

CLINICAL PROFILE IN MRI PROVEN CEREBRAL VENOUS SINUS THROMBOSIS IN A TERTIARY HOSPITAL IN TAMIL NADU

G. Anitha¹, N. K. Senthilnathan², M. Rajasekaran³, R. Elanchezian⁴, L. Muthuman⁵

¹Professor, Department of Medicine, K. A. P. Viswanatham Government Medical College/MGM Government Hospital, Trichy, Tamilnadu.

²Assistant Professor, Department of Medicine, K. A. P. Viswanatham Government Medical College/MGM Government Hospital, Trichy, Tamilnadu.

³Assistant Professor, Department of Medicine, K. A. P. Viswanatham Government Medical College/MGM Government Hospital, Trichy, Tamilnadu.

⁴Junior Resident, Department of Medicine, K. A. P. Viswanatham Government Medical College/MGM Government Hospital, Trichy, Tamilnadu.

⁵Assistant Professor, Department of Medicine, K. A. P. Viswanatham Government Medical College/MGM Government Hospital, Trichy, Tamilnadu.

ABSTRACT

BACKGROUND

CVT is a rare type of cerebrovascular disease that can occur at any age. The widespread use of neuroimaging now allows for early diagnosis and has completely modified our knowledge on this disorder. CVT is more common than previously thought and it is recognised as a disorder with a wide spectrum of clinical presentations.

AIMS & OBJECTIVE

- To establish the clinical spectrum of the disease.
- To determine the relationship between clinical findings, lab investigations and magnetic resonance imaging with venogram findings in CVT.

MATERIALS AND METHODS

The purpose of the study was explained to the patients and an informed written consent was obtained. Patients presenting with signs and symptoms suggestive of cerebral venous sinus thrombosis were evaluated. The diagnosis of cerebral sinus venous thrombosis is to be confirmed by MRI combined with MR venogram. The patients were analysed for clinical presentations, signs and symptoms, imaging findings, location and extent of the thrombus, and parenchymal lesions and based on the data to establish the correlation between clinical and MRI/MRV findings. Unpaired 't' test and Chi square test were used to analyse the significance.

RESULTS

47% of the cases had a sub-acute onset while 40% had acute onset of symptoms. Headache is the most common presentation followed by seizures and focal neurological deficits and 21% of the cases presented with altered sensorium. Superficial sinuses were involved in 79% of cases. Most common site is superior sagittal sinus and superficial cortical veins. Deep sinus was involved in 21% of cases. 62% of patients had a haemorrhagic infarct or an associated finding. 13.2% succumbed to the illness. MRI/MRV proved to be better investigation to confirm the diagnosis than CT brain.

DISCUSSION AND CONCLUSION

The spectrum of the disease includes headache, seizures, focal neurological deficits, altered sensorium and other neurological signs. Most commonly superficial cortical veins, superior sagittal sinus are involved. Patients with deep CVT/IJV involvement had a poor prognosis.

KEYWORDS

Cerebral venous sinus thrombosis, computed tomography, magnetic resonance imaging, superior sagittal sinus, haemorrhagic infarct, puerperium CVT.

HOW TO CITE THIS ARTICLE: Anitha G, Senthilnathan NK, Rajasekaran M, et al. Clinical profile in MRI proven cerebral venous sinus thrombosis in a tertiary hospital in Tamilnadu. J. Evid. Based Med. Healthc. 2016; 3(31), 1454-1459.

DOI: 10.18410/jebmh/2016/331

Financial or Other, Competing Interest: None.
Submission 18-03-2016, Peer Review 23-03-2016,
Acceptance 07-04-2016, Published 18-04-2016.
Corresponding Author:
Dr. L. Muthumani,
Assistant Professor, Department of Medicine,
K. A. P. Viswanatham Government Medical College/
MGM Government Hospital, Trichy, Tamilnadu.
E-mail: drmuthumani@yahoo.co.in
DOI: 10.18410/jebmh/2016/331

INTRODUCTION: Venous stroke is more common than once thought. Cerebral venous thrombosis includes dural sinus thrombosis and thrombus in the deep or cortical cerebral venous system. Cerebral venous sinus thrombosis is one of the important causes of stroke in young and in postpartum states.

