

A Study on Clinical and Radiological Profile of Cerebral Venous Thrombosis

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Abstract:

Background: Cerebral venous thrombosis (CVT) is a life threatening condition with varied clinical presentations. It is mainly a diagnosis by means of radiological tool. CT Brain is the initial investigation of choice. It may be normal in 30 – 40 % of the population. MRI brain with MRV is the gold standard for the diagnosis of CVT, varied reasons for availability and affordability of MRI imaging can make diagnosis of CVT a challenge. Early diagnosis of this condition will prevent mortality and morbidity. This study aims to evaluate different clinical presentation of CVT and its radiological features.

Methods: In 40 subjects with symptoms suggestive of CVT and diagnosed to have cerebral venous sinus thrombosis by means of MRI brain and MR venogram at Tertiary Care Teaching Center, detailed history was taken and clinical examination was done after taking informed consent.

Results: Out of 40 subjects of CVT, 23 were female and 17 were male, female to male sex ratio is 1.35:1. The mean age of presentation is 35.9 years. Majority of the subjects (47.5%) have acute presentation. The most common presenting feature is headache (80%), followed by convulsions (60%) and focal deficits (50%). The most common sign is papilloedema (60%) followed by hemiparesis (35%). The commonest sinus involved is superior sagittal sinus (62.5%), followed by transverse sinus (52.5%) and sigmoid sinus (22.5%). CT brain was normal in 40% of the subjects.

Conclusion: Clinical presentation in CVT is extremely varied and symptoms may evolve over hours to weeks. Important clinical features to suggest this disorder are presentation with headache, seizures, papilloedema and focal deficits. Important radiological features in this study are cerebral edema, haemorrhagic and non-haemorrhagic infarct. MRV shows that most common sinus involved is Superior sagittal sinus, Transverse sinus, sigmoid sinus and Straight sinus. Less common involved are deep cerebral veins, superficial cerebral veins and Inferior sagittal sinus

Keywords: Cerebral Venous Thrombosis, Magnetic Resonance Imaging.

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Introduction

Cerebral venous thrombosis involves the thrombosis of the cortical veins and the draining venous sinuses, either alone or in combination. CVT affects 5 people per million annually and accounts for 0.5 -1 % of all strokes. About 75% of adult patients affected with CVT are females. [1,2] It accounts for 10-20 % of the etiology of young strokes in India[3,4,5]

More than 100 causes of cerebral venous sinus thrombosis have been recorded in the literature. However, even with extensive investigation no cause is identified in 20 – 25% of the cases.[6] CVT presents with a wide spectrum of symptoms and signs. Mode of onset is acute, subacute and chronic. Headache is the presenting symptom in

70-90% of cases, followed by seizures (40%), Focal deficits such as monoparesis, hemiparesis (40%), paraparesis, Hemi sensory disturbance, Impairment of level of consciousness (15-20%) and Papilloedema (20-30%).[7,8] The diagnosis is often missed because of its varied clinical presentation and highly variable mode of onset. The etiological factors are even more heterogeneous making cerebral venous thrombosis a unique clinical entity.

The disease can occur de nova as the first manifestation, or can overlap on another co existing clinical problem. The occurrence of thrombus depends upon the site, duration, extent and the rapidity with which the thrombus occur. So, the diagnosis of CVT requires high index of suspicion because of its

varied presentation. Neuroimaging used are CT brain, MRI brain and MR venography. Gold standard for the diagnosis is MR venography, as CT scan is positive in only 70% of cases.[9]

Material and Methods

This is an Observation study conducted in the Department of General Medicine at Tertiary Care Teaching Hospital in subjects >18 years presented with headache and other symptoms suggestive of cerebral venous thrombosis.

Inclusion Criteria: Age above 18 yrs Subjects presented with severe headache & other symptoms suggestive of CVT, who are diagnosed to have CVT by means of MRI & MRV in Tertiary Care Teaching Center.

Exclusion Criteria

- Pregnancy
- Pulmonary embolism or Deep vein thrombosis
- Arterial stroke within past 3 months
- Head injury within past 3 months
- Septicemia

Method of Collection: In all subjects with symptoms suggestive of CVT and diagnosed to have cerebral venous sinus thrombosis by means of MRI brain and MR venogram, detailed history was taken and clinical examination was done after taking informed consent.

Statistical Analysis: All the data were entered in a data collection sheet in an Excel format and analysed using SPSS Software. Numerical values were reported using mean and standard deviation. Categorical values were reported using number and percentages. Statistical significance will be shown by Chi-square test.

