

Clinical Profile and Radiological Features in Cerebral Sinus Venous Thrombosis : A Prospective Observational Study in a Tertiary Care Hospital, Telangana, India

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Abstract

Introduction: Cerebral sinus venous thrombosis (CSVT) is an uncommon condition. Its clinical presentation is varied and often dramatic. Although recognized for more than 100 years. The annual incidence is currently estimated to be 3-4 cases per 1 million people. 3 out of 4 people with CSVT are women. It accounts for 10-20 % of the etiology of young strokes in india. **Objectives:** To study the Clinical features and imaging studies of cerebral venous thrombosis. To study the prognosis based on clinic radiological features. **Methodology:** Forty patients aged >18 years suspected to have cerebral venous thrombosis based on clinical history and examination were evaluated but only those with confirmed diagnosis (based on neuroimaging) of cerebral venous sinus thrombosis were taken up for the study. Meticulous history, clinical examination, laboratory investigations were carried out in all cases of cerebral venous sinus thrombosis. Cerebral venous thrombosis was confirmed by CT scan (or) conventional MRI (or) MR venogram. **Results :** Most common radiological finding was hemorrhagic infarction seen in 55% of cases. Empty delta sign was noted in 47.5% of cases. Cord sign was noted in 22.5% of cases. Radiologically most common sinus involved was

superior sagittal sinus in 70% of cases followed by transverse sinus in 42.5% of cases LMWH was given in 65% of cases and intravenous unfractionated heparin infusion in 35% of cases, whereas 10% of the patients required decompressive craniotomy. The presence of haemorrhagic infarct is associated with a bad prognosis. Overall outcome is good with 69.44% of the patients having complete recovery at the time of discharge and overall mortality rate was 10%. **Conclusion** : The present study emphasizes that CVST is not an uncommon condition. It is an important cause of stroke especially in the peripartum settings and is one of the common causes of stroke in young people. Management with unfractionated heparin, LMWH and oral anticoagulation is appropriate.

Keywords : Radiological features, Cerebral Sinus Venous, CSVT, Clinical Profile

INTRODUCTION

Cerebral sinus venous thrombosis (CSVT) is an uncommon condition. Its clinical presentation is varied and often dramatic. It often affects young to middle-aged patients, and more commonly women. Although recognized for more than 100 years. The annual incidence is currently estimated to be 3-4 cases per 1 million people. 3 out of 4 people with CSVT are women¹. It accounts for 10-20 % of the etiology of young strokes in India. Current therapeutic options for CVST treatment include anti-thrombotic therapy with unfractionated heparin, low-molecular-weight heparins (LMWH), oral anticoagulants, intravenous thrombolysis, local thrombolysis by selective sinus catheterization and a combination of thrombolysis² and anticoagulation in addition to symptomatic therapy. CVST has an acute case fatality of less than 5% and almost 80% of patients recover without sequelae. It has been found that early diagnosis of cerebral venous thrombosis is essential because early treatment may prevent morbidity and may even be lifesaving. Hence the present prospective observational study was undertaken to describe the clinical profile, diagnosis and prognosis of CSVT³.

METHODOLOGY: This study titled “Clinical Profile and Radiological Features in Cerebral Sinus Venous Thrombosis : A Prospective Observational Study in a Tertiary Care Hospital, Telangana, India” was carried out during the period from November 2016 to April 2018. The study was conducted on 40 selected patients fulfilling the criteria⁷. The study was conducted at Chalmeda Anandarao Institute of Medical Sciences, Karimnagar, Telangana, India. with an aim to observe the Clinical Profile and Radiological Features in Cerebral Sinus Venous Thrombosis.

Inclusion criteria: All patients aged >18 years suspected to have cerebral venous thrombosis based on clinical history and examination were evaluated but only those with confirmed diagnosis (based on neuroimaging) of cerebral venous sinus thrombosis were taken up for the study.

Exclusion criteria: CT scan inconclusive of CVT, Hypertensive haemorrhage, Athero thrombotic stroke, Metabolic encephalopathies

Ethics: This study was approved by the Institutional Ethics Committee, Chalmeda Anandarao Institute of Medical Sciences, Karimnagar, Telangana, India. An informed written consent was taken from all the patients involved in the study after explaining regarding the study.

Study Procedure: Forty patients aged >18 years suspected to have cerebral⁴ venous thrombosis based on clinical history and examination were evaluated but only those with confirmed diagnosis (based on neuroimaging) of cerebral venous sinus thrombosis were taken up for the study. Meticulous history, clinical examination, laboratory investigations were carried out in all cases of cerebral venous sinus thrombosis. Cerebral venous thrombosis was confirmed by CT scan (or) conventional MRI (or) MR venogram. All the 40 patients were given anticoagulation, initially with subcutaneous LMWH in 26 cases (65%) and intravenous unfractionated heparin infusion in 14 cases (35%), later on changed over to oral anticoagulants.

