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Original Research Article

A STUDY ON THE CLINICAL PROFILE OF CEREBRAL VENOUS THROMBOSIS

Shanmugasundaram N [1], Selvaraj R [2], Rameshkumar T[3], Shaik Sulaiman Meeran A[4], Velusamy S[5], Murugapandian N[6], Lourdes Pravina[7]

[1]Associate Professor, Department of Neurology, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[2]Associate Professor, Department of Neurosurgery, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[3]Professor, Department of Medicine, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[4]Professor, Department of Medicine, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[5]Professor, Department of Neurology, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[6]Assistant Professor, Department of Neurology, Government Kilpauk Medical College, Chennai, Tamilnadu, India.
[7]Assistant Professor, Department of Neurology, Government Kilpauk Medical College, Chennai, Tamilnadu, India.

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Corresponding Author:
Dr. Lourdes Pravina
Email:doctorpravina@gmail.com

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Abstract

Background: Cerebral Venous thrombosis (CVT), also called Cerebral venous sinus thrombosis (CVST), occurs when the cortical veins and dural venous sinuses that drain the brain parenchyma become occluded. Despite recent breakthroughs in CVST detection, diagnosis and therapy can be challenging due to the variability of underlying risk factors, presenting characteristics, and the lack of a standardized therapeutic approach. This study aimed to determine the clinical manifestations, multiple etiologies and prognostic aspects of cerebral venous sinus thrombosis.**Materials and Methods:**This is a hospital-based descriptive study done on 50 patients having cerebral venous thrombosis from August 2021 to July 2022. A detailed history, clinical findings, and required relevant investigations were all recorded and analyzed.**Result:**CVST was generally observed in younger patients, commonly between 31-40 and <30 years. We have observed male preponderance. Headache and seizure were the most common presenting clinical feature accounting for 92% and 80%. The more common site of occlusion was the superior sagittal sinus. Concerning the patient's outcome at discharge, about 68% had recovered with no symptoms of MRS 0, 14% had no significant disability with MRS 1, 6% had a slight disability with MRS 2, and 4% had moderate to the severe disability with MRS 3-5. About 44% had near complete recanalization at about six months, and three patients who were not compliant and regular with the treatment had worsening cerebral venous thrombosis, including death in one patient. **Conclusion:**Cerebral venous thrombosis is a complex disease with a large and variable clinical spectrum and various signs and symptoms.The overall outcome is good if identified and treated early.

INTRODUCTION

Cerebral Venous thrombosis (CVT), also called cerebral venous sinus thrombosis (CVST),is venous thrombosis of dural venous sinuses, and cortical veins form a distinct subgroup of cerebrovascular disease. It is one of the commonest causes of stroke in young people in India.Banerjee et al., in an autopsy series in the late 1980s, found that CVST accounted for almost 10% of all strokes in India.[1]Venous occlusion results from changes in blood stasis, vessel wall abnormalities, and blood composition (Virchow's triad), leading to an imbalance between pro-thrombotic and fibrinolytic processes, predisposing to progressive venous thrombosis. Obstructing venous vessels induces increased venous pressure, reduced capillary perfusion, and locally increased cerebral blood volume. Although initially compensated for by the dilatation of cerebral veins and the recruitment of collateral vessels, continued elevation of venous pressure can cause vasogenic edema (due toblood-brain barrier disruption) and decreased cerebral perfusion pressure and cerebral blood flow with

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tissue infarction; thus, both cytotoxic and vasogenic edema can occur.[2]

Further disruption of the blood-brain barrier with parenchymal hemorrhage or hemorrhagic infarction.[3]The etiology, risk factors, and pathogenesis of CVST are being analyzed in various studies.Thus, in the present study, we have evaluated the clinical profile of cerebral venous thrombosis in patients diagnosed to have thrombosis of dural venous sinuses or cortical veins by imaging.

MATERIALS AND METHODS

The cross-sectional study was done from data of patients admitted and treated in a tertiary care government hospital of Kilpauk Medical college between August 2021 to July 2022 and diagnosed with thrombosis of dural venous sinuses or cortical veins by imaging. All the patients included in the study were subjected to brain computed tomography (CT)scan,magnetic resonance imaging (MRI)with MR arteriogram, and MR venogram. In a few cases with a CT angiogram,a venogram was done where MRV forsuspected venous sinus thrombosis or cortical vein wasnot identifiable. We did not include arterial infarcts, intracerebral bleeding due to other causes, and postpartum women having cerebral venous thrombosis.