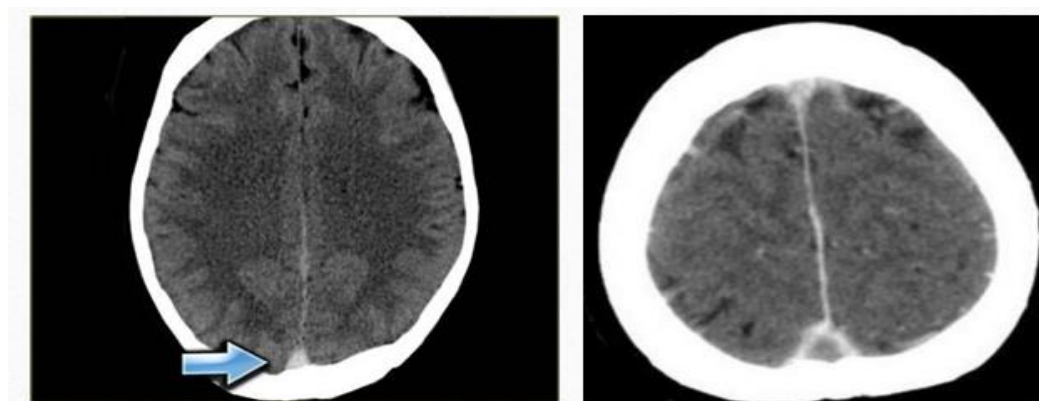


Figure 1: CT Brain showing dense triangle sign (Blue arrow) and empty delta sign (white arrow)

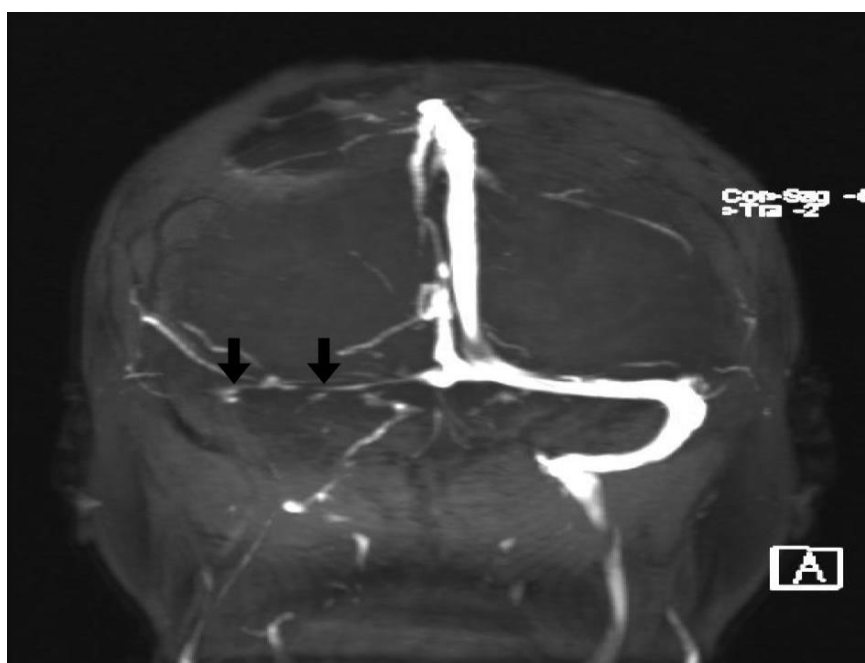


Figure 2: Magnetic resonance venography confirmed thrombosis (black arrows) of right transverse and sigmoid sinuses and jugular vein.

Results

Table 1: Age distribution in subjects with CVT

Age group (years)	Number of subjects	Percentage (%)
18-29	20	50
30-39	5	12.5
40-49	4	10
50-59	7	17.5
≥60	4	10
Total	40	100

Among 40 subjects with CVT, 20 subjects (50%) were in the age group 18-29 years, followed by 7 subjects (17.5%) in 50-59 years, 5 subjects (12.5%)

in 30-39 years, 4 subjects (10%) in 40-49 years and 4 subjects (10%) ≥60 years. Among 40 study subjects mean age is 35.9 ± 11.69 yrs.

Table 2: Sex distribution in subjects with CVT

Sex	Number of subjects	Percentage (%)
Female	23	57.5
Male	17	42.5
Total	40	100.0

Among the 40 subjects of CVT in the study, 23 were females (57.5%) and 17 were males (42.5%). The ratio of female: male was 1.35:1

Table 3: Mode of Onset of symptoms

Onset	Number of subjects	Percentage (%)
Acute	19	47.5
Subacute	15	37.5
Chronic	6	15
Total	40	100

Subjects who presented in < 48 hours were considered to have acute onset, between 48 hours to 30 days were considered subacute and > 30 days were considered as chronic. In the present study 19 subjects (47.5 %) had acute presentation, 15 subjects (37.5%) had subacute presentation followed by 6 subjects (15%) with chronic presentation.

Table 4: Clinical symptoms at presentation

Symptoms	Number of subjects	Percentage (%)
Headache	32	80
Convulsions	24	60
Focal deficits	20	50
Altered sensorium	14	35
Vomiting	12	30
Double vision	3	7.5
Blurring of vision	2	5

In the present study most common symptom is Headache in 32 subjects (80%) followed by Convulsions in 24 subjects (60%), Focal deficits in 20 subjects (50%), Altered sensorium in 14 subjects (35%), Vomiting in 12 subjects (30%), Double vision in 3 subjects (7.5%) and Blurring of vision in 2 subjects (5%).

