Academia Journal of Stroke

Case Report

Wright Academia
Library of Medical Publications

Diagnosis of Artery of Percheron Stroke on CT Perfusion

Yoram Ebrahimi*

Binghamton University, SUNY Binghamton, US

***Corresponding author:** Yoram Ebrahimi, Binghamton University, SUNY Binghamton, USA;
E-mail: yebra1031@gmail.com

Citation: Ebrahimi Y (2020) Diagnosis of Artery of Percheron Stroke on CT Perfusion. Academia J Stroke 2:006.

Volume 2	Issue 1
Pages	31-33
Received	February 23, 2020
Accepted	April 02, 2020
Published	April 07, 2020

Abstract

Bilateral medial thalamic strokes are rare and can be caused by an occlusion of the artery of Percheron, an anatomical variant branch off of the posterior cerebral artery. Artery of Percheron (AOP) strokes usually present with general symptoms of hypersomnolence, opthalmopplegia and memory impairment, which may show similar features of other conditions and can delay diagnosis. Diagnosing an AOP stroke becomes a challenge due to its small size and ambiguous symptoms, leading to delayed thrombolytic treatment. CT Perfusion (CTP) imaging can be used to detect these small infarcts. The patient in this case was a 94-year-old woman appearing post-surgery who was found to have an AOP stroke discovered only upon CT Perfusion imaging several hours after presentation. Lack of clinical suspicion for this unique syndrome may prevent prompt treatment. A newly defined tPA window of nine hours allows for patients to be treated despite delayed diagnosis, which the patient in our case would have been eligible for. When recognized promptly, patients who present with an AOP stroke may be eligible for Intravenous thrombolysis (IVT) with a good prognosis.

Introduction

The artery of Percheron (AOP) is an uncommon anatomical variant in which a small branch of the posterior cerebral artery (PCA) supplies the bilateral medial thalami, with or without rostral midbrain supply. Estimates for the prevalence of this variant in the population range from 4-11.7% to 30% [1]. AOP strokes are rare, with an estimated prevalence ranging from 0.1-2% of all ischemic stroke patients [1-3]. Small artery disease has been reported to be the most common etiology [2]. When recognized promptly, patients with AOP stroke may be eligible for Intravenous thrombolysis (IVT). Several authors have reported successful thrombolysis of an AOP stroke [4,5].

Patients with an AOP stroke present with a wide array of clinical manifestations including pupillary dilation, hypersomnolence, opthalmoplegia (mostly vertical gaze palsy), and rarely memory impairment [2,6,7]. These symptoms may mimic substance intoxication and other neurological syndromes (i.e. Wernicke-Korsakoff syndrome), posing a challenge in clinical diagnosis. Neuroimaging in the acute phase of an AOP stroke may also be non-revealing. The artery of Percheron is very small, averaging 2 mm in diameter [8,9]. One report by Roitberg, et al. identified occlusion of this artery by digital subtraction angiography (DSA) [10]. CT angiography (CTA), however, has limited spatial resolution and is unable to depict an AOP occlusion. Therefore CTA is expected to be normal in most isolated AOP strokes. Diffusion-Weighted Imaging (DWI) and MRI can demonstrate an AOP stroke, however it is not readily available for acute stroke worldwide [1,7]. Subsequent to these clinical and radiological challenges, diagnosis of AOP stroke is commonly made hours to days after symptom onset [7,11], when patients are well beyond the IVT time window.

The ability of CTP source images to demonstrate AOP strokes has been recently reported in several case reports [7,12]. We present here a case of AOP stroke diagnosed by CTP and discuss the therapeutic options for such patients in an extended time window.

Case Presentation

We describe a 94-year-old female with severe aortic stenosis and atrial fibrillation treated with aspirin only. She was admitted for elective Transcatheter Aortic Valve Implantation (TAVI). The implantation was successfully performed under deep sedation through a right femoral approach two days later at 11:00 am and was uneventful. On examination shortly after the procedure patient was hypersomnolent without any other major neurological deficits. Somnolence was attributed to age and slow clearance of sedatives administered during the procedure. However, patient remained unresponsive and at 6:00 pm, the neurologist was urgently called. Vital signs were normal. On physical examination, she was hypersomnolent with bilateral mydriasis and a normal, localizing motor response to painful stimuli in all four limbs. Plantar reflex was flexor bilaterally. Eye movements were not assessed. Non-contrast head CT (NCCT) (Figure 1A) showed no evidence of stroke, and CT angiography (Figure 1B) did not demonstrate any vessel occlusion.

