



CLINICAL PROFILE, RISK FACTORS AND OUTCOMES IN PATIENTS WITH CEREBRAL VENOUS THROMBOSIS: A STUDY FROM SOUTH TELANGANA, INDIA

Sandeep Kumar G	Assistant Professor, SVS Medical College, Mahbubnagar, Telangana State, India
Rakesh Reddy P	Senior Resident, SVS Medical College, Mahbubnagar, Telangana State, India.
Venkateswarlu N*	Professor And HOD, SVS Medical College, Mahbubnagar, Telangana State, India. *Corresponding Author
Nikhita Kailas	Postgraduate Student, SVS Medical College, Mahabubnagar, Telangan State, India

ABSTRACT

BACKGROUND: Cerebral venous and sinus thrombosis is not a rare disease in India and abroad. The present study was undertaken to various clinical and radiological manifestations of the same.

METHODS AND MATERIALS: A total 100 patients admitted to SVS Medical college and hospital, Mahabubnagar between September 2013 to September 2020 with a confirmed diagnosis of cerebral venous thrombosis were studied in this study. Detailed clinical examination along with basic investigations including CT/MRI brain and MRV/CTV in all.

RESULTS: Headache and seizures are the most common findings followed by paresis and fever. Alcohol addiction and tobacco consumption were found to be present in 53 and 56% of cases followed by iron deficiency in 45, hypertension in 35, pregnancy related cases were only 18. Steroid abuse and hypothyroidism were noted in 18 and 16 instances while evidence of infection was noted in a dozen patients. Cerebral imaging (CT/MRI) revealed venous infarction hemorrhagic or non-hemorrhagic in 67 patients and isolated CVT without infarction in 21 patients. Infarctions were unilateral in 56 patients. Superior Sagittal Sinus in combination with other deep venous sinuses was seen in 54 percent of this study.

CONCLUSION: CVST presents in young and equal in frequency in males and females. Headache, seizures are more frequent symptoms. Addiction with alcohol and tobacco are the more frequent risk factors followed by Iron deficiency anemia and hypertension. SSS was the most common site of venous sinus thrombosis.

KEYWORDS : CSVT, MRV/CTV, alcohol addiction, Iron deficiency anemia, Superior Sagittal Sinus

INTRODUCTION:

Cerebral venous and sinus thrombosis has been traditionally considered a disease of women in the postpartum period in tropical countries¹⁻⁷. With the advances in imaging studies and advances in medical fields, more and more studies proved CSVT in male gender proved to be dominantly affected with⁸⁻¹². The present study was undertaken to various clinical and radiological manifestations of cerebral and sinus venous thrombosis (CSVT).

METHODS AND MATERIALS:

Patients admitted to SVS Medical college and hospital, Mahabubnagar between September 2013 to September 2020 with a confirmed diagnosis of cerebral venous thrombosis were taken up for the study. Inclusion criteria were a) Age more than 15 years of age b) clinically symptomatic patients c) Diagnosis confirmed by Magnetic resonance Venography (MRV) or CT Venography (CT Venography). Exclusion criteria: Patients with infarct in arterial territory, hypertensive hemorrhage, metabolic encephalopathy, and eclampsia were excluded from the study. Detailed clinical examination along with basic investigations including CT/MRI brain and MRV/CTV in all.

Statistics:

Descriptive statistic was performed as frequency, mean and standard deviation or percentages. Difference in continuous variables was evaluated by using independent t-test while chi-square test was performed in categorical variables. Statistical P<0.05 was considered statistically significant.

RESULTS

A total of 100 cases of cerebral sinus versus thrombosis were evaluated in the present study. Headache and seizures are the most common findings followed by paresis and fever.

