complaints of frequent migraines, occurring 10-12 days per month, lasting 4-6 hours each time. The headaches were exacerbated by weather changes, strong smells, and menstrual cycles. She had been tried on various medications for migraine management without significant improvement. Her medical history was notable for recently starting an etonogestrel / ethinyl estradiol vaginal ring for birth control. Family history was significant for maternal great grandmother and grandmother passing away from a ruptured brain aneurysm. Physical examination was unremarkable apart from non-focal neurological findings.

**Tried meds:** Topiramate, Gabapentin, Sumatriptan, Eletriptan, Ubrogepant, Aspirin / Paracetamol / Caffeine.

**Review of Systems:** frequent headaches, otherwise unremarkable (no loss of consciousness, no weakness, no numbness, no seizures, no dizziness, no tremor, no gait dysfunction, no paralysis)
Physical Exam: within normal limits, non-focal

Diagnostic Assessment: MRI/MRA of the head and neck revealed a proximal basilar artery fenestration measuring approximately 6 mm in craniocaudal diameter. No other intracranial abnormalities were noted. The patient’s migraines were likely multifactorial, with the fenestration potentially contributing to altered hemodynamics and triggering factors.

Figure 1. MRA Head without contrast highlights basilar artery fenestration measuring 6mm in craniocaudal diameter. The red arrow is pointing to the anatomic finding. No other intracranial abnormalities were noted. MRI/MRA imaging revealed the characteristic features of basilar artery fenestration, with two parallel channels of the basilar artery separated by a septum, rejoining distally to form a single basilar artery. No evidence of thrombosis, aneurysm, or other associated vascular abnormalities was noted.

Management and Outcome: The patient was advised to discontinue her etonogestrel / ethinyl estradiol vaginal ring due to the increased risk of clots and strokes with migraines. She was given rimegepant samples for abortive migraine care and galcanezumab injection for preventive treatment. Lifestyle modifications and healthy practices were encouraged. Follow-up MRI/MRA imaging was recommended annually to monitor the basilar artery fenestration. Over a follow-up period of 6 months, the patient remained stable without progression of symptoms or new neurological deficits.

Discussion

Basilar artery fenestration is a rare vascular variant that may predispose individuals to aneurysm formation. In patients with migraines, especially those with a family history of aneurysms, thorough evaluation including imaging studies is crucial. Management involves a combination of pharmacotherapy, lifestyle modifications, and regular monitoring to mitigate potential complications.

This case underscores the importance of considering and assessing for with MRA vascular anomalies like basilar artery fenestration in patients with migraines, especially when there is a family history of cerebrovascular disorders. Moreover, clinicians ought to evaluate birth control regimen of migraine patients, especially whether it is estrogen-containing birth control. Monitoring patients with basilar artery fenestration with annual MRI/MRAs seems like a reasonable plan balancing risks and benefits. In the meantime, we recommend appropriate blood pressure control and lifestyle modifications to lower the risk of aneurysm formation and/or rupture. Nonetheless, we recommend having a low threshold for referral to vascular surgery if anatomical findings are changing.
Statements

Statement of Ethics

This study protocol was reviewed and approved HCA Healthcare PUBCLEAR, approval number MS #2486. This research was supported in whole or in part by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the authors and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Written informed consent was obtained from the patient seen in Southeast Neurology Specialists for publication of the details of their medical case and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

AR: conceptualization, data curation, formal analysis, investigation, methodology, validation, writing - original draft, and writing - review and editing

KK: validation, and writing - review and editing

Both agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of research participants but are available from the corresponding author [AR] upon reasonable request.

References

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Figures
Figure 1. MRA Head without contrast highlights basilar artery fenestration measuring 6mm in craniocaudal diameter. The red arrow is pointing to the anatomic finding. No other intracranial abnormalities were noted. MRI/MRA imaging revealed the characteristic features of basilar artery fenestration, with two parallel channels of the basilar artery separated by a septum, rejoining distally to form a single basilar artery. No evidence of thrombosis, aneurysm, or other associated vascular abnormalities was noted.