CT perfusion summary maps also did not show a perfusion defect. However, mean transit time (MTT) and time to peak (TTP) maps demonstrated bilateral symmetric foci of delayed perfusion in the medial thalami and rostral midbrain, leading to the diagnosis of an AOP stroke (Figure 2). Cerebral blood volume (CBV) values were normal within the foci, defining them as potentially reversible ischemic penumbra.

Unfortunately, by the time imaging was performed 7.5 hours have elapsed since patient was last seen normal and so patient was ineligible for IVT by the standard 4.5 hour time window. A nasogastric tube was inserted and patient was loaded with aspirin and clopidogrel. The next day she remained unresponsive and also developed left sided weakness. A repeat NCCT showed bilateral medial thalamic and rostral midbrain infarcts in the same distribution as the MTT maps. Five days later she developed aspiration pneumonia and sepsis and subsequently died from respiratory failure.

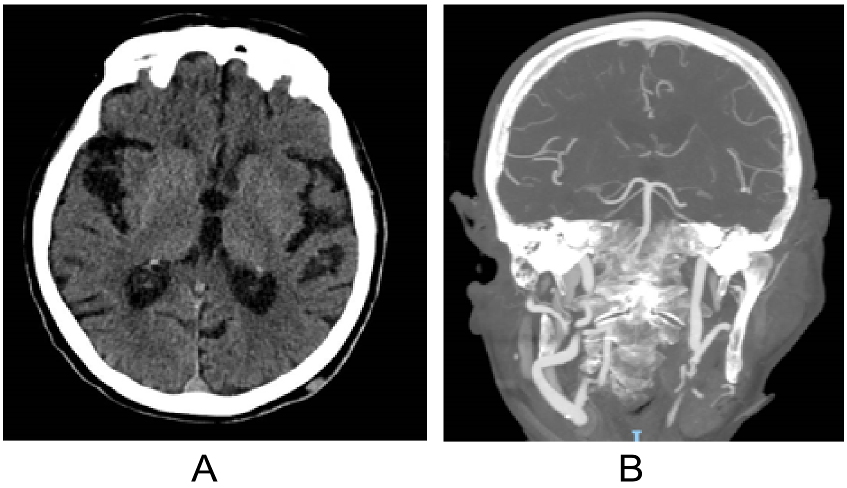

Figure 1: A normal non-contrast CT (A) and CT angiography (B).