The presentations may mimic arterial stroke or mass lesion.^{1,2}

The pathophysiology of venous stroke differs from that of arterial stroke. While arterial stroke presents with cytotoxic oedema, venous stroke induces vasogenic and interstitial oedema due to venous congestion.

Given the varying presentations, diagnosing CVT remains a challenge. Although CVT may present with varying signs and symptoms, Headache is the most common and earliest presentation. The diagnosis requires high index of suspicion. Early diagnosis can lead to complete recovery provided the patient survives the acute episode.³

CT brain may show direct or indirect signs of CVT, but it may be normal in 10-30% of cases. Hence there arises the need for magnetic resonance imaging with venography for establishing the diagnosis of CVT.

CVT is considered a medical emergency, mode of onset highly variable and spectrum of clinical presentation extremely wide.⁴

This study analysis a sample of patients with CVT, their clinical presentations and laboratory evaluation.

AIMS & OBJECTIVE:

- To provide an overview of various clinical presentations in cerebral venous thrombosis.
- To establish the spectrum of the disease so that early diagnosis is possible.
- To determine the relationship between clinical findings and magnetic resonance imaging with venogram findings in CVT.
- To establish/determine poor prognostic factors based on the MRI/MRV findings and lab investigations.

MATERIALS AND METHODS:

- The Study was done at Mahatma Gandhi Memorial Govt. Hospital attached with K.A.P.V. Govt. Medical College, Tiruchirapalli.
- The study, was conducted during the period of 24 months from September, 2013 to August 2015.
- Type of study: Analytical type of cross-sectional study
- Patients presenting with signs and symptoms suggestive of cerebral venous sinus thrombosis were evaluated and subjected to MRI/MRV.
- The diagnosis of cerebral sinus venous thrombosis to be confirmed by MRI combined with MR venogram.

Inclusion Criteria:

- MRI/MRV showing definite cerebral venous sinus thrombosis
- All men and women with definite CVT above 12 years of age

Exclusion Criteria:

- Doubtful CVT/definite diagnosis could not be established with MRI/MRV (Inconclusive).
- Hypertensive haemorrhage.
- Arterial stroke.
- Arteriovenous malformations.
- Space occupying lesions.
- Metabolic encephalopathy.

The purpose of the study was explained in detail to the patient and an informed written consent obtained. Data was collected using a pretested proforma meeting the objectives of the study.

Parameters Studied: All patients were interviewed in detail and history regarding fever, sepsis, oral contraception, and puerperium were obtained in detail. Clinical examination of the patient included general examination, systemic examination including detailed neurological examination.

The investigations included haemoglobin, complete blood count, urea, serum creatinine, blood sugar, uric acid, peripheral smear. Imaging studies included magnetic resonance imaging including venography, CT brain, x-ray chest, ultrasound of the abdomen and echocardiogram (in selected cases).

The patients were analysed for clinical presentations, signs and symptoms, imaging findings, location and extent of the thrombus, and parenchymal lesions and based on the data to establish the correlation between clinical and MRI/MRV findings.

The data was analysed by using SPSS version 16. The values were expressed as Mean (±SD) unpaired 't' test was used to find out the difference between the groups. The 'p' value of less than 0.05 was considered as statistically significant.

RESULTS AND ANALYSIS:

Age	Frequency	Percent (%)	Cumulative percent (%)
< 20	4	7.5	7.5
20-40	39	73.6	81.1
41-60	9	17	98.1
>60	1	1.9	100
Total	53	100.0	

Table 1: Distribution of study subjects according to age (n=53)

Mean±SD=32.55±10.8.
 Median (IQR)=29(13-67).
 Majority of the study subjects (73.6%) were in the age group 20 to 40 years of age.

