

# Clinical and Etiological Profile of Cerebral Venous Sinus Thrombosis

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## ABSTRACT

**Introduction:** Cerebral Venous Thrombosis is an important cause of stroke in the young. The importance of recognising this condition is that it carries a good prognosis if recognised and treated early. Study objective was to analyse the clinical and etiological profile of Cerebral Venous Sinus Thrombosis.

**Material and Methods:** Prospective cross sectional study in patients attending OPD or emergency at a tertiary referral centre in eastern Tamilnadu with history suggestive of CVT and in whom the diagnosis of CVT confirmed by imaging of brain (MRI and MRV) were included in the study after meeting the inclusion criteria

**Result:** Among the 33 patients included in the study, majority affected were young males, most common clinical presentation was headache and most common sinus involved was superior sagittal sinus. Pro thrombotic state was observed in 27% of cases and alcohol addiction was found to highly prevalent in the study population.

**Conclusion:** Cerebral Venous Thrombosis is found to be significantly high in males and alcoholics. Compared to other Indian studies there was not much disparity in clinical profile and risk factors.

**Keywords:** Papilledema, Cerebral Venous Thrombosis, MR Venogram, Young Stroke

## INTRODUCTION

Cerebral venous sinus thrombosis (CVT) forms a distinct subgroup of cerebrovascular disease and is one of the commonest causes of stroke in young people in India. Etiology and Prevalence of CVT are yet to be understood although various risk factors implicated in the pathogenesis have been described. Bousser et al in 2007 in a study estimated that CVT occurs in 5 persons per million and contributes to 0.5% of all strokes.<sup>1</sup> Banerjee et al in an autopsy study of stroke in India estimated around 10% incidence of CVT in all patients with stroke.<sup>2</sup> The first description of CVT, appeared in the French literature in 1825. Ribes gave description of a 45-year old man who had symptoms of severe headache, epilepsy, and delirium for 6-months, who was later found to be a case of CVT.<sup>3</sup> Although it was recognized in the early part of the nineteenth century it still remains an arduous diagnostic and therapeutic challenge for the clinician because of unpredictable and misleading clinical presentation of this condition. The causes of this condition can be countless and often tricky to diagnose. For the last few decades infective causes have become much infrequent and is responsible for only 8% of cases. Amongst the non-infective causes, systemic conditions such as connective tissue diseases, other granulomatous or inflammatory disorders and malignancies are most common.

In young women, CVST occurs more frequently during the puerperal period than during pregnancy. Recent evidences have shown that Oral contraceptives and various coagulation disorders have frequently been implicated as a cause for CVT. Hereditary prothrombotic conditions such as Factor V Leiden mutation, deficiency of proteins C and S and AT III as well as prothrombin gene mutation also have been implicated. Alcoholism is also known to predispose an individual to a prothrombotic state and hence CVT is increasingly reported in such individuals. Alcoholism leads to a state of dehydration and hyper viscosity and increasing platelet reactivity. Though earlier studies have reported higher mortality, recent studies have reported lesser mortality due to earlier diagnosis, increased awareness and management. Diagnosis of this condition requires a high index of suspicion and hence it is important to study its clinical profile. Study objective was to analyse the clinical and etiological profile of Cerebral Venous Sinus Thrombosis.

## MATERIAL AND METHODS

The study was conducted during the period of July 2018 to July 2019. This prospective cross sectional study was done in 33 patients who were clinically suspected as CVT. The study was conducted in a tertiary care referral centre in eastern Tamilnadu. All the patients included in the study were subjected to MRI brain with MR venogram. Patients attending OPD or emergency with history suggestive of CVT and in whom the diagnosis of CVT confirmed by imaging of brain (MRI and MRV) were included in the study. Patients with inconclusive evidence on imaging, hypertensive haemorrhage, arterial stroke, Puerperal CVT, metabolic encephalopathy and presence of intracranial space

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occupying lesions on imaging were excluded from the study. A pre-tested proforma meeting the objectives of the study was used for collecting the data. Informed written consent was taken after explaining the objectives of the study. Detailed history was taken with respect to clinical features, substance abuse and alcohol addiction. Routine blood investigations along with MRI Brain with Venogram was done for all the patients. Detailed physical examination for any evidence of anaemia, dehydration, sepsis, DVT of leg and neurological examination by two neurologists blinded to the imaging and findings of other was carried out.

## RESULTS

A total of 33 patients were included in the study. Age group ranged from 18 years to 54 years with majority less than 40 years (87.8%) The youngest patient was 18 years and the oldest was 54 years of age. There were 26 males and 7 females. The most common clinical presentation was headache which was present in 69.7%. Majority of the patients (86.9%) had headache which was short lasting – i.e. less than a week. The common type of headache was holocranial diffuse type (78.2%) followed by localized headache (13.04%) and thunderclap headache (8.6%). Vomiting was present in 25 patients (75.7%). Seizures was observed in 39.4% of the patients. The generalized tonic clonic seizure type was the most common semiology observed (76.9%). 2 patients had focal seizures and one had status epilepticus. Aphasia was observed in 9.1% and all of them were brocas aphasia. Motor weakness was observed in 12 patients (36.4%). Most common pattern of weakness observed was hemiparesis (66.6%) followed by monoparesis. 8 patients had altered sensorium at the time of presentation. Sensory symptom was present in 15.2% of patients, of which numbness was the predominant sensory symptom (80%) followed by loss of sensation in 1 patient. Papilledema was observed in 15 patients (45.5%) out of which majority had mild degree of papilledema (60%). Fever was present in only 3 patients (9.1%). Cranial Nerve involvement was noted in 21.2%. Most common cranial nerve affected was unilateral 6 th Nerve palsy (57.1%) followed by facial (28.5%) and ninth and 10 th palsy in one patient. Addictions were observed in 27 patients (81.8%) out of which 72.7% were chronic alcoholics. 60.6% of the patients were addicted to cigarette smoking / tobacco chewing. 3 patients (9.1%) were IV drug abusers. Among Alcoholics 51.8% were heavy drinkers, 33.33% were moderate drinkers and 14.8% were light drinkers. All patients had venous sinus thrombosis in MR venography. Many patients had multiple venous sinus involvement and Superior sagittal sinus was noted to be the most common sinus involved (81.8%) followed by transverse sinus (69.7%) – Figure 1. Anaemia was observed in 71.8% of the patients out of which 33% were severely anaemic according to WHO classification. No specific etiological diagnosis could be found in majority of the patients (42.4%). Pro-thrombotic state was found in 27.3% of the patients and infection as a probable aetiology was observed in 18.2% of the patients. 3 patients were eventually found to have malignancy. 18.2%

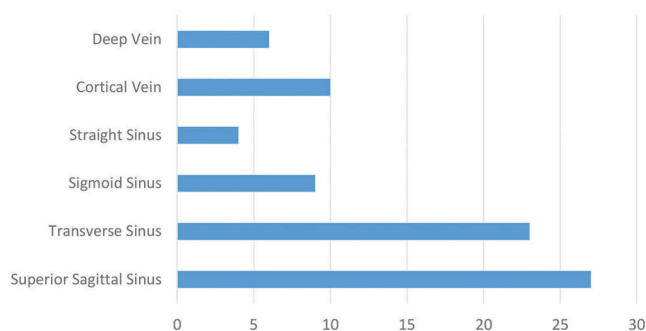


Figure-1: Venous System involvement in CSVT

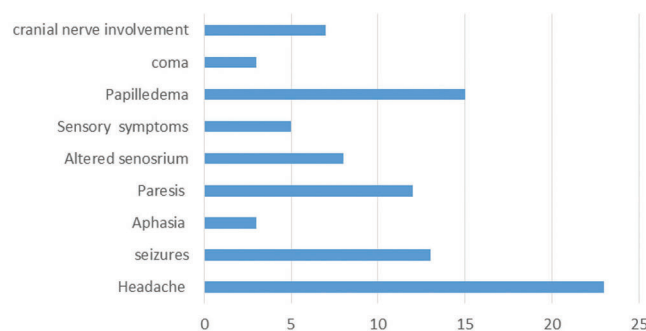


Figure-2: Clinical Profile of CVST

of the patients were found to be APLA positive. Combined protein C & S deficiency was present in 6.1% of the patients. Other hypercoagulable states were observed in 9% of the patients. Clinical Profile of CVST is summarised in Figure 2.

## DISCUSSION

In contrast to arterial stroke, cerebral venous sinus thrombosis often occurs in young individuals. The varying symptoms and presentations makes it often a diagnostic challenge unless the treating physician has a high index of suspicion. Modern imaging techniques has significantly improved the detection rates of CVT. If coupled with appropriate lab investigations like pro-coagulant workup the etiological enigma to an extent is solved. We compared our experience of CVST, highlighting its manifold clinical presentations, varied predisposing factors, and Neuro-imaging with other studies. We have excluded puerperal CVT because a lot of studies have investigated this association already, instead we focused on other possible causes and associations of CVT. The majority of study population belonged to the less than 40 years with a mean age of 31.2 which is in accordance to various Indian studies.<sup>4,5</sup> Headache is the commonest and many a times, the earliest symptom of CVT. In our study headache was seen as the initial and most common symptom (69.7%) which closely resembles the NIVSR cohort (88.3%).<sup>6</sup> Headache had varied presentations like acute, sub-acute, chronic or thunderclap-like presentation. In most of the cases (86%), headache precedes the development of all other features by at least a week. The most commonly postulated theory on headache in CVT is due to over stretching of nerve fibers in the walls of the blocked sinus and local inflammation of the involved sinus. The holocranial diffuse type headache (78.2%) in our study may be due to multiple

