Content available at: https://www.ipinnovative.com/open-access-journals

Panacea Journal of Medical Sciences

Journal homepage: http://www.pjms.in/

Original Research Article

Clinical profile and treatment outcome of patients with cerebral venous sinus thrombosis

Anisha Ameena Bashir[1]*, Hanadi Meherali[1], Santwana Chandrakar[1]

[1]*Dept. of General Medicine, Dr. D. Y. Patil Hospital and Research Centre, Navi Mumbai, Maharashtra, India*

ARTICLE INFO

Article history:
Received 30-08-2023
Accepted 22-12-2023
Available online 21-12-2024

Keywords:
Cerebral venous sinus thrombosis
MRI
Sinus
Prognosis
Anticoagulants

ABSTRACT

Background: Cerebral venous sinus thrombosis is an uncommon cause of stroke often affecting young individuals and it can pose a diagnostic dilemma due to its diverse clinical presentation. An analysis of patients admitted with cerebral venous sinus thrombosis (CVST) at D.Y. Patil Hospital, Navi Mumbai, was conducted to assess etiology, clinical features, diagnosis, and prognosis. The study concluded that early recognition and timely intervention is essential for good outcome. The use of imaging techniques, such as magnetic resonance imaging, is required for diagnosis and monitoring.

Materials and Methods: A study conducted on thirty patients withclinical features and MRIsuggestive of CVST.

Results : The average age of presentation was 31.53 years, with 60% of cases being females. The predominant symptoms were headache (36.7%) and seizures (33.3%). The superior sagittal sinus, transverse sinus, and sigmoid sinus were most affected. Low molecular weight heparin was administered to 83.3% of patients, whereas 16.7% received unfractionated heparin. 73.3% of patients had fully recovery and 26.7% had partially recovered after treatment.

Conclusion: A variety of symptoms and signs can be observed with cerebral venous sinus thrombosis. The most common symptom was headache, with thrombosis mainly affecting the transverse sinuses, superior sagittal sinuses, and sigmoid sinuses. An aggressive anticoagulation regimen yields excellent clinical outcomes.

1. Introduction

It is noteworthy that cerebral venous sinus thrombosis (CVST) is a distinct subgroup of cerebrovascular diseases with a variety of deceptive and fluctuating clinical manifestations resulting in complex diagnostic and therapeutic challenges. It has been established that cerebral venous sinus thrombosis is responsible for 10% to 20% of strokes in young individuals. Prior to this discovery, this condition was thought to be rare. In the literature, more than 100 potential causes of CVST have been reported.[1] Many risk factors are associated with CVST, such as pregnancy, puerperium, prothrombotic states, and malignancy.[2,3] However, in 20%-25% of patients, the cause remains unknown, despite extensive investigation.

The presenting symptoms include headache, hemiparesis, seizures, altered sensorium, and papilledema.[4] Magnetic resonance imaging (MRI) with venogram is the preferred diagnostic method. Patients are treated with either anticoagulation or thrombolysis. It is primarily done using heparin in conjunction with oral anticoagulants. The thrombolysis can be administered via selective sinus catheterization or a systemic route in patients who don't respond to anticoagulation.[5,6] To mitigate the risk of recurrent episodes , long-term anticoagulation should be implemented in patients with prothrombotic disorders.[7]

* *Corresponding author*.
E-mail address: anisha.shijur@gmail.com (A. A. Bashir).

https://doi.org/10.18231/j.pjms.2024.119

CVST patients can have variable outcome depending on their underlying etiology, but their prognosis is generally good. The main causes of mortality in these patients are infections, metabolic abnormalities, brain herniation, hemorrhagic venous infarctions, and aspiration pneumonias.[8] Timely diagnosis and prompt treatment is crucial for favorable outcome. The purpose of this research was to evaluate the clinical characteristics, risk factors and treatment options in patients diagnosed with CVST.

2. Materials and Methods

An observational prospective study was conducted at the Department of General Medicine, Dr. Dr. DY Patil Hospital and Research Centre, Nerul, Navi Mumbai, for a period of one year. Patients were selected sequentially, using a non-probability method. The Institutional Ethical Committee approved the enrollment of patients in this study. A written consent was obtained before enrolling the subjects.