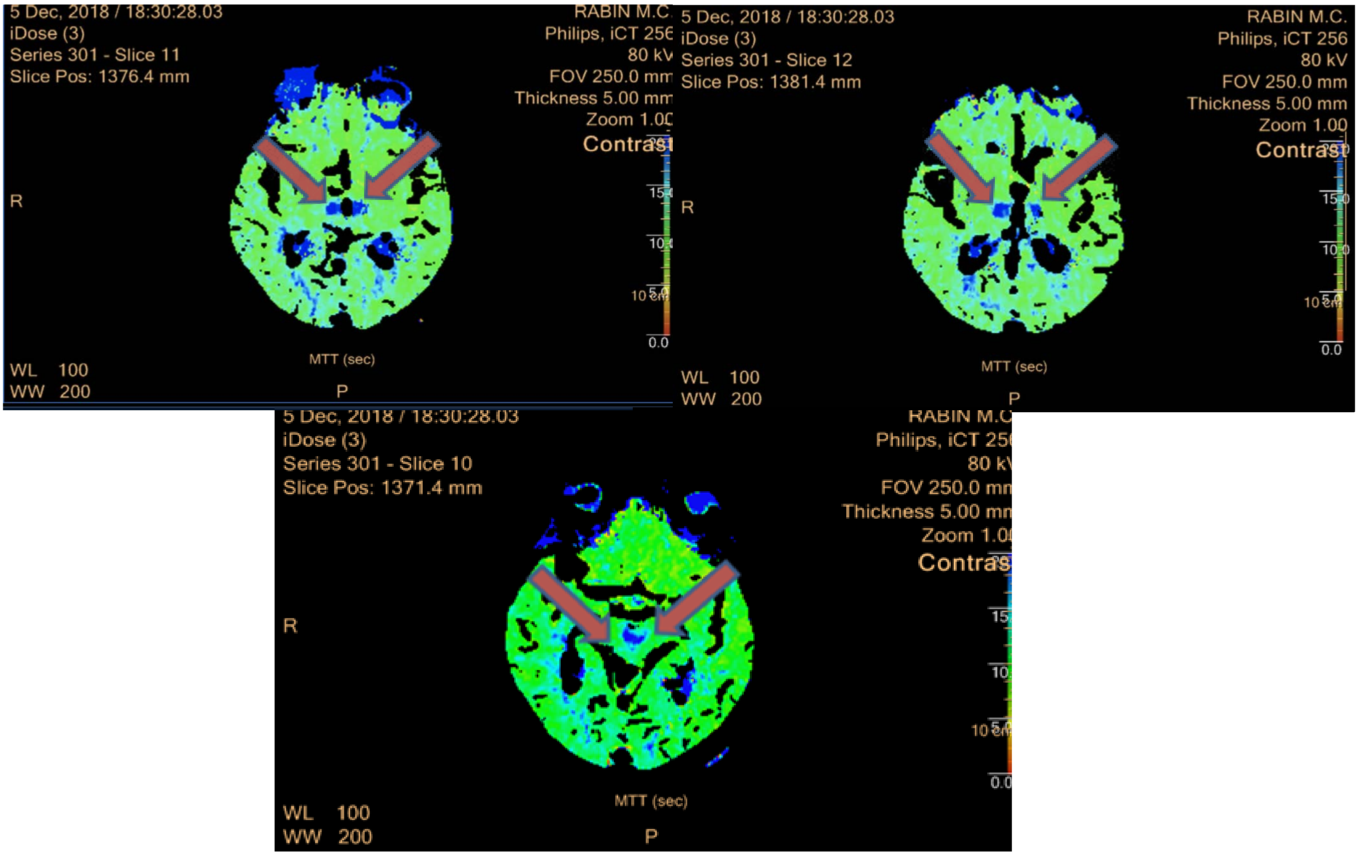

Figure 2: CT Perfusion MTT maps showing high MTT in bilateral medial Thalami and rostral midbrain (arrows), making the diagnosis of AOP stroke.

Discussion

Our patient presented with peri-procedural AOP stroke most probably due to a cardioembolic source. Clinical presentation was non-specific, with isolated hypersomnolence that was attributed to procedural sedation. A neurological examination was only performed several hours late and showed bilateral mydriasis without further localizing signs. CT and CTA were also non-revealing. Diagnosis of AOP stroke in this patient was only possible after CTP was performed, showing bilateral thalamic and midbrain hypoperfusion foci.

This case raises some important points. First, CT perfusion may be used to punctually diagnose these strokes. The ability of CTP source images to demonstrate AOP (bilateral paramedical thalami) strokes has been recently reported in several case reports [7,12] and is demonstrated clearly in our case. CTP imaging from these cases detected increased MTT and decreased cerebral blood flow in the area [12], similar to the findings in our patient. Another lesson to be learned from our case is that isolated somnolence, without evidence of any suspected causes, and bilateral pupillary abnormalities even without lateralizing signs should arouse the suspicion of AOP stroke, and subsequent MRI or CT Perfusion imaging should be promptly performed. Early diagnosis of AOP stroke by CTP allows for prompt IV thrombolysis treatment with complete patient recovery, one case of which has been successfully demonstrated and documented by Ume, et al. [5].