Gender	Frequency	Percent (%)
Male	21	39.6
Female	32	60.4
Total	53	100

Table 2: Distribution of study subjects according to gender (n=53)

Females were predominant than males with 60.4% versus 39.6% among the study subjects.

Duration of symptoms	Frequency	Percent (%)
< 2 days	21	39.62
48 hours to 30 days	25	47.17
>30 days	7	13.21
Total	53	100

Table 3: Distribution of study subjects according to duration of symptoms (n=53)

Mean (±SD) duration of symptoms=18.7 (±40.5) days. Median (IQR) = 4(1-180).

About 39.62% of the study subjects had their signs and symptoms between 0 to 2 days of duration. The rest 47.17% and 13.21% had their time duration of about 2 to 30 days and > 30 days respectively.

Tobacco Use	Frequency	Percent (%)
Yes	12	22.6
No	41	77.4
Total	53	100

Table 4: Distribution of study subjects according to tobacco use (n=53)

About 22.6% were tobacco users and all were males. No females in the study reported to have any kind of tobacco use.

Alcohol use	Frequency	Percent (%)
Yes	16	30.2
No	37	69.8
Total	53	100

Table 5: Distribution of study subjects according to alcohol consumption (n=53)

About 30.2% were alcoholics and all were males. No females in the study reported to have alcohol consumption.

Pregnancy related	Frequency	Percent (%)
Yes	18	56.2
No	14	43.8
Total	32	100

Table 6: Distribution of females in relation to pregnancy (n=32)

Among the female subjects, around 56.2% had their CVT related to pregnancy.

Clinical Features*	Frequency	Percent (%)
Headache	47	88.7
Seizures	26	49.1
Neurological deficit	14	26.4
Altered sensorium	11	20.8
Giddiness	1	1.9
Fever	2	3.8
Blurring of vision	5	9.4
Vomiting	5	9.4

Table 7: Distribution of study subjects according to clinical signs and symptoms (n=53)

* The clinical features were not mutually exclusive.

Regarding the clinical features, majority (88.7%) had headache followed by seizures (49.1%), neurological deficit (26.4%), altered sensorium (20.8%), giddiness (1.9%), fever (3.8%), blurring of vision (9.4%) and vomiting (9.4%) respectively.

Clinical features*	Frequency	Percent (%)
Superior sagittal sinus	30	56.6
Transverse sinus	15	28.3
Sigmoid sinus	4	7.5
Cavernous sinus	1	1.9
Internal Jugular vein	3	5.7
Superficial vein involvement	25	47.2
Straight sinus	1	1.9
Thalamic involvement/ deep cerebral vein	5	9.4
Inferior sagittal sinus	0	0
More than one sinus involvement	24	45.3

Table 8: Distribution of study subjects according to sinuses involved (n=53)

*The clinical features were not mutually exclusive.

Type of sinus	Frequency	Percent (%)
Superficial	42	79.2
Deep	11	20.8
Total	53	100

Table 9: Distribution of study subjects according to superficial or deep sinuses (n=53)

About 79.2% of the study subjects had CVT in superficial sinuses with the rest 20.8% in deep sinuses.

Other MRI findings*	Frequency	Percent (%)
Present	33	62.3
Absent	20	37.7
Total	53	100

Table 10: Distribution of study subjects according to presence of other associated MRI findings (n=53)

*Other associated MRI findings were haemorrhagic infarction, cerebral oedema, thalamic infarct.

About 62.3% of the study subjects showed other associated MRI findings.

Treatment	Frequency	Percent (%)
Heparinised	47	88.7
Not heparinised	6	11.3
Total	53	100

Table 11: Distribution of study subjects according to treatment given (n=53)

About 88.7% of the study subjects were heparinised and the rest 11.3% were not heparinised.

CVT outcome	Frequency	Percent (%)
Expired	7	13.2
Alive or discharged	46	86.8
Total	53	100

Table 12: Distribution of study subjects according to outcome of CVT (n=53)

Among the study subjects, 13.2% were dead and the rest 86.8% were alive.

Variable	Sub-group	CVT outcome		Total (n, row %)	p value	Chi square value or 't' statistic value
		Dead (n, row %)	Alive (n, row %)			
Age	Mean age (in years)	41.86	31.13	-	0.013 ^{cs}	-2.575 [#]
Gender	Female	5(15.6%)	27(84.4%)	32(100%)	0.521 [*]	0.412 [@]
	Male	2(9.5%)	19(90.5%)	21(100%)		
Duration of symptoms	Mean no. of days	3.71	20.98	-	0.299 ^{cs}	1.05 [#]
Altered sensorium	Yes	5(45.5%)	6(54.5%)	11(100%)	<0.0001 [*]	12.59 [@]
	No	2(4.8%)	40(95.2%)	42(100%)		
Type of sinus	Superficial	1(2.4%)	41(97.6%)	42(100%)	<0.0001 [*]	20.69 [@]
	Deep	6(54.5%)	5(45.5%)	11(100%)		

Table 13: Association of CVT outcome with independent variables (n=53)

Student 't' test was applied to test difference in mean age and mean duration of symptoms between those were alive and dead.

* Chi-square test was applied as a test of association and a p value of <0.05 is considered to reject null hypothesis.

't' statistic value.

@ Chi square value.

Variables like age of the subjects, presence of altered sensorium and Deep sinus involvement only were significantly associated with the mortality due to CVT.

Independent variables		OR (95% CI)	AOR (95% CI)	P value
Age (in years)		1.08(1.01-1.17)	1.009(0.91-1.116)	0.854
Altered sensorium	Yes	16.67(2.61-106)	6.12(0.6-74.3)	0.120
	No	1	1	
Type of sinus involved	Deep	49.2(4.87-496.4)	26.7(2.02-353.4)	0.013
	Superficial	1	1	

Table 14: Multivariate logistic regression showing association between independent variables and outcome of CVT among the study subjects (n= 53)

- In the univariate logistic regression analysis, variables like age of the subjects, presence of altered sensorium and Deep sinus involvement were significantly associated with the mortality due to CVT.
- In the multivariate logistic regression analysis, only presence of Deep sinus involvement was significantly associated with the dependent variable. The rest of the variables lost their significance after adjusting with other variables.

DISCUSSION: In our study, a total of 53 patients were studied.

- 1. Age Distribution:** The majority of the patients were in the age group of 20 to 40 years in our study. 73.6% belonged to this age group.

The mean age of the study group was 32.5 years. The present study showed similar findings with 73.6% in 20 to

40 age group which is comparable to Daif et al – mean age 27.8.

The higher mean age may be attributed to the more number of male patients in the present study.

- 2. Sex Distribution:** In our study, females were predominantly affected when compared to males. (60.4% vs 39.6%). M:F ratio 1:1.5.

The ratio is comparable with the previous studies like Agarwal DS et al – M:F 1:1.38 and Mehta SR et al – 1:1.4.⁵

- 3. Types of CVT Patients:** The present study group contained 53 patients out of which 18 were related to pregnancy (33.9%). 14 patients were females not related to puerperium. 21 were male patients. When compared to other studies Nagaraj et al- 86%,⁶ sheriff et al – 90%,⁷ Neki NS et al- 62%,⁸ the present study has less percentage of puerperal CVT.

The present study emphasis that non puerperal CVT is not as rare as previously thought.

4. Duration of Symptoms: In the present study, 81% of the patients had their symptoms within 10 days of duration. The median was 4 days while the mean was 18 days. This is comparable with the results of Shariff et al (76%) and Kumar et al⁹ (69%).

5. Symptoms and clinical signs: Headache was the most common symptom as seen in various other studies.^{10,11} 88.7% of patients in this study had headache. In most of the patients, headache was an associated symptom. Headache as the only symptom of CVT was seen in 23.9%. Headache alone as the presenting symptom did not result in mortality.

The results of this study is comparable with Shariff et al, Neki S et al and Daif et al.