4 patients (10%) required decompressive craniotomy, out of which one patient died. Additional treatments included antiepileptics in 28 patients (70%) and antiedema measures in 30 patients (75%).

Results :

A total of 40 cases of cerebral sinus versus thrombosis were evaluated in the present study.

Table : 1 Age incidence

Age in years	No.of patients	Percentage
18-30	27	67.5
31-40	9	22.5
41-50	2	5
>50	2	5

The mean age of the patients in the present study was 29.8 ± 8.7 . Majority of them were in the age group of 18-30 contributing to 67.5%. The youngest being 18 and the eldest 58 years of age.

Table :2: Sex Distribution

In the present study, Male : Female is 2:3.

Gender	No.of patients	Percentage
Male	16	40
Female	24	60
Total	40	100

Table :3 Mean Age of the Patients

Sex	Mean age	Std deviation	Range
Female	26.62	5.7	18-42
Male	34.62	10.3	20-58

The mean age of female patients is 26.62 with a standard deviation of 5.7, where as that of males is 10.3 in the present study.

Table:4 Types of CSVT

Types	No.of patients	Percentage
Puerperal	21	52.5
Non puerperal	19	47.5
Total	40	100

In the present study, out of 40, 21 (52.5%) patients belong to puerperal group and 19(47.5%) belong to non-puerperal group. Out of 19 non-puerperal,3 were females and 16 were male patients.

Table 5 :Duration from delivery on onset of symptoms

Duration (days)	No.of patients	Percentage
1-10	15	71.42
11-20	4	19.04

21-30	1	4.76
>30	1	4.76

In the present study, out of 21 puerperal patients,71.42%(15cases)of CVT occurred during 1-10 days after delivery.

Table 6 :Mode of onset

Mode of onset	No.of patients	Percentage
Acute	15	37.5
Subacute	19	47.5
Chronic	6	15
Total	40	100

Those who presented with in 48 hours were considered to have acute onset, with onset longer than 48 hours but less than 1 month were considered Subacute ,and with onset more than 1 month as chronic (Bousser et al).In the present study, 19 cases (47.5%) of CSVT had subacute presentation,followed by 15 cases (37.5%) with acute presentation

Table :7 Level of Consciousness

Level of consciousness	No.of patients	Percentage
Conscious	21	52.5
Drowsy	9	22.5

Stuporous	6	15
Comatose	4	10
Total	40	100

In the present study, 21 patients (52.5%) were conscious and 9 patients (22.5%) were drowsy at the time of presentation.

Table – 8 : Initial Symptoms at Presentation

Symptom	No.of patients	Percentage
Headache	34	85
Convulsions	26	65
Focal deficits	23	57.5
Altered sensorium	21	52.5
Vomiting	18	45
Fever	11	27.5
Diplopia	4	10

In the present study, most common symptom is headache present in 85%.(34cases) followed by convulsions in 65% (26 cases).

Table :9 Clinical Signs at Presentation

Signs	No.of patients	Percentage
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Cranial nerve involvement	19	47.5
hemiparesis	16	40
papilledema	16	40
pallor	13	32.5
Dysphagia	7	17.5

In the present study, cranial nerve palsy was present in 47.5% hemiparesis was present in 40%, papilloedema in 40% and Dysphagia in 17.5% of patients.

Table –10: Cranial Nerve Involvement

Cranial nerve involvement	No.of patients	Percentage
3 rd nerve	2	10.53
6 th nerve	4	21.06
7 th nerve	6	31.57
10 th nerve	6	31.57
6 th and 10 th nerve	1	5.27
total	19	100

Table – 11 : Investigations

Hb%	No.of cases	Patients live	Patient dead
< 5	1	0	1
5-8	6	4	2
8-10	6	5	1
>10	27	27	0

Hb% <8 V/s >8 Chi-square = 10.18, p<0.05 Sig.

In the present study, out of 40 patients, 13 were anemic, accounting for 32.5% and the mortality was higher when the degree of anaemia was severe.

The Lab investigations like leucocyte count, blood sugar, serum creatinine, blood urea, liver function tests, serum electrolytes did not contribute to the diagnosis and were non specific.

Table :12 :CT and MRI findings

Finding	No.of patients	Percentage
HI	22	55
NHI	18	45
EDS	19	47.5
CS	9	22.5

In the present study,22 cases (55%) had haemorrhagic infarction,followed by non-hemorrhagic infarction comprising 18 cases (45%).

TABLE – 13 : CSF ANALYSIS

Mode of onset	No.of patients	Percentage
Normal	7	63.63
Pleocytosis	4	36.36
Protein rise	2	18.18

Eleven patients were subjected to CSF analysis wherever there was suspicion of meningitis, out of which 7 were normal and pleocytosis seen in 4 patients and protein rise in 2 patients.