A total of 30 patients over the age of 12 years with clnical features and history suggestive of CVST were included. Patients with arterial stroke, space-occupying lesions, metabolic encephalopathy, and those unwilling to participate were excluded. MRI with MRV were performed on all patients with the 1.5 Tesla magnetic resonance machine. Anticoagulants and supportive measures were administered. Patients were monitored for symptomatic improvement and residual neurological deficits. The statistical data was analyzed using SPSS version 25 (developed by SPSS Inc. in Chicago, USA).

3. Results

The mean age of our cohort was 31.53 ±12.40 years . Table 1 shows that 40% of the patients were males (n = 12), and 60% were females (n = 18). In Table 2, headache was the most prevalent symptom (36.67 %), followed by seizures (33.33%; n = 10), stroke (20%; n = 6), headaches and seizures (6.7 percent; n = 2), and unconsciousness (3.3%; n = 1). Table 3 shows that 11 (36.67%) had thrombosis of the transverse sinus, cerebral veins, and superior sagittal sinus, whereas 26.67% had thrombosis of the superior sagittal sinus. A total of 13.3% of patients suffered both sigmoid and transverse sinus thrombosis. It is estimated that 66.7% of brain damage occurred in the temporal lobe and 13.3% in the frontoparietal lobe.

Cosidering the risk factors, 16.6% (n = 24) had hyperhomocysteinemia and 13.4% were in the postpartum period. In addition, 6.7% were affected during peripartum, and an equal percentage had predisposing factors such as chronic suppurative otitis media (CSOM), tuberculous meningitis, trauma, and sinusitis. Among 23.3% of patients, no cause was identified (Table 4). Twenty-five patients (83.3%) received LMWH and warfarin, and five (16.7%) received unfractionated heparin and warfarin. 14 patients were treated with anticonvulsants. A total of 24 patients (80%) had regular follow-ups, and six (20%) had irregular follow-ups. 22 patients (73.3%) recovered fully, and 8 patients (26.7%) recovered partially (Table 6).

Table 1: Baseline characteristics of the study patients

Variable	Mean±SD	Range
Age in years	31.53±12.40	19-67
Gender		
Male: Female	2:3	-

Table 2: Clinical profile

Variable	Frequency	%
Headache	11	36.7
Seizure	10	33.3
Stroke	6	20
Headache and seizure	2	6.7
Unconscious	1	3.3

Table 3: Sinus involvement

Variable	Frequency	%
SSS,TS,CV	11	36.7
SSS	8	26.7
SS,TS	4	13.3
SS,SSS	2	6.7
SS	1	3.3
SSS,CV	1	3.3
SSS,TS	1	3.3
TS	1	3.3
TS,CV	1	3.3

Table 4: Profile ofrisk factors

Variable	Frequency	%
Idiopathic	7	23.3
Hyperhomocysteininemia	5	16.7
Postpartum	4	13.4
Csom	2	6.7
Peripartum	2	6.7
TB Meningitis	2	6.7
Trauma	2	6.7
Sinusitis	2	6.7
Bacterial Meningitis	1	3.3
OC pills	1	3.3
Protein C deficiency	1	3.3
Puerperial sepsis	1	3.3

4. Discussion

Young individuals are more vulnerable to cerebral venous sinus thrombosis1. Diagnosis can be challenging due to the wide range of presenting symptoms. Neuroimaging advances, however, have made early detection easier due

Table 5: Profile of treatment

Treatment	Frequency	%
LMWH and warfarin	25	83.3
Unfractionated Heparin with warfarin	5	16.7

Table 6: Treatment outcome

Variable	Frequency	%
Recovered	22	73.3
Partially recovered	8	26.7

to improved diagnostic accuracy. The purpose of this study was to elucidate the various clinical manifestations of CVST. We compared our results with the existing literature on the topic to identify the potential risk factors and assess treatment outcomes.

In most comprehensive studies on CVST, the age range is between 37 and 39 years. However, it can affect all age groups. The mean age of study population was 31.53 years±12.40 years and males to females ratio was 2 : 3. According to a Sudanese research, the mean age was 33.9 ± 11.8, with females comprising 80% of the sample.[8]CVST primarily affects young females, as evidenced by research conducted in nearby countries like Iran, Oman, and Saudi Arabia.[9–13] According to Narayan et al., males have higher prevalence of CVST as a result of increased alcohol consumption, advances in obstetric care, and clinical awareness that leads to early detection of CVST.[2]

The predominant clinical feature was headache in 36.7% patients, in accordance with a study by Idris et al.[8] This incidence was slightly lower when compared to other regional and international studies on CVST.[14,15] A Turkish case report has documented that CVST was misdiagnosed as subarachnoid hemorrhage as headache being the only presenting symptom.[16] This highlights the importance of comprehensive clinical evaluation and investigation, especially in high -risk individuals. . Deep vein thrombosis (DVT) and stroke have been associated with elevated levels of homocysteine in the bloodstream, known as hyperhomocysteinemia.[17] In our cohort, hyperhomocystenemia was observed in 16.7%, with females showing a higher prevalence. Cantu et al. found an increased risk of CVST was associated with hyperhomocysteinemia and decreased plasma folate in Mexicans.[18] These findings were attributed to the prevailing low socioeconomic conditions and inadequate nutritional status experienced by the population. The study by Narayan et al.,[2] showed 18.2% of patients had raised homocysteine levels which was in line with the present study . Compared to arterial strokes, cerebral venous sinus thrombosis (CVST) is more likely to cause seizures. The present study revealed that a significant proportion of patients (33.3%) had seizures resembling those described by Narayan et al.[2] and the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT).[19]

The most commonly affected sinuses are the Superior Sagittal Sinus, the Transverse Sinus, and the Cerebral Vein, which account for 36.7% of all cases. Additionally, 26.7% of patients had thrombosis in the Sagittal Venous Sinus (SSS). In comparison to Saudi Arabia and the International Study on Cerebral Veins and Dural Sinus (ISCVT), these findings are closely aligned with those of similar studies conducted in Oman, Iran, and India.[9,10,12,17–19]

In terms of treatment options, 83.3 percent used LMWH and warfarin, while 16.7% used UFH and warfarin. In total, 73.3% of patients were fully recovered. According to the ISCVT cohort and an Oman study, these proportions are consistent.[9,19] The primary treatment approach focuses on detecting the condition early and initiating anticoagulation as soon as possible. The underlying etiological factors must also be investigated and managed in conjunction with anticoagulation. According to current recommendations, heparin should be administered immediately followed by long-term treatment with warfarin; the duration of anticoagulation is governed by the underlying cause of the bleeding.[19] Typically, anticoagulation should be administered for 3–6 months for CVST that has been provoked and for 6–12 months for CVST that has not been provoked; lifelong if CVST has been recurrent or if CVST has been associated with venous thromboembolism or severe thrombophilia.[17] Due to the lack of definitive evidence, direct acting oral anticoagulants are not recommended first-line therapy for patients ineligible for warfarin. In light of the fact that recanalization occurs primarily within the first few months following CVST, determining the duration of anticoagulation based on it seems inappropriate since it does not appear to be related to clinical outcomes.[20,21]

5. Conclusion

Cerebral Venous Sinus Thrombosis (CVST) can present with a variety of clinical manifestations. The clinical and radiology departments must work closely together to make an accurate diagnosis. The most common symptom on presentation was headaches, followed by seizures, with a subset of patients experiencing both. In most cases, the superior sagittal sinus and transverse sinus were affected. With a good prognosis, heparin and warfarin were the main treatment options.

6. Conflicts of Interests

The authors have no financial interests or conflicts of interest.

7. Source of Funding

None.