CT perfusion is a functional imaging modality that can produce high-resolution maps of cerebral perfusion. It additionally offers the advantages of a short acquisition time, low cost and increasing availability. The use of CT perfusion for precise depiction of ischemia is becoming more widespread, especially after a recent meta-analysis that showed that IV tPA can be administered in an extended time window up to 9 hours using CTP data [13]. The study suggests that even if the standard 4.5 hours IVT window is missed, patients can still be treated with IVT up to 9 hours as long as CTP does not show a significant infarct core and there is evidence of salvageable brain tissue. Delayed treatment beyond the standard window can still improve functional outcomes, with minimal risk of intracerebral hemorrhage. By these new time criteria, our patient would have been eligible for IVT, potentially preventing any fatal complications.

Conclusion

AOP strokes are rare and diagnosis is challenging, which delays IVT treatment. CTP may offer a reliable method of detecting these strokes more rapidly. A low level of suspicion for this condition in acutely somnolent patients and timely diagnosis may allow for prompt IVT.

References

1. Garcia-Grimshaw, M. A., Peschard-Franco, M., & Gutierrez-Manjarrez, F. A. (2018). Bilateral Thalamic Ischemic Stroke Secondary to Occlusion of the Artery of Percheron. *Cureus*. doi: 10.7759/cureus.2676

2. Caballero, P. E. J. (2010). Bilateral Paramedian Thalamic Artery Infarcts: Report of 10 Cases. *Journal of Stroke and Cerebrovascular Diseases*, *19*(4), 283–289. doi: 10.1016/j.jstrokecerebrovasdis.2009.07.003

3. Sandvig, A., Lundberg, S., & Neuwirth, J. (2017). Artery of Percheron infarction: a case report. *Journal of Medical Case Reports, 11*(1). doi: 10.1186/s13256-017-1375-3

4. Kostanian, V., & Kramer, S. C. (2007). Artery of Percheron Thrombolysis. *American Journal of Neuroradiology*, 28(5), 870-871.

5. Ume, K., & Hileman, M. (2018). Case report: Artery of Percheron stroke detected by CT Perfusion imaging, prompting thrombolytic treatment with excellent outcome. *Neurology, 90*, 341.

6. Gentilini, M., Renzi, E. D., & Crisi, G. (1987). Bilateral paramedian thalamic artery infarcts: report of eight cases. *Journal of Neurology, Neurosurgery & Psychiatry*, 50(7), 900–909. doi: 10.1136/jnnp.50.7.900

7. Khanni, J. L., Casale, J. A., Koek, A. Y., Pozo, P. H. E. D., & Espinosa, P. S. (2018). Artery of Percheron Infarct: An Acute Diagnostic Challenge with a Spectrum of Clinical Presentations. *Cureus*. doi: 10.7759/cureus.3276

8. Griessenauer, C. J., Loukas, M., Tubbs, R. S., & Cohen-Gadol, A. A. (2013). The artery of Percheron: an anatomic study with potential neurosurgical and neuroendovascular importance. *British Journal of Neurosurgery*, 28(1), 81-85. doi: 10.3109/02688697.2013.812181

9. Krampla, W., Schmidbauer, B., & Hruby, W. (2008). Ischaemic stroke of the artery of Percheron (2007: 10b). European Radiology, 18(1), 192–194. doi: 10.1007/s00330-007-0615-0

10. Roitberg, B. Z., & Tuccar, E. (2002). Bilateral Paramedian Thalamic Infarct in the Presence of an Unpaired Thalamic Perforating Artery. *Acta Neurochirurgica*, *144*(3), 301–304. doi: 10.1007/s007010200040

11. Lamot, U., Ribaric, I., & Popovic, K. S. (2015). Artery of Percheron infarction: review of literature with a case report. *Radiology and Oncology*, 49(2), 141–146. doi: 10.2478/raon-2014-0037

12. Maclellan, A., & Boyle, K. (2017). Computed Tomography Perfusion Abnormalities in Bilateral Thalamic Infarction Due to Artery of Percheron Occlusion. *Journal of Stroke and Cerebrovascular Diseases*, *26*(8). doi: 10.1016/j.jstrokecerebrovasdis.2017.05.017

13. Campbell, B. C. V., & Ma, H. (2019). Extending thrombolysis to 4·5–9 h and wake-up stroke using perfusion imaging - a systematic review and meta-analysis of individual patient data . *Lancet*, *394*(10193), 139-147. doi: doi.org/10.1016/S0140-6736(19)31053-0