PREDISPOSING/ETIOLOGY FACTOR IDENTIFICATION

Table-14: Prothrombotic workup

Parameters	No of patients	percentage
Normal	5	41.66
APLA antibodies	3	25
Lupus anticoagulant	2	16.67
Hyper homocystenemia	2	16.67

Twelve patients were subjected to detailed coagulation profile because of economical restrains, out of which, five patients were normal, seven patients have risk factors, of which APLA antibodies seen in three patients, lupus anticoagulant seen in two patients and hyperhomocystenemia in two patients. On study of drug history, OCP intake were strongly positive in four cases out of which two cases were associated with additional risk factor lupus anticoagulant. Serum homocysteine levels were elevated in two patients, of these one patient was chronic alcoholic with a history of binge alcohol. Five patients were normal in the present study out of twelve patients.

TABLE – 15 : SINUS INVOLVEMENT (MRV)

Sinus involved	No.of patients	Percentage
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Superior sagittal sinus	28	70
Transverse sinus	17	42.5
Sigmoid sinus	9	22.5
Jugular sinus	8	20
Straight sinus	7	17.5
Internal cerebral vein	4	10

In the present study, the most common sinus involved was superior sagittal sinus in 28 patients accounting to 70% followed by transverse sinus (42.5%) in 17 patients.

TABLE – 16 :OUTCOME AT DISCAHRGE, 3 MONTHS AND 6 MONTHS

Modified Rankin scale	At discharge (n=40)		3 months (n=32)		6 months (n=26)	
	No.of cases	%	No.of cases	%	No.of cases	%
0	13	32.5	21	65.62	22	84.61
1	11	27.5	6	18.75	3	11.54
2	6	15	4	12.5	0	0
3	4	10	1	3.12	1	3.85
4	1	2.5	0	0	0	0
5	1	2.5	0	0	0	0
Death	4	10				

TABLE – 17 :Mortality

Status	No.of patients	Percentage
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Alive	36	90
Dead	4	10
Total	40	100

In the present study of 40 patients ,4 patients (10%) died and 36 patients were alive comprising (90%)

Discussion

The epidemiological factors, clinical presentation, etiological factors of CVT are highly variable. The incidence of CSVT in adults is 3-4 cases per million annually⁵. In the largest clinical series, the International Study on Cerebral vein and dural sinus thrombosis (ISCVT) , the median age of patients with CVT was 37 years and in a study conducted in Pakistan by Khealani et al¹¹ median age was 35 years compared to the median age in our study of 26 years. The mean age in our study was 29.8 years, lower than that reported by Khealani et al¹¹, Bossoni AS et al in a Brazilian study and Narayan et al¹³ in their study done in Hyderabad, India.

Hence a lower mean and median age was observed in our study compared to most other studies by khealani et al¹¹ christo et al and narayan et al¹³. This could be because 67.5% of our patients were between the age range of 18-30 years of which 74% were females.Hence the mean age of females (26.62years) in our study was lower than that observed by Khealani et al. We also observed that the mean age of females in our study was lower than that of males (34.62years) similar to the observations of Khealani et al In our study females formed the majority (60%) of the total 40 patients similar to that observed in most other studies except that of Narayan et al who observed a male predominance (53.7%). Comparing the age group involved, 20-40 years was the commonest age group involved in various series (Metha SR et al 77.8% and Ameri et al, 61%). The present study also showed similar finding with 87.5% in the same age group, with mean age of onset 29.8 years which is comparable with Daif et al¹⁵

In our study 52.5% of patients were in postpartum state. Similar higher incidence of puerperal CVT was reported by the Pakistanian study

Douglas et al¹⁴ reported by multivariate analysis that caesarean section and hypertension was significantly associated with peripartum and post partum CVT. The authors of the study suggest that the small increased risk with pregnancy induced hypertension might be due to a higher rate of caesarian section in women with hypertension and that there may be a cumulative effect of resistance to activated protein C during pregnancy together with decreased protein C levels following surgery. However such an association of caesarean section or pregnancy induced hypertension was not seen in our study. Only 1 (2.6%) of the 38 patients of Bousser et al¹ was puerperal, while in Deschiens et al study only 8 (20%) of patients were puerperal. Only 1 (2.5%) of Daif et al was post partum. 4 (21.1%) of 19 patients of Zuber et al. related to pregnancy and puerperium. compare to these studies, most of the cases in our study were puerperal. The experience of other authors from India⁷ had been similar like Neki NS et al (2003) had found 62% of cases of CVT in postpartum period. The present study is comparable with Neki NS, et al and Cantu C. et al Kumar S, et al (2003) had found that 65 out of 85 cases (76%) of CVT presented with symptom duration of 4 days or less. The present study showed 71.42% of patients presented within 10 days, which is comparable with Kumar S. et al. About 47.5% of the patients in our study had a sub-acute onset of presentation. 47% of patients of Zhang et al, 40% of Daif et al series had subacute onset. The mode of onset in our study in similar to most other studies.