References

1. Dash D, Prasad K, Joseph L. Cerebral venous thrombosis: an Indian perspective. *Neurol India*. 2015;63(3):318–28.
2. Narayan D, Kaul S, Ravishankar K, Suryaprabha T, Bandaru VS, Mridula KR, et al. Risk factors, clinical profile and long-term outcome of 428 patients of cerebral sinus venous thrombosis: insights from Nizam's Institute Venous Stroke Registry. *Neurol India*. 2012;60(2):154–9.
3. Current concepts: thrombosis of the cerebral veins and sinuses. *N Engl J Med*. 2005;352(17):1791–8.
4. Connor SE, Jarsoz JM. Magnetic resonance imaging of cerebral venous sinus thrombosis. *Clin Radiol*. 2022;57(6):449–61.
5. Misra UK, Kalita J, Chandra S. Low molecular weight heparin versus unfractionated heparin in cerebral venous sinus thrombosis: a randomized controlled trial. *Eur J Neurol*. 2012;19(7):1030–6.
6. Dentali F, Squizzato A, Gianni M, De Lodovici M, Venco A, Paciaroni M, et al. Safety of thrombolysis in cerebral venous thrombosis. A systematic review of the literature. *Thromb Haemost*. 2010;104(5):1055–62.
7. Pai N, Ghosh K, Shetty S. Hereditary thrombophilia in cerebral venous thrombosis: a study from India. *Blood Coagul Fibrinolysis*. 2013;24(5):540–3.
8. Idris MNA, Sokrab TEO, Ibrahim EA, Mirgani SM, Elzibair MA, Osman RR, et al. Cerebral venous thrombosis. Clinical presentation and outcome in a prospective series from Sudan. *Neurosciences*. 2008;13(4):408–11.
9. Al-Hashmi K, Al-Wahaibi K, Al-Khabori M, Al-Lamki S. Characteristics and Outcomes of Patients with Cerebral Venous Sinus Thrombosis. *JAMA Neurol*. 2017;34(5):434–7.
10. Ashjazadeh N, Haghighi AB, Poursadeghfard M, Azin H. Cerebral venous-sinus thrombosis: a case series analysis. *Iran J Med Sci*. 2011;36(3):178–82.
11. Shahid R, Zafar A, Nazish S, Alsulaiman A, Alabdali M, Aljaafari D, et al. Etiologic and Clinical Features of Cerebral Venous Sinus Thrombosis in Saudi Arabia. *J Neurosci Rural Pract*. 2018;10(2):278–82.
12. Kajtazi NI, Zimmerman VA, Arulneyam JC, Al-Shami SY, Al-Senani FM. Cerebral venous thrombosis in Saudi Arabia. Clinical variables, response to treatment, and outcome. *Neurosciences (Riyadh)*. 2009;14(4):349–54.
13. Hassan M, Khan NU, Rajput HM, Shahzad W, Hassan T, Mushtaq HF, et al. Clinical and radiological study profile of cerebral venous sinus thrombosis at a tertiary care center in Pakistan. *Brain Hemorrhages*. 2022;3(4):151–4.
14. Agostoni E. Headache in cerebral venous thrombosis. *Neurol Sci*. 2004;25(3):206–10.
15. Tanislav C, Siekmann R, Sieweke N, Allendorfer J, Pabst W, Kaps M, et al. Cerebral vein thrombosis: clinical manifestation and diagnosis. *BMC Neurol*. 2011;11(1):69. doi:10.1186/1471-2377-11-69.
16. Unal AY, Unal A, Goksu E, Arslan S. Cerebral venous thrombosis presenting with headache only and misdiagnosed as subarachnoid hemorrhage. *World J Emerg Med*. 2016;7(3):234–6.
17. Saposnik G, Barinagarrementeria F, Brown RD, Bushnell CD, Cucchiara B, Cushman M, et al. Diagnosis and management of cerebral venous thrombosis: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2011;42(4):1158–92.
18. Cantu C, Alonso E, Jara A, Martínez L, Ríos C, Fernández M, et al. Hyperhomocysteinemia, low folate and vitamin B12 concentrations, and methylene tetrahydrofolate reductase mutation in cerebral venous thrombosis. *Stroke*. 2004;35(8):1790–4.
19. Ferro JM, Canhão P, Stam J, Bousser MG, Barinagarrementeria F. Prognosis of cerebral vein and dural sinus thrombosis: results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). *Stroke*. 2004;35(3):664–70.
20. Behrouzi R, Punter M. Diagnosis and management of cerebral venous thrombosis. *Clin Med (Lond)*. 2018;18(1):75–9.
21. Aaron S, Alexander M, Moorthy RK, Mani S, Mathew V, Patil AKB, et al. Decompressive craniectomy in cerebral venous thrombosis: a single centre experience. *J Neurol Neurosurg Psychiatry*. 2013;84(9):995–1000.

Author's biography

Anisha Ameena Bashir, Assistant Professor

Hanadi Meherali, Resident

Santwana Chandrakar, Professor

Cite this article: Bashir AA, Meherali H, Chandrakar S. Clinical profile and treatment outcome of patients with cerebral venous sinus thrombosis. *Panacea J Med Sci* 2024;14(3):672-675.