Table 5: Clinical signs at presentation

Signs	Number of subjects	Percentage (%)
Papilledema	24	60
Hemiparesis	14	35
Cranial nerve palsy	8	20
Dysphasia	4	10

In the present study Papilledema is present in 24 subjects (60%), Hemiparesis in 14 subjects (35%), Cranial nerves palsy in 8 subjects (20%) and Dysphasia in 4 subjects (10%).

Table 6: Cranial nerves involvement in CVT

Cranial nerves	Number of subjects	Percentage (%)
Facial	4	10
Abducent	2	5
Oculomotor	2	5
Total	8	20

Among 8 subjects (20%) with cranial nerves palsies, 4 subjects (10%) had facial nerve involvement followed by 2 subjects (5%) with abducent and 2 subjects (5%) with oculomotor nerve palsy.

Table 7: CT Brain plain in subjects with CVT

CT Brain	Number of subjects	Percentage (%)
Normal	16	40
Abnormal	24	60
Total	40	100

Among 40 subjects of cerebral venous thrombosis CT Brain was abnormal in 24 subjects (60%) and normal in 16 subjects (40%).

Table 8: Spectrum of CT Brain plain findings in CVT

CT Brain Abnormality	Number of subjects	Percentage %
Cerebral edema	18	45
Haemorrhagic infarct	13	32.5
Cord sign	6	15
Non Haemorrhagic infarct	5	12.5

In subjects with abnormal CT Brain, Cerebral edema in 18 subjects (75%), Haemorrhagic infarct seen in 13 subjects (32.5%), Cord sign in 6 subjects (15%) and Non Haemorrhagic infarct in 5 subjects (12.5%).

Table 9: Spectrum of MRI brain findings in CVT

MRI Brain Abnormality	Number of subjects	Percentage (%)
Cerebral edema	24	60
Haemorrhagic infarct	16	40
Non Haemorrhagic infarct	8	20

Among 40 subjects with CVT, in MRI brain cerebral edema seen in 24 subjects (60%), Haemorrhagic infarct in 16 subjects (40%) and Non Haemorrhagic infarct in 8 subjects (20%).

Table 10: Sinus involvement by MRV in CVT

Sinus involved in MRV	Number of subjects	Percentage (%)
Superior sagittal sinus	25	62.5
Transverse sinus	19	47.5
Sigmoid sinus	9	22.5
Straight sinus	6	15
Deep cerebral veins	4	10
Superficial cerebral vein	2	5
Inferior sagittal sinus	1	2.5

Among 40 subjects with CVT, MRV shows that most common sinus involved is Superior sagittal sinus in 25 subjects (62.5 %), Transverse sinus in 19 subjects (47.5%), Sigmoid sinus in 9 subjects

(22.5%), Straight sinus in 6 subjects (15%), Deep cerebral veins in 4 subjects (10%), Superficial cerebral veins in 2 subjects (5%) and Inferior sagittal sinus in 1 subject (2.5%).

Table 11: Number of sinus involved in MRV

MRV	Number of sinus involved	Number of subjects	Percentage %
1		18	45
2		19	47.5
3		3	7.5
Total		40	100

In the present study of 40 subjects 1 sinus was involved in 18 subjects (45%), 2 sinuses involved in 19 subjects (47.5%) and 3 sinuses involved in 3 subjects (7.5%).

Discussion

The mean age in this study is 35.9 years which is comparable with previous studies conducted by Isabelle, Nagaraja et al and Stolz et al [10] in which mean age in study subjects were 36.2, 27.8, 32.3 and 42.8 years.

The ratio of the male to female subjects in this study was 1:1.35 and this closely correlated with the ratio obtained in the study carried out by Daif et al, [11] where the sex ratio was 1:1.3. Similar observations are observed in the studies conducted by Agarwal et al 1:1.38, [12] Mehta et al 1:1.4 and Akila et al 1:1.3. [13,14]

In this present study 47.5 % of subjects had acute presentation, 37.5% had subacute presentation followed by 15% subjects with chronic presentation which is comparable with Bousser et al and Isabella et al studies. [15,16]

Headache was the most common symptom in the present study accounting for 80% of subjects. The present study is comparable with most other studies like Bousser et al. 74%, and Mehta SR et al. 77.8%. [15,13]

In the present study, 60% subjects had convulsions which is comparable with Kumar S et al in which 67% had convulsions. [17] In the studies conducted by Bousser et al and Stolz et al convulsions were present in 29% and 39.2% respectively. [15,18] In the present study, 50% of subjects had focal deficits which is comparable to Stolz et al study 56%. [18] In the studies conducted by DR. A Akila et al and Bousser et al focal deficits was present in 40% and 35% respectively. [14,15]

In the present study, 35% of subjects had altered sensorium which is comparable with Stolz et al with 36.7%. In other studies conducted by Bousser et al altered sensorium was present in 26% subjects. In the present study, