

Clinical profile and Outcome of Cortical Venous Sinus Thrombosis at a tertiary care centre

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Abstract

Background: Cortical Venous Sinus Thrombosis (CVST) is known to be a cause of stroke especially in the young population. It has a multifactorial etiology with a varied presentation. Given the increasing burden of this disease and availability of magnetic resonance imaging for definitive diagnosis, a high level of clinical suspicion must be kept in mind while evaluating such patients.

Materials and Methods: This study was a retrospective observational study conducted over a period of 1 year (1st August 2017 to 31st September 2018) in the medicine department of a Tertiary care teaching and research center. 36 patients admitted with varying complaints and diagnosed to have CVST on magnetic resonance venography were included. Patients were treated according to standard protocols and guidelines.

Results: Of the total of 36 patients, 31 (86.11%) were males and 5 (13.89%) were females. The average age of the patients was 35.28 ± 14.31 years, the maximum being in the age group of 21-30 years [10 patients (27.28%)]. 12 (33.33%) patients were farmers by occupation. The months of April and May had higher number of patients [5 (13.89%) each]. Headache was the most common presenting complaint [33 (91.67%) patients], followed by seizures [24 (66.67%) patients] followed by vomiting [17 (47.22%)] and hemiparesis [15 (41.67%)]. 10 (27.78%) patients had papilloedema on presentation. Most common sinus involved was transverse sinus [35 (97.22%)] followed by sigmoid sinus [22 (61.11%)], and sagittal sinus [19 (52.78%)]. Multiple sinus involvement was seen in 29 (80.56%) patients. Midline shift due to mass effect was seen in 11 (30.56%) patients. The average midline shift was 5.2 ± 2.2 mm. 2 (5.56%) patients underwent surgery i.e. decompression craniectomy. Total of 2 (5.56%) patients died during this study. The average duration of hospital stay was 8.9 ± 3.07 days. 23 (63.89%) patients were alcoholic; 13 (36.11%) patients had history of dehydration in the form of working more than 6 hours in the sun, noon travelling, acute gastroenteritis, significantly decreased oral fluid intake. 10 (27.78%) patients were anemic. 3 (8.33%) patients had evidence of infection in the form of CSOM or fever. Of the 7 patients that did serum homocysteine levels, 5 (71.43%) had increased levels. Of the 5 female patients, 2 (40%) had recent history of consumption of oral contraceptive pills (OCPs) and 1 (20%) was peripartum.

Conclusion: The present study was a retrospective observational study conducted at a tertiary care center. It showed a male predominance for disease at our centre with an average age of 35.3 years. Most of the populations were farmers, alcoholics, mostly affected during the summer months of April and May. In females, OCPs were an important risk factor. Headache and seizures were the most common presenting features. Transverse sinus involvement was commoner as was multiple sinus involvement. Overall mortality was 5.56% affecting persons with multiple sinus thrombosis. CVST is a treatable cause of acute stroke having a better prognosis than arterial strokes and therefore, a high index of clinical suspicion must be kept while dealing with such patients.

Keywords: Cerebral Venous Sinus Thrombosis, headache, seizures, dehydration, transverse sinus

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I. Introduction

Cortical Venous Sinus Thrombosis (CVST) is a known cause of stroke in the young population affecting nearly 5 persons per million¹. It is said to be the cause of 0.5% of all strokes¹. It has a widely varying presentation with headache usually being the most common symptom². Other presenting symptoms are seizures, hemiparesis, papilloedema, impairment of the level of consciousness. Prothrombotic states like autoimmune diseases, malignancies, nephrotic syndrome, coagulation disorders, pregnancy, oral contraceptive pill use, predispose to CVST as also dehydration³ – a more likely cause in our country. Infection as a cause of CVST has

been decreasing. In many cases, the etiology may be unknown even after a battery of investigations⁴. Magnetic resonance venography is the preferred mode of definitive diagnosis. Mortality rates are around 4.39%⁵ - relatively low as compared to arterial stroke. Therefore, an early diagnosis, requiring a high degree of clinical suspicion will further reduce morbidity and mortality, improving clinical outcomes.

II. Objectives

The aim of this study is to investigate the risk factors, demographic profile, clinical presentation, radiological features and outcomes in the patients admitted and diagnosed with CVST.