sinus involvement in most of our patients. Various studies have proved that except for the olfactory nerve, any other cranial nerves can be involved in CVT. In a hospital based study Pai et al. reported 7.3% of patients having cranial nerve palsies.<sup>4</sup> In our study group cranial nerve palsies were surprisingly higher -21.2%. This may be due to late detection of CVT since most referring physicians were prompted to investigate only after a cranial nerve palsy and ours being a tertiary referral institute usually receives complicated cases. In comparison to arterial stroke the rate of seizures in CVT is far high (35-50%).<sup>7</sup> Our Observations also yielded similar results - 39.4% of the patients had seizures. It was no surprise that we had a higher ratio of male patients as we excluded the puerperal cases. All previous studies a decade or two ago except a series of 110 proven CVT by Parikh et al from India reported a higher proportion of women with CVT.<sup>8</sup> There is a recent change of trend in gender affection in CVT as reported by Narayan et al<sup>5</sup> which plausibly related to the change in gender trends and better obstetric care.

Focal neurological deficit can occur in CVT depending on the area involved. In our study 36.4% had focal neurological deficit of which hemiparesis was the most commonly observed Focal neurological deficit (66%). In various Indian studies by Pai et al., Narayan et al., Parikh et al and in western studies by Wassay et al. Ferro et al the percentage of focal deficit ranged from 25 to 47%.<sup>6-9</sup> Sensory symptoms observed in our study was also comparable to other studies like that of Ferro et al which reported about 5%.<sup>6</sup> Papilledema was present in about 45.5% of the patients and 60% had only grade 1/2 papilledema. In various Indian studies by Pai et al., Narayan et al., Parikh et al the percentage of papilledema ranged from 29 to 64%. Papilledema is usually seen in chronic cases and in those with delayed presentation and our values were accounted to the delayed presentation of most of the cases. Among various addictions alcoholism (72.7%) followed by cigarette smoking (60.6%) was very high in our study population. Alcohol abuse has not been consistently found to be a risk factor for ischaemic stroke and also CVT.<sup>10,11</sup> Heavy drinking might lead to stroke by sympathetic surge leading on to paroxysmal hypertension, cardiac arrhythmias and hypercoagulability. Alcoholism especially heavy drinking contributes to CVT by creating a state of dehydration, hyper viscosity and increasing platelet reactivity.<sup>11</sup> 51.8% the alcoholics of our study group were heavy drinkers but on statistical evaluation we couldn't find a significant association (P=0.87) between the increased daily consumption and seizure at presentation. This is because binge drinking is a more potent risk factor than daily consumption. In many studies it has been proved that moderate alcohol consumption seems to have a protective effect and in many a cases acute alcoholic intoxication leads to stroke like presentation.<sup>12</sup> All the alcoholics in our study group had a binge of alcohol in the previous 3 days to presentation. Superior sagittal sinus was noted to be the most common sinus involved (81.8%) followed by transverse sinus (69.7%) in our study. Our observations were similar to the International study on cerebral vein and

dural sinus thrombosis, where they reported superior sagittal sinus (62%) & transverse sinus (42%) as the most common sinuses involved.<sup>6</sup> Pro-thrombotic state is identified as most common cause for unprovoked CVST in published literature throughout the world. The prevalence range from 34% in the International study on Cerebral Venous Thrombosis (ISCVT) cohort to 12-18% in Indian studies.<sup>4</sup> Our study showed similar observations to the above studies- Pro thrombotic state was found in 27.3% of the patients. It could be still higher as the financial constraints didn't allow us to do complete panel in some patients. In the ISCVT cohort, overall 34% had pro thrombotic state and 22% genetic pro thrombotic state. In a study by Pai et.al the most common pro thrombotic state in India was Protien C deficiency but in our study we got APLA as the common pro thrombotic state.<sup>4,13</sup> All the APLA positive patients were later found to be positive for various Connective tissue disorders.

## CONCLUSION

Cerebral Venous Sinus Thrombosis still remains the most common cause of treatable and reversible causes of stroke in young. Clinical presentation is varied and with a high index of suspicion and newer imaging modalities the long term prognosis is excellent. Among the preventable risk factors alcohol consumption of foremost importance which many studies failed to identify. The present study evaluates common risk factors and clinical presentations pertaining to our population and we need more studies in future from our country to prevent and treat CVT better.

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