Sinus Involved:

Sl. No	Sinus involved	Ameri et al	Daif et al	Strolz et al	Shariff et al	Present study
1	Superior sagittal sinus	72%	85%	72.2%	65%	56.6%
2	Transverse sinus, Sigmoid sinus	70%	2.5%	38%	25%	28.3% 7.5%
3	Straight sinus,	16%	7%	7.6%	15%	1.9%
4	Sigmoid sinus, Jugular vein		32%	20.3% 7.6%	20% 20%	7.5% 5.7%
5	Internal cerebral veins	8%	10%	6.3%	10%	9.4%

Table 15: Showing the percentage of different sinus involvement in various studies

Similar to other studies, the present study also showed that superior sagittal sinus as the commonly involved sinus. Next common was the Transverse sinus.

Mortality:

Sl. No	Author	No. of cases	Percentage mortality
1	Bansal et al	138	27.5
2	Srinivasan et al ¹⁴	135	25.9
3	Nagaraj et al (46)	200	21.7
4	Strolz et al	79	15
5	Shariff et al	40	10
6	Present study	53	13.2%

Table 16: Showing the percentage of mortality in various studies

The mortality rate was comparable with that of Shariff et al and Strolz et al.

IV Heparin followed by oral anticoagulant is the treatment of choice even in the presence of haemorrhagic infarct.^{15,16}

CONCLUSION: Any young/ middle aged adult presenting with focal deficits or seizures or visual disturbances preceded by headache – think of CVT.

Seizures: The present study showed that 49.1% of patients had seizures at presentation or in the course of includes. This includes both focal and generalised seizures. The result is comparable with that of Stolz et al¹¹ and Ameri et al.¹²

Focal Deficit: The present study shows 26.4% of patients presented with neurological deficits. It includes hemiparesis, hemisensory disturbance. This is comparable with Bousser et al.¹³ All other studies showed a higher percentage with focal deficits.

Altered Sensorium: In our study, 20.8% patients presented with altered sensorium. The result was comparable with Ameri et al and Bousser et al. All other studies had a higher percentage of patients. This probably is due to exclusion of postictal confusion from altered sensorium in the present study.

- The spectrum of the disease includes simple headache, seizures, focal neurological deficits, altered sensorium and other neurological signs.
- Do a MRI/MRV as soon as possible.
- Most commonly superficial cortical veins, superior sagittal sinus are involved.
- Followed by transverse sinus, sigmoid sinus and then deep sinus.
- Multiple sinus involvement is seen in around 45% of cases.
- Patients with deep CVT/IJV involvement had a poor prognosis.

SUMMARY: This study was aimed to determine the clinical profile in cerebral venous sinus thrombosis. This study included 53 patients.

- Mean age of the patients is 32 years while the median age is 29 years. Majority of the patients belonged to the 20 to 40 age group, which formed 73.8% of cases.
- Though females (60%) outnumbered the male (40%) patients, CVT in males is not a rare entity.

- Among the females, 56% is related to pregnancy. Nonpuerperal CVT occurred in 14 patients forming 44% of the female patients.
- 30% of the cases were alcoholics and 22% were tobacco users. All were males.
- Mean duration of presentation was 18 days and the median was 4 days. 47% of the cases had a subacute onset while 40% had acute onset of symptoms.
- 9.4% had a past history of hypertension and diabetes.
- Headache is the most common presentation followed by seizures and focal neurological deficits and 21% of the cases presented with altered sensorium.
- CVT following OC pill intake is seen in 6.2% of cases and 51% of cases were anaemic.
- Superficial sinuses were involved in 79% of cases. Most common site is superior sagittal sinus and superficial cortical veins. Deep sinus was involved in 21% of cases.
- 62% of patients had a haemorrhagic infarct or an associated finding.
- 86.8% of patients recovered from the illness, while 13.2% succumbed to the illness.
- Although Septic venous sinus thrombosis has become a rare entity it still prevails in immunocompromised patients.
- MRI/MRV proved to be better investigation to confirm the diagnosis than CT brain.
- IV Heparin followed by oral anticoagulant is the treatment of choice even in the presence of haemorrhagic infarct.

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