III. Material and Methods

It is a retrospective observational study, conducted over a period of 1 year (1st August 2017 to 31st September 2018) in the Medicine Department of a tertiary care hospital and research centre. Approval from the ethics committee of the hospital was obtained.

Patients included were:

All patients above the age of 12 years, admitted in the ward or ICU and diagnosed as CVST on MR Venography.

Patients who took discharge against medical advice were excluded.

A total of 36 patients were included in the study. Data of these patients was analyzed and results obtained. All patients were managed as per standard guidelines. Basic investigations such as hemogram, renal and liver function tests, serum electrolytes, were done in all patients; Serum homocysteine levels were done only in 7 patients due to financial constraints. Patients received hydration, anticonvulsants, anticoagulants, decongestive agents and other clinically indicated treatment as per usual protocols. Those requiring decompressive craniotomy underwent the same.

IV. Results

Figure no. 1: The mean age of patients was 35.28 ± 14.31 years. Out of a total 36 patients, 10(27.78%) patients were in the age group of 21-30 years. Males were 31(86.11%) and females were 5(13.89%). Male: Female ratio was 6.2:1. Of the males, 9(29.03%) were in the age group of 21-30 years followed by 7(22.58%) in the age group of 41-50 years. 3(60%) of the 5 females were in the age group of 41-50 years.

Figure no. 1: Age and Sex distribution of patients

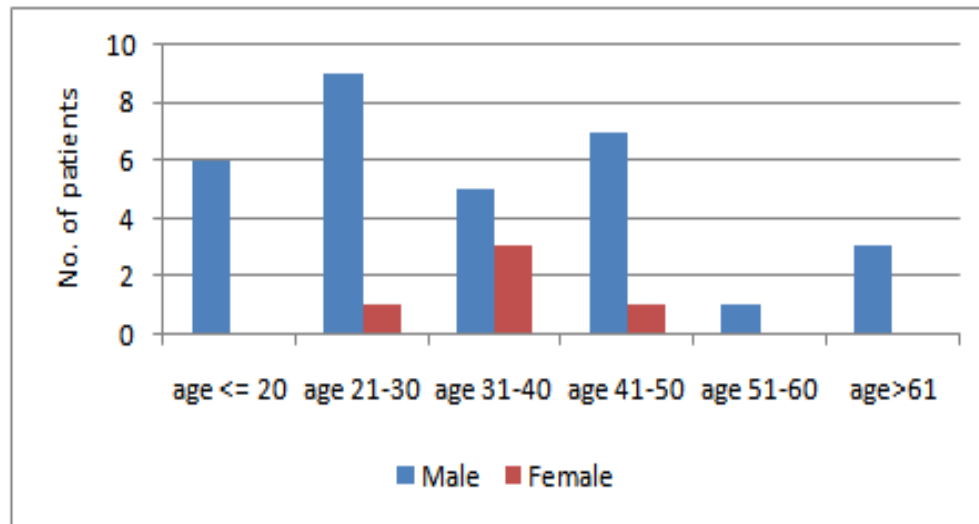


Figure 2: 12(33%) patients were farmers by occupation, most having history of extensive physical exertion in the sun. 8(22.22%) were students, out of which 3(37.5%) had history of preceding dehydration and 3(37.5%) of them had history of alcohol binges and 1(12.5%) had CSOM (chronic suppurative otitis media). 6(16.67%) patients were drivers.

Figure no. 2:Occupation of the patient population

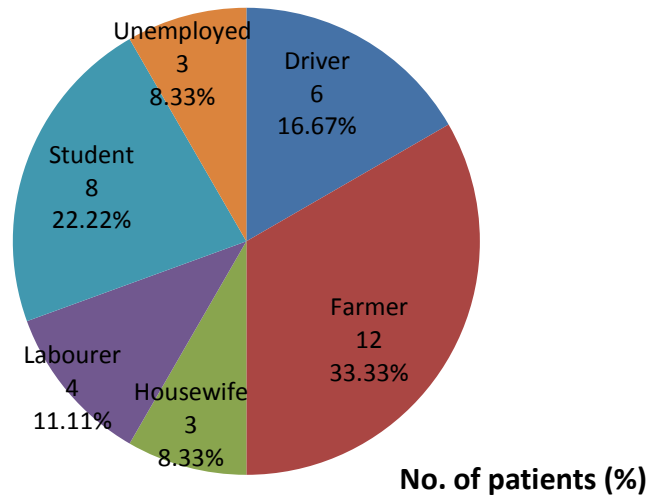


Figure no. 3: 13(36.11%) of patients had incidence in the summer months of March, April and May. Of these, 6(60%) had daily occupational work in the sun for most of the day. This was followed by 4(11.11%) patients each in June, September and October, the relatively warmer months in our country.