Headache appears to be the most common and often the earliest symptom⁸ in CVT patients. In the present study 85% of our cases had headache. Thus similar to other studies Cantu et al (113) and Daif et al (40) series have 80.5% and 82.5% headache respectively. In the present study, 65% of cases had seizures which is comparable with Kumar⁹ S. et al.

In our study, generalised seizures were the commonest type occurred in 68% of patients 10.5% had focal seizures, 5% focal seizures becoming generalised. 15% of our patients presented with status epilepticus.

15 out of the 21 puerperal CVT (71.4%) of the study had seizures, while 11 out of 19 (57.9%) non puerperal had seizures. This suggests that seizures are more common in puerperal CVT. This is supported by higher incidence of seizures in puerperal CVT patients of Nagaraja et al Srinivasan and Natarajan et al.

About 52.5% of our patients had altered sensorium at the time of presentation. 4 (10%) patients were in coma at the time of presentation. Our study suggests that Altered sensorium occurs in major proportion of our Patients. Our incidence is similar to that of most other authors except that Bousser et al noted Altered sensorium in only 26% of cases

In the present study, 57.5% of 40 patients had focal neurological deficits (motor, sensory, cranial nerve deficits). Cranial nerve palsy was the common focal deficit. It was seen in (19) 82.6% of 23 patients with focal deficit. Among patients with focal deficits 30.4% had dysphagia. 16(69.5)% had hemiparesis. Paraplegia, sensory deficits were uncommon manifestations. It becomes difficult to assess the focal deficits with worsening sensorium.

The present study is comparable with Strolz et al (56%) In the present study, 10(40%) out of 40 patients had papilloedema. Similar observations were noted with Bousser et al⁵ and cantu et al¹⁰ who had papilloedema in 45% of the cases.

CT SCAN FINDINGS

Normal CT scans are reported in 10 - 20% of patients (Bousser et al Nagaraja et al^{4,5,6} Rao et al Daif et al) found 42% of 40 patients had normal scans, whereas in Zhang et al⁵⁷ 41% had normal scans. In our study, CT scan brain was normal in 20% of the patients. 70% of patients of our 40 cases had direct evidence of CVT. 22.5% had cord sign, 47.5% had empty delta sign.

27.5% of patients had indirect evidence of CVT like cerebral edema, tentorial enhancement, obliteration of cistern, squashing of ventricles. In our study direct signs were common than indirect signs. Hemorrhagic infarcts were the most common parenchymal abnormality. 55% had hemorrhagic infarct, 45% had non-hemorrhagic infarct. Similar observations noted with various studies like Nagaraj et al Dixit et al with 40.9% and 48.4% respectively.

MRI FINDINGS

All our patients were subjected to MRI brain with MR Venogram . MR angiogram, diffusion weighted and ADC mapping and gradient echo sequences was done in all 40 patients in our study. It was abnormal in all patients. The anatomical localisation of the sinus involvement is as follows: The superior sagittal sinus (SSS) was involved along with other sinus in 28 (70%) patients. SSS was involved alone in 12 patients (30%). SSS was involved along with transverse sinus (TS) in 8 patients (20%). SSS was associated with TS and sigmoid sinus (SG) in 3 patients (7.5%). SSS was associated with haemorrhage/haemorrhagic infarct in 13 patients (32.5%). SSS is associated with transverse sinus with haemorrhage in 1 pt (1.6%). Transverse sinus (TS) involvement is present in 17 patients (42.5%) together along with other sinus involvement. Isolated TS thrombosis is present in none of our patients^{7,8,9}. TS is associated with SG in 7 (17.5%) patients. TS is associated with haemorrhage in 8 patients (20%). Sigmoid sinus involvement alone is present in none of our patient. With other combinations it is present in 9 patients (22.5%). SG and TS sinus involvement is present in 7 patients (17.5%) Haemorrhage is present in a total of 22 (45%) of patients. SSS is associated with haemorrhage in 13 patients. Haemorrhage is associated with TS in 8 (20%) of patients. Mortality rate in our study is 10% which is comparable with daif et al, cantu et al and debrujin et al with 10% , 9% and 10.17% respectively .

Conclusion : The present study emphasizes that CVST is not an uncommon condition. It is an important cause of stroke especially in the peripartum settings and is one of the common causes of stroke in young people. Management with unfractionated heparin, LMWH and oral anticoagulation is appropriate. surgical decompression is helpful in the case of continuing deterioration, inspite of maximum medical management. CSVT generally has a favourable prognosis with good ,short and long term outcomes when the acute phase of illness has been survived.

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