Table 1: Common presenting symptom with CVST

Symptoms	Total	Male (49)	Female (51)	Significance
Headache	98	48	50	0.643
Seizures	92	44	48	0.652
Vertigo	82	42	40	0.582
Fever	74	32	42	0.062
Paresis	72	30	40	0.052
Vomiting	60	24	36	0.058
Coma	38	24	14	0.625
Mental changes	22	14	08	0.078
Papilledema	08	01	09	0.043

Table 2: Risk factor for CVT in included patients

Risk factor	Total (100)	Male (49)	Female (51)	Significance
Iron deficiency anemia < 6 G%	45	14	31	0.03*
B12 deficiency anemia	14	3	11	0.01*
Alcoholic dependency	53	32	21	0.26
Tobacco consumption	56	36	20	0.25
Dyslipidemias	18	12	6	0.08
Hypertension	35	21	14	0.26
Pregnancy and puerperium	18	-	18	0.01*
Oral contraceptive usage	9	-	9	0.01*
Connective tissue disorders	6	1	5	0.05*
Malignancy	5	4	1	0.05*
Steroid usage	18	5	13	0.05*
Evidence of infection and septicemia	12	2	10	0.01*
Hypothyroidism	16	4	12	0.01*

*Statistically significant

Table 3: OUTCOME OF THE CASE IN THIS STUDY

OUTCOME	TOTAL	MALE	FEMALE	SIGNIFICANCE
DEATH	5	2	3	0.245

PERMANENT DEPENDENCY	6	3	3	0.326
RECOVERY	89	44	45	0.426

CSF analysis done in 92 cases; mild rise in CSF protein and mild pleocytosis in a few numbers of cases.

Cerebral imaging (CT/MRI) revealed venous infarction hemorrhagic or non-hemorrhagic in 67 patients and isolated CVT without infarction in 21 patients. Infarctions were unilateral in 56 patients (left side 34; and right side 22. Bilateral infarctions were seen in 22. Hemorrhagic infarctions (57.47%) were more frequent than pale infarctions (42.51%). 81 patients underwent MRI/MRV while MR was contraindicated in 19 cases due to various reasons viz., prostheses etc. these cases had CT Venography. Tables 4 and 5 reveal the various findings of abnormalities.

Table 4: Showing Certain specific signs on CT

Radiological findings	Number of patients	Male	Females	Significance
Higher dense sign	17	4	13	0.05*
Dense triangle	12	8	4	0.24
Card sign	17	10	7	0.34
Empty delta sign	16	9	7	0.65
Empty delta sign + card sign + hyperdense sinus	18	12	6	0.06
Hyper dense sinus + Empty delta sign	12	4	8	0.35
Hyperdense sinus + cerebral edema	08	2	6	0.65
Total	100	49	51	0.65

Table 5: SINUS INVOLVEMENT MRI/MRV or CTV

SINUS INVOLVEMENT	NUMBER OF PATENTS	MALE	FEMALE	SIGNIFICANCE
SUPERIOR SAGITTAL SINUS	28	8	20	0.05*
SSS + St S + SIGMOID SINUS	16	8	8	0.642
SSS + TS	16	12	4	0.642
SSS+TS+VEIN OF LABBE	14	6	8	0.240
TRANSVERSE SINUS	14	8	6	0.240
SSS + St S	8	4	4	0.542
SIGMOID SINUS	4	3	1	0.042*

Table 6: The association between clinical symptoms with sinus of patients studied

Sinus involved	SUPERIOR SAGITTAL SINUS	SSS + SIGMOID SINUS	SSS + TS	SSS+TS+VEIN OF LABBE	TRANSVERSE SINUS	SSS + St S	SIGMOID SINUS
HEADACHE	55	5	6	1	5	8	1
Headache + vomiting	12	9	-	-	-	-	-
Headache + Vomiting + GTCS + Seizures-Focal + visual disturbance + Paresis	32	12	22	21	6	5	1

Headache + Vomiting + GTCS + HMF + LOC	22	10	23	11	8		1
Headache + Vomiting + HMF	12	11	2	14	6	3	1

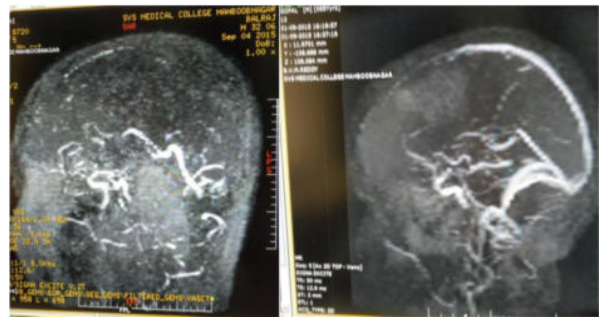


Fig 1 and 2 MRV showing filling defect in superior sagittal sinus



Fig 3 MRV showing filling defect in transverse sinus on left side

DISCUSSION:

A total of 100 cases of CSVT proved by MRI/MRV or CTV (Computed Tomography Venography) were included and analysed clinically demographically and radiological correlation. Age in this study is 25.8 years almost like many earlier publications^{9,10,11,29}. Only few case studies differ as Strolz and others²⁸ reported as 42.8. there wasn't any gender frequency in present study but for a few studies of pregnancy and puerperium. Symptomatology did not differ from other earlier authors. Headache, convulsions, paresis, altered level of consciousness and fever.

Risk factors noted in this study could not be done fully owing to financial constraints.

Surprisingly alcohol addiction and tobacco consumption were associated with 53 and 56 total cases with not much gender variation. Narayan et al¹¹ noted alcohol consumption in about 15.6% cases mostly men.

Iron deficiency anemia was found in 45% while 31 were female candidates. Internal studies¹⁰ showed a small percentage of less than 10% while Indian publications showed a higher rates 33.8%²⁷, 42.5%¹², 29.33%¹⁵,

Vitamin B12 deficiency Macrocytic anemia in 14 of which 11 were women; the cause found to be nutritional. Homocysteine levels was done in only 12 cases with normal levels. Hypercysteinemia was reported in many earlier studies^{11,17,30}.

Pregnancy and puerperium are known to result in increased incidence of the CVST due to the normal physiological changes in the pregnancy that results in hypercoagulability and proneness to infection during delivery. The present study had 18 cases associated with pregnancy and delivery had CSVT while another 9 cases were seen using the oral contraceptive drugs: comparable with earlier studies^{15-18,30and31}.

Hypothyroidism was found in 16 (4+12). Ferro et al described 11 cases both hypo- and hyperthyroid status¹⁰. Agarwal and Sharma reported a case of hypothyroidism in autoimmune thyroiditis³⁰.

Table 7: Comparison of present study with similar Indian cohort studies on CVST.

Study	Age (average)	Male: Female	Headache	Seizures	Paresis	Thrombophilia
Parikh et al., (1987) ⁸ (n = 110)	34.6	2:1	38.1%	60%	38.1%	NA
Narayan et al., (2012) ¹¹ (n = 428)	31.3	1.16:1	88.3%	39.9%	25.3%	12.3%
Pai et al., (2013) ¹³ (n = 612)	31.9	3:2	61.9%	31.2%	47.7%	18%
Anadure et al., (2014) ¹⁴ (n = 48)	30.9	1.18:1	98%	58%	41%	72%
Aneesh et al., (2017) ²² (n = 116)	35.2	1.32:1	62%	51.7%	20.6%	NA
Anadure et al., 2018 ¹⁷ (n = 54)	34.4	2.6:1	94%	40%	22%	53%
Present study(n = 100)	25.8	1:1	98%	92%	72%	NA

Table 8: Comparison of the present study with earlier studies as per the sinus involved

STUDY	Sinus involved	Percentage
ISCVT trial 2004	Superior Sagittal Sinus	62.0
	Lateral sinus, left	44.7
	Lateral sinus, right	41.2
Boussier et al., 2007 ¹⁸	Superior sagittal Sinus SSS	62
	Transverse Sinus	42
Agarwal et al., 2010 ²³	Superior sagittal Sinus (SSS)	88
Narayan et al., 2012 ¹¹	SSS with/without other sinuses	54.3
	Right TS with/without other sinuses	31.0
	Left TS with/without other sinuses	16.7
	Sigmoid S with/without other sinuses	20.6
Anadure et al., 2014 ¹⁴	Superior sagittal Sinus (SSS)	49

Patil et al 2014 ²⁶	Superior Sagittal Sinus	46
	Sigmoid or Transverse sinus	32
	Multiple sinuses	20
	Cavernous sinus	2
Mangshetty B and Reddy KN 2015 ³¹	Superior Sagittal Sinus	70
Aneesh et al., 20 (2017) ²³	Superior sagittal Sinus (SSS)	50.8
Bose et al., 2017 ¹²	Superior sagittal Sinus (SSS)	60
	Transverse sinus	54
Saroja et al., 2017 ¹⁵	Superior sagittal sinus Sigmoid sinus Transverse sinuses.	57.33
Banakar et al., 2017 ¹⁹	Superior Sagittal Sinus	74.1
Anadure et al., 2018 ¹⁷	Transverse sinus	74
	Superior Sagittal Sinus	52
Singh et al., 2018 ¹⁶	Superior sagittal sinus (SSS)	71
	Transverse sinus	66
	Sigmoid sinus	45
Goyal et al., 2018 ³⁰	Transverse Sinus	83.9
	Sigmoid Sinus	44.6
	Superior Sagittal Sinus	35.7
Ramrakiani et al., 2019 ²⁷	Superior sagittal Sinus (SSS)	70.8
	Transverse sinus Left	34.4
	Transverse sinus Right	33.8
Khan M et al., 2020 ²⁴	MULTIPLE SINUSES	66.6
	Transverse Sinus	54.5
	Superior Sagittal Sinus	45.5
Present study	Superior Sagittal Sinus in combination with other deep venous sinuses	54
	Superior Sagittal Sinus alone	28

CONCLUSION:

The clinical presentation of venous sinus thrombosis to tertiary care centers is changing outside the traditional puerperal / pregnancy related venous sinus thrombosis. Common risk factors include anemia, alcoholism, pregnancy related, vasculitis, oral contraceptive usage. Male involvement was almost as common in this study. Superior sagittal sinus involved as the most common sinus involved either singly or combined with other sinuses. Prognosis in our cases was very good may be due to anticoagulation and better care facility.

Limitations of the study:

Complete workup for prothrombotic states could not be done in a systematic manner. Homocysteinemia levels could not be done owing to financial constraints.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Padmavati S, Gupta S, Singh B: A clinical study of 44 cases of hemiplegia in adult women. *Neurology (India)* 5: 59, 1957
2. Parkash C, Singh S: Cerebral venous and sinus thrombosis in puerperium. *Journal of Association of Physicians of India* 8: 363, 1960
3. Janaki S, Thomas L: Neurological complications occurring during pregnancy and puerperium. *Neurology (India)* 11: 128, 1963
4. Pathak SN, Dhar P, Berry K, Kumar S: Venous and arterial thrombosis in 30 young Indian women. *Neurology (India)* 14: 102, 1966
5. Abraham J, Rao PSS, Inbaraj SG, Shetty G, Jose CJ: An epidemiological study of hemiplegia due to stroke in South India. *Stroke* 1: 477, 1970.
6. Srinivasan K, Natarajan M. Cerebral venous and arterial thrombosis in pregnancy and puerperium. *Neuro India* 1974; 22:131-40.
7. Nagpal RD. Dural sinus and cerebral venous thrombosis. *Neurosurg Rev* 1983; 6: 155-60
8. Parikh PM, Sukthankar RU, Parikh A, et al. Cerebral venous thrombosis. *J*

- Assoc Physicians India. 1987; 35: 349-351.
9. Nagaraja D, Taly AB.; Puerperal cortical venous thrombosis.; J Assoc Physicians India. 1993; 41(7): 473.
 10. Ferro JM, Canhao P, Stam J. Prognosis of cerebral vein and dural sinus thrombosis: Results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). *Stroke* 2004; 35: 664-70.
 11. Narayan D, Kaul S, Ravishankar, et al. Risk factors, clinical profile, and long-term outcome of patients of cerebral sinus venous thrombosis: Insights from Nizam's Institute Venous Stroke Registry, Hyderabad (India). *Neurol India* 2012; 60: 154-9.
 12. Bose P, Joshua PJ, Thandavarayan M. A clinical study of cerebral venous thrombosis: International Journal of Advances in Medicine. *Int J Adv Med* 2017; 4: 1236-40.
 13. Pai N, Ghosh K, Shetty S. Hereditary thrombophilia in cerebral venous thrombosis: A study from India. *Blood Coagul Fibrinolysis* 2013; 24: 540-3.
 14. Anadure RK, Nagaraja D, Christopher R, et al. Plasma factor VIII in non-puerperal cerebral venous thrombosis: a prospective case-control study. *J Neurol Sci*. 2014; 339 (1): 140-143.
 15. Saroja AO, Tapsi C, Naik KR. Cerebral venous thrombosis in women from Indian subcontinent. *J Sci Soc* 2017; 44: 20-5.
 16. Singh N, Udainiya D, Kulshreshtha S, Bindal J. Evaluation of cerebral venous thrombosis by computed tomography/MRI and magnetic resonance venography in pregnant and postpartum women: a prospective study. *Int J Res Med Sci* 2018; 6: 3381-4.
 17. Anadure RK, Wilson V, Sahu S, Singhal A, Kota S; A study of clinical, radiological and etiological profile of cerebral venous sinus thrombosis at a tertiary care center; *Medical journal armed forces India* 74 (2018) 326 - 332
 18. Bousser MG, Ferro JM. Cerebral venous thrombosis: an update. *Lancet Neurol*. 2007; 6: 162-170.
 19. Banakar B, Hiregoudar V. Clinical profile, outcome, and prognostic factors of cortical venous thrombosis in a tertiary care hospital, India. *J Neurosci Rural Pract*. 2017; 8(2): 204-208.
 20. Kumaravelu S, Aditya A, Singh KK. Cerebral venous thrombosis. *Med J Armed Forces India*. 2008; 64(4): 355-360.
 21. Mehta SR, Muthukrishnan J, Varadarajulu R. Cerebral venous sinus thrombosis: a great masquerader. *Med J Armed Forces India*. 2004; 60(3): 299-301.
 22. 20. Aneesh T, Gururaj H, Arpitha JS, et al. Clinical features, predisposing factors and radiological study of cerebral venous sinus thrombosis: experience from a tertiary care center in Southern India. *Int J Res Med Sci*. 2017; 5: 3023-3028.
 23. Agarwal P, Kumar M, Arora V; Clinical profile of cerebral venous sinus thrombosis and the role of imaging in its diagnosis in patients with presumed idiopathic intracranial hypertension; *Indian Journal of Ophthalmology* MARCH/APRIL 2014: 153-5
 24. Khan M, Zeeshan H, Iqbal S (December 22, 2020) Clinical Profile and Prognosis of Cerebral Venous Sinus Thrombosis. *Cureus* 12(12): e12221.
 25. Stolz E, Rahimi A, Gerriets T, Kraus J, Kaps M. Cerebral venous thrombosis: an all or nothing disease? Prognostic factors and long-term outcome. *Clin Neurol Neurosurg* 2005; 107: 99-107.
 26. Patil VC, Choraria K, Desai N, Agrawal S. Clinical profile and outcome of cerebral venous sinus thrombosis at tertiary care center. *J Neurosci Rural Pract*. 2014; 5(3): 218-24.
 27. Ramrakhiani N, Sharma DK, Dubey R, Gupta P, Sharma A, Sharma KK; Clinical Profile, Risk Factors and Outcomes in Patients with Cerebral Venous Sinus Thrombosis: A Study from Western India *JAPI* 2019 67: 49-53.
 28. Aggarwal S, Sharma N. Cerebral venous sinus thrombosis with autoimmune thyroiditis. *Indian J Endocrinol Metab*. 2013; 17(Suppl 1): S176-S177.
 29. Patil VC, Choraria K, Desai N, Agrawal S. Clinical profile and outcome of cerebral venous sinus thrombosis at tertiary care center. *J Neurosci Rural Pract* 2014; 5: 218-24.
 30. Goyal G, Charan A, Singh R. Clinical presentation, neuroimaging findings, and predictors of brain parenchymal lesions in cerebral vein and dural sinus thrombosis: A retrospective study. *Ann Indian Acad Neurol* 2018; 21: 203-8.
 31. Mangshetty B, Reddy KN. Clinical and neuroimaging correlation in patients with cerebral sinus venous thrombosis. *Al Ameen J Med Sci* 2015; 8: 64-71.