We have collected data from the patient's history regarding attributable risk factorsand by an evaluation which included routine complete blood count and peripheral smear. The haematologydepartment screened the patient's blood for inhibitors that could contribute to this thrombophilic state protein C protein S and inhibitors. The patients also had serum homocysteine levels and autoimmune workup forantinuclear antibody (ANA), antiphospholipid antibody, anticardiolipin antibody, Beta 2 glycoprotein,and Extractable nuclear antigen screening(ENA). Basic Screening for internal malignancy was doneby ultrasonogram and imaging. In patients having peripheral polycythemia smear, serum erythropoietin levels were done.The usual line of management as per literature was followed,and the patient's recovery status at discharge was assessed.Data were presented as frequency and percentage.

RESULTS

Of the 50 cases, 34 were male, and 16 were female.The age and sex distribution are shown in table 1. More cases were in males and females in the 31 to 40 age group, followed by the <30 age group [Table 1].

Table 1: Distribution of male and female patients according to age groups

Age	Male	Female	Total	Percentage
<30	5	7	18	36
31-40	22	5	19	38
41-50	4	2	7	14
51-60	1	1	2	4
>60	3	1	4	8

Patients with venous thrombosis of the cerebral venous system have presented with the following clinical features, as shown in [Table 2]. Headache and seizure were the most common presenting clinical feature accounting for 92% and 80%, respectively. The duration of headaches had been longer in many patients.However, in 64%, 36%, and 24% of cases, lateral rectus restriction, motor weakness, and papilledema were seen.Clinical features like aphasia, sensory deficit, and coma are seen in the least number of patients [Table 2].

Table 2: Various clinical features and risk factors among male and female patients

		Male	Female
Clinical features	Headache	35	11
	Seizure	30	10
	Papilledema	8	4
	Aphasia	5	1
	Lateral Rectus restriction	24	8
	motor weakness	14	4
	Sensory deficit	3	1
	Coma	8	1
Risk factor association	Anaemia	3	9
	Polycythemia	13	0
	Hyperhomocysteinemia	8	2
	Thrombophilic -Protein C, S deficiency	1	1
	Alcoholism	29	0
	Infection-related	2	1
	Autoimmune association	4	6
	malignancy	2	
	No identifiable cause	10	8
	Combination	7	5

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Attributable risk factors,alcoholism in 58%of cases,polycythemia in 26%of cases, anemia in 24%of cases,and hyperhomocysteinemia in 20%of cases, weremore commonly seen. Among autoimmune causes, antiphospholipidpositivity and inhibitors were identifiable in 8% of cases.The pro-thrombotic tendency with protein Sdeficiency was seen in 4% of cases, including one acquired versus innate cause with post varicella zoster infection.Associated risk factor of internal malignancy in 4% of cases. But in 36% of cases,no attributable cause could be identified [Table 2].

The imaging pathology identified imaging had been hemorrhagic infarction in 58%of cases, followed by bleeding alonein 18% of cases and edema in 12% of cases [Table 3].

Table 3: Imaging findings, site, and MRS among all the patients

		Number of cases	Percentage
Radiological manifestation	Hemorrhage parenchymal alone	9	18
	Hemorrhage with SAH SDH	4	8
	Hemorrhagic infarct	29	58
	Edema	6	12
	No change identified	5	10
Site	Superior sagital sinus	18	36
	Transverse and sigmoid	16	32
	Deep-set cerebral veins	2	4
	Isolated cortical vein	4	8
	Combination/mixed	5	10
MRS	0	34	68
	1	7	14
	2	3	6
	3	1	2
	4	1	2
	5	0	0
	6	4	8

The site of occlusion superior sagittal sinus was more commonly involved in 36% of cases, followed by transverse and sigmoid in 32%of cases, deep venous set in 4%, isolated cortical vein in 8%, and combination of sinuses in 10% of cases.

Concerning the patient's outcome at discharge, about68% had recovered with no symptoms of MRS 0, 14% had no significant disability with MRS1,6% had a slight disability with MRS 2, and 4% had moderate to the severe disability with MRS 3-5.Moreover, 8% had expireddue to mass effects due toa larger volume of hemorrhage or hemorrhagic infarction or its complications despite treatment. The overall outcome was better in most of the cases. About 6 to 10%of patients had protracted recovery with a longer hospital stay and rehabilitation duration.

Regarding recanalization,about 44%had near complete recanalization at about six months, with the remaining56% having partialrecanalization of affected sinuses [Table 4].

Table 4: Recanalization of the patient at six months

Recanalization at six months	Partial	Percentage	Complete	Percentage
At six months	22	44	28	56

In our study, three patients who were not compliant and regular with the treatment had worsening cerebral venous thrombosis, including death in one patient [Table 5].

Table 5: Recurrence rate in patients

Recurrence	Partial	Anticoagulation compliant	Anticoagulation Noncompliant	Percentage
From 6 months- 1 year	3	0	3	6

DISCUSSION

In our study, the number of male patients was higher, and most of the patients were in the younger age group. In the literature,multiple studies have variably mentioned male preponderance and female preponderance. In our study, the male majoritymay be due to the non-inclusion of puerperal CVST and more alcoholism and associated metabolicand nutritional risk factors in males.Regardingmanifestations,CVST-related headache does not have specific diagnostic features, though it is usually progressive in onset (hours or days).[4]It issuggested that neuroimaging should be performed in the presence of red flags for CVST, including new-onset and persistent headaches.[5]Next to headaches, seizures are more frequently observed in this study. Kalitaet al.[6]found that only a supratentorial parenchymal lesion on MRI was independently associated with a higher risk of presenting seizures.[6,7]

Regarding attributable risk factors, alcoholism is also known to predispose an individual to a pro-thrombotic state; hence,CVST is increasingly reported in such individuals. Alcoholism led to a

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state of dehydration and hyperviscosity and increased platelet reactivity.[9,10]

Pro-thrombotic condition, otherwise called thrombophilic tendency, is also a common risk factor identified for CVST.In the ISCVST cohort, a pro-thrombotic condition was found in 34% of all patients. A genetic pro-thrombotic condition was found in 22% of all patients.11Rajiv etal.8have proposed a comprehensive thrombophilia panel (inherited and acquired).[8-12] weeks after stopping anticoagulation, protein C levels,protein S (free) levels,antithrombin levels, Factor VIII Lupus anticoagulant, andserum homocysteine levels are likely to be affected by the acute thrombotic state or the use of anticoagulants.[12-15]

Polycythemia is a disorder that is caused by a variety of etiology. Cigarette smoking creates a unique condition of combined polycythemia secondary to chronic hypoxia.[9,10]anemia, especially when caused by iron deficiency, can sometimes lead to thrombocytosis.[13]The cause of the anemia cases in this case series may be nutritional or autoimmune etiology unidentified.Cerebral venous thrombosis is multifactorial, and identifying one risk factor should not deter the clinician from searching for more causes. Narayan et al. reported 18.2% of patients had multiple risk factors in their study from South India.[16]In our study,24% of patients had a combination of risk factors.

Regarding radiological manifestation, hemorrhagic infarction was more commonly seen than bleeding in this group of cases. The lesion volume is related to the development of collateral veins in the affected venous segment. Venous hypertension from a poor outflow can lead to edema, cerebral venous infarction (~50% of cases), and hemorrhage. Superior sagittal sinus or the dominant transverse sinus thrombosis can affect the arachnoid granulation's absorption of cerebrospinal fluid, and a consequent increase of cerebral swelling may occur.[17]

Regarding outcome,most patients who recover completely achieve relative independence, usually expressed as between 0 and 2 on the modified Rankin Scale (mRS). However, mild residual symptoms, such as headache, motor deficits, linguistic difficulties, and impaired vision or cognition, often remain. Only 5–10% of patients who survive the acute phase remain moderately or severely dependent (mRS 3 or 4).However, this proportion increases to 34% in those with massive CVST.[18] In our study,the majority were in the recovery status of MRS 0 to MRS 2, consistent with previous studies.

The overall incidence of recurrent venous thrombosis within the first year after a first episode of CVST is estimated at around 4 per 100 patient-years that of recurrent CVST is 0.5% to 2.2%. Notably, the male sex is associated with a 7-fold increased risk of recurrence.Cohort studies on long-term evaluation of the risk of recurrent thrombosis after anticoagulant therapy discontinuation showed higher figures in the first period (5.0%, 2.6%, and 1.7% patient-years in the first, third, and tenth years after discontinuation.[19,20] In our study, non-continuation of treatment also had a recurrence and worsening of cerebral venous thrombosis in 6% of cases.

CONCLUSION

Cerebral venous thrombosis is a complex disease with a large and variable clinical spectrum and various signs and symptoms. Cerebral venous thrombosis is still the most common cause of treatable and reversible cause of stroke with modifiable risk factors in young people. With a high index of suspicion and improved imaging techniques, the overall and long-term prognosis is excellent. Alcohol use is one of the most important modifiable risk factors associated with this condition. The current study tried to highlight some information about the risk factors and clinical manifestations in the study population, and further studies from our country are required to provide a better perspective of this clinical condition.

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