Figure no. 3:Seasonal distribution of patients

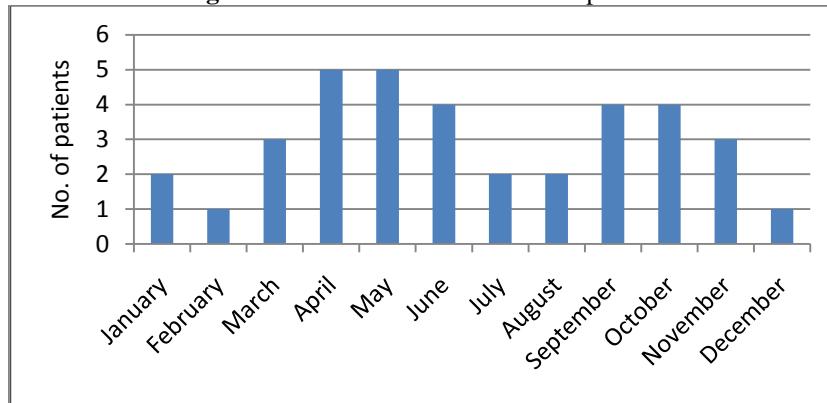


Table no. 1:The most common presenting complaint was headache present in 33(91.67%) patients followed by convulsions in 24(66.67%) patients. Other presenting complaints were vomiting in 17(47.22%) patients, hemiparesis/hemiplegia in 15(41.67%) patients and altered sensorium with slowing of responses in 7(19.44%) patients. Papilloedema was present in 10(27.78%) patients.

Table no. 1:Clinical presentation of the patients

Symptom and Sign	No. of pts	%
Headache	33	91.67
Convulsions	24	66.67
Vomiting	17	47.22
Hemiparesis/ Hemiplegia	15	41.67
Papilloedema	10	27.78
Altered sensorium	7	19.44

Table no. 2: 23(63.89%) patients had history of alcohol consumption prior to event; 13(36.11%) patients had preceding history of dehydration in the form of in the form of working more than 6 hours in the sun, noon travelling, acute gastroenteritis, significantly decreased oral fluid intake. 2(5.56%) patients had CSOM and 1(2.78%) had orbital cellulitis leading to cavernous sinus thrombosis. 2(40%) of the women had history of consumption of Oral Contraceptive Pills(OCPs), and 1(20%) was peripartum. 5(71.43%) out of 7 patients that did the test, had hyperhomocysteinemia.

Table no. 2: Risk factors in the patient population

Predisposing Condition	No. of pts	%
Preceding h/o dehydration	13	36.11
Alcohol binge	23	63.89
CSOM	2	5.56
Orbital cellulitis	1	2.78
Women consuming OCPs	2 (out of 5)	40% (of women)
Peripartum women	1 (out of 5)	20% (of women)
Anemia	10	27.78
Hyperhomocysteinemia (out of 7)*	5	71.43

*Only 7 out of 36 patients had done serum homocysteine levels due to financial constraints.

Table no. 3: The most common sinus involved was transverse (97.22%) followed by sagittal (52.78%). Multiple sinus involvement was seen in 29(80.56%) of patients.

Table no.3 : Venous sinus involved in the study population

Sinus	No. of pts	%
Transverse	35	97.22
Sagittal	19	52.78
Sigmoid	22	61.11
Straight	6	16.67
Cavernous	1	2.78
Multiple sinus	29	80.56

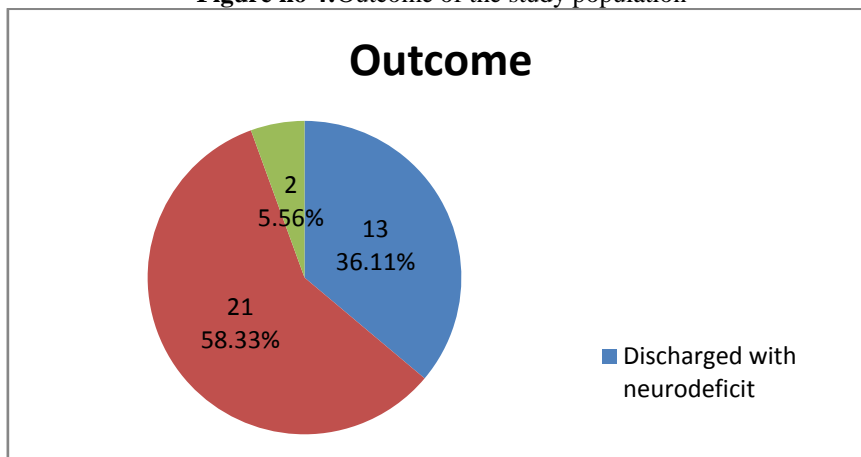
Table no. 4: The average duration of hospital stay was 8.39 ± 3.07 days. Midline shift due to mass effect was present in 11(30.56%) patients. The average midline shift was 5.2 ± 2.2 mm. 2(5.56%) patients required decompressive surgery.

Table no. 4: Midline shift on CT, and requirement of surgery

Midline Shift present	11 pts (30.56%)
Average midline shift	5.2 ± 2.2 mm
Decompressive surgery required	2 pts (5.56%)
Average duration of hospital stay	8.39 ± 3.07 days

Figure no 4: 2(5.56%) patients died out of which 1 was post op decompressive craniotomy. 21(58.33%) patients were discharged with a neurodeficit (hemiparesis or hemiplegia) and 13(36.11%) patients were discharged asymptomatic.

Figure no 4: Outcome of the study population



V. Discussion

CVST is emerging to be an increasingly common cause of stroke and seizures in young patients, probably more in the developing countries.

The pathogenesis of CVST is not clearly understood. The thrombosis of cerebral veins or dural sinus causes obstruction of blood drainage from the brain leading to vasogenic edema and leakage of plasma into the interstitial space. There is associated decreased absorption of the cerebrospinal fluid leading to elevated intracranial pressure¹⁷. Hemorrhagic infarctions may occur in approximately 10–50% of cases, principally affecting the cortex and adjacent white matter². The clinical presentation is diverse as discussed above. A large number of patients have complete resolution of their neurological deficit, suggesting that there is majorly reversible tissue damage. Risk factors are multiple and varied, and a given patient may have more than one. MRI with MR venography has replaced CT as the diagnostic tool of choice. In many cases, a CT tends to have been done first, simply because of availability. CT may be normal or show the ‘empty delta sign’, reflecting opacification of the collateral veins in the walls of the superior sagittal sinus¹⁸.

Here, we compare the data of our study, with other Indian [Table no. 5] and Western studies [Table no. 6].

Table no. 5:

	Khoysa S (2015)	Pazare et al (2018)	Narayan et al (2012)	Present study (2018)
Duration of study	6.5 years	1.5 years	8 years	1 year
Type of study	Retro+prospective	Prospective	Prospective	Retrospective
No. of patients	50	71	428	36
Mean age	27.74	38.25	31.3	35.28
Male : Female	30:41	3:2	1.17:1	6.2:1
Headache	85%	89.47%	88.3%	91.67%
Seizures	58%	63.15%	39.9%	66.67%
Vomiting	42%	71.92%	69.6%	47.22%
Papilloedema	42.7%	31.57%	63.4%	27.78%
Hemiplegia/paresis	29.6%	63.15%	25.3%	41.67%
Peripartum	40.80%	-	9.8%	2.67%
OCPs	9.80%	-	11.4%	5.56%
Infection/fever	28%	14.03%	2.1%	8.33%
m.c. sinus	SSS (82%)	SSS(80.76%)	SSS (54.3%); trans(47%)	Transverse(97.22%)
Alcohol	-	-	15.6%	63.89%
Anemia	60.56%	-	18.4%	27.78%
Surgery	1.4%	-	3.7%	5.56%
Mortality	2.8%	14.03%	7.7%	5.56%
Complete recovery	-	52.63%	52.8%	58.33%

Table no. 6:

	Algherbauwe et al¹⁹ (2011)	Wasay et al (2008)	Ferro et al (2004)	Present study (2018)
Duration of study	4 years	10 years	8 years	1 year
Type of study	Retrospective	Retro +prospective	Prospective	Retrospective
No. of patients	43	182	624	36
Mean age	34.4 years	38 years	39 years	35.28 years
Male : Female	2.07:1	2:3	1:3	6.2:1
Headache	95.3%	71%	88.8%	91.67%
Seizures	37.2%	32%	39.30%	66.67%
Vomiting	55.8%	-	-	47.22%
Papilloedema	25.5%	32%	28.30%	27.78%
Hemiplegia/paresis	25.5%	41%	37.2%	41.67%
Peripartum	9.3%	32%	20.10%	2.67%
OCPs	9.3%	5%	54.5%	5.56%
Infection/fever	30.2%	14%	12.3%	8.33%
Dehydration	-	-	1.9%	36.11%
m.c. sinus	SSS (83.7%)	-	SSS(62%)	Transverse(97.22%)
Surgery	1.4%	-	1.4%	5.56%
Mortality	4.6%	13%	8.3%	5.56%

In a study by Paiet al⁶ the, the male to female ratio was 3.2 and mean age 31.3 years. Another study by Wasayet al⁷ had a population showing mean age of 38 and 60% females. The present study showed an average age of 35.28 years and was majorly male dominated with a ratio of 6.2. The reason for this may be related to the risk factor profile of this particular population and needs to be further studied.

Headache was the most common symptom in our study (91.67%), comparable to a study by Halesha et al⁸. Convulsions were present in 66.67% patients, similar to a study by Kumar et al⁹ (69%). Altered sensorium was present in 19.44% patients and papilloedema in 27.78% in this study, while a study by Bousseret al¹ reported as 26% and 31.57% respectively. Focal neurological deficit was present in 41.67% patients, much lesser than the study by Kumar et al(66%)⁹ but more than the study by Daif et al¹⁰ (27%), thus indicating the wide variation in presentation.

Prakash et al¹¹ and Daif et al¹⁰ reported that the most common involvement in CVST was superior sagittal sinus (72%), but in our study transverse sinus involvement(97.22%) was most common followed by sigmoid sinus(61.11%). Most of the existing studies show superior sagittal sinus having most common involvement.⁸

Narayan et al¹² found alcoholism as a risk factors in 15.6%, (stating that alcohol contributes to thrombosis by dehydration, hypercoagulability, and reactive thrombocytosis), oral contraceptive pill (OCP) intake in 11.4%, postpartum state in 9.8%. The same study also found anemia to be a risk factor in 18.4% of patients. The present study showed 63.89% alcoholism, 22.78% having anemia and 40% of women having OCPs and 20% women were peripartum. Ferro et al¹³ had 12.3% of the cases to have prior exposure to OCPs. Deficiency of folic acid, B6, and B12 is the commonest cause of hyperhomocysteinemia rather than inherited causes of it¹⁴. Hyperhomocysteinemia was present in 24% of the cases in the study by Patil et al³ and 34% in the study by Aaron et al. 71.43% of patients tested for the same had hyperhomocysteinemia in our study. Kalita et al¹⁵ and Patil et al reported dehydration in 6.25% and 76% patients respectively, as compared to 36.11% in this study.

Mortality rate in the study by Daif et al¹⁰ was 10% as compared to 5.56% in this study. 33% patients had residual neurological deficit in a study by Pazare et al¹⁷ comparable with our results(36.11%). 6% patients required surgery in the study by Patil et al³ – 5.56% in the present study.

This study is limited in term of the small number of cases observed, and also lack of uniformity and completeness in evaluation of the coagulation profile.

VI. Conclusion

CVST is majorly a disease of the young population with average age around 35 years. This retrospective study conducted in our hospital, showed a male predominance of CVST. Most of the population were farmers, alcoholics, mostly affected during the summer months of April and May. In females, OCPs were an important risk factor. Dehydration due to acute gastroenteritis, decreased fluid intake, increased insensible losses are important and neglected risk factors for CVST that must be addressed in susceptible populations. Supplementation of methylcobalamin, folic acid and pyridoxine may play a major role in the prevention and management of CVST. Headache and seizures were the most common presenting features in the present study. Transverse sinus involvement was commoner as was multiple sinus involvement. Overall mortality was 5.56% affecting persons with multiple sinus thrombosis. CVST is a multifaceted disease, requiring well conducted multicenter studies to investigate the etiologic, clinical and therapeutic differences in different centres. It is a treatable cause of acute stroke having a better prognosis than arterial strokes and therefore, a high index of clinical suspicion must be kept while dealing with such patients.

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