

Cerebral Venous Thrombosis: A Critical Appraisal

Jacob *et al.* present an insight on the link of cerebral venous thrombosis (CVT) with bacterial infection.^[1] The manuscript has a significant impact as it is possibly the largest cohort of patients reported from Southern India with CVT and concurrent bacterial infection. It is well established that a local site infection such as facial infection, sinusitis, orbital cellulitis, pharyngitis, otitis, or trauma can be linked temporally as a trigger for CVT and it is very well iterated by the authors. Although the manuscript is heavily tilted toward highlighting bacterial infections as the cause of CVT in this cohort, a thorough reading brings up some important considerations for future exploration.

Authors in this observational descriptive study highlight an association of CVT with bacterial infections, but other infective causes such as fungal and viral infections have been reported in clinical practice.^[2] Jacob *et al.*, in their study have lacked the extensive workup profile that these patients usually demand. This includes an extended thrombophilia panel comprising CRP, fibrinogen, fibrin, D-dimer, antithrombin-3, thrombin-antithrombin complexes, prothrombin fragment F₁₊₂, plasminogen, PAI-1 and thrombomodulin, prothrombin gene mutation, hereditary hyperhomocysteinemia, deficiency of Protein C and Protein S^[3,4] which ideally should be done in a non-acute setting after the resolution of this acute phase.

Summarizing these patients in terms of other systemic diseases such as the presence of Crohn's disease, systemic lupus erythematosus, Wegener granulomatosis, Behcet syndrome and ulcerative colitis could also be beneficial.^[5]

Authors in future studies can also aim to investigate in detail the evaluation of the thrombotic risk profile and vascular system to elucidate potential risk factors for CVT. In patients with profound septicemia secondary to bacterial infection, it is also well known that disseminated intravascular coagulation (DIC) itself can be a risk factor for CVT.^[6]

In the current study we lack details on the work up for a concurrent DIC.

Due to the rarity of this entity there is paucity of robust data establishing a direct connection cause–effect relationship between CVT and systemic infection. A better study design would be to compare this cohort of patients (with CVT) against a matched control group with bacterial infections (but no CVT) and further explore why a certain subset of patients with bacterial infection developed CVT while others did not. Early recognition of cerebral venous thrombosis which may present with non-specific clinical signs such as fever and headache is critical. More specific clinical findings such as periorbital swelling and ophthalmoplegia may be harbinger of an already advanced pathological course and may need aggressive approach for a good outcome. Other complications

can include DIC, meningitis, subdural empyema, brain abscess, blindness, pan hypopituitarism, intracranial hypertension, infectious arteritis or mycotic aneurysm of the internal carotid artery, vasospasm, septic emboli, hemorrhagic infarction, coma, and death. Mortality rates as high as 80% in the era before antibiotics have diminished to below 8–13%.^[7,8] With the advancement in the care of our critically ill patients in modern medicine with antibiotics and anticoagulation, the risk of long-term sequelae is reduced but still remains significant in up to 50% of survivors. The study period for this specific paper has spread over a span of 15 years and a significant amount of changes have come through for the management of these patients in terms of anticoagulation and early antibiotics. It would be of great interest to the reader of this journal and the others in the field of Neurology and Infectious diseases if the authors can follow this up with another study describing the outcome of these patients longitudinally highlighting the risk factors for poor outcome and residual neurological deficits. We would like to congratulate the authors for publishing this interesting work and the continual commitment to improve the outcome of CVT patients with rigorous research and vigor.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Amos Lal, Andrew C.F. Hui¹

Department of Medicine, Division of Pulmonary and Critical Care Medicine, Multidisciplinary Epidemiology and Translational Research in Intensive Care Group, Mayo Clinic, Rochester, MN, United States, ¹Department of Medicine, Division of Neurology, Ng Teng Fong General Hospital, National University Hospital Cluster, Singapore

Address for correspondence: Dr. Amos Lal,

Department of Medicine, Division of Pulmonary and Critical Care Medicine, Multidisciplinary Epidemiology and Translational Research in Intensive Care Group, 200 1st St SW, Mayo Clinic, Rochester, MN - 55905, United States.

E-mail: Lal.Amos@mayo.edu

REFERENCES

1. Jacob MS, Gunasekaran K, Miraclin AT, Sadiq M, Kumar C V, Oommen A, Koshy M, Mishra AK, Iyadurai R. Clinical profile and outcome of patients with cerebral venous thrombosis secondary to bacterial infections. *Ann Indian Acad Neurol* 2020;23:477-81.
2. Lal A, Dhamne MC, Hui AC, Ahmad A. Herpes simplex virus (HSV) encephalitis in a young man: An unusual course. *BMJ Case Rep* 2018;2018:bcr2017222499.
3. Grau AJ, Bugge F, Heindl S, Steichen-Wiehn C, Banerjee T, Maiwald M, *et al.* Recent Infection as a risk factor for cerebrovascular ischemia. *Stroke* 1995;26:373-9.
4. Grau AJ, Bugge F, Steichen-Wiehn C, Heindl S, Banerjee T, Seitz R, *et al.* Clinical and biochemical analysis in infection-associated stroke. *Stroke* 1995;26:1520-6.
5. Sasidharan PK. Cerebral vein thrombosis misdiagnosed and mismanaged. *Thrombosis* 2012;2012:210676.
6. Guenther G, Arauz A. Cerebral venous thrombosis: A diagnostic and

treatment update. *Neurologia (English Edition)* 2011;26:488-98.

7. Frank GS, Smith JM, Davies BW, Mirsky DM, Hink EM, Durairaj VD. Ophthalmic manifestations and outcomes after cavernous sinus thrombosis in children. *J AAPOS* 2015;19:358-62.
8. Wang YH, Chen PY, Ting PJ, Huang FL. A review of eight cases of cavernous sinus thrombosis secondary to sphenoid sinusitis, including a 12-year-old girl at the present department. *Infect Dis (London, England)* 2017;49:641-6.

Submitted: 26-Jul-2020 **Revised:** 26-Jul-2020 **Accepted:** 27-Jul-2020

Published: 08-Dec-2020

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

DOI: 10.4103/aian.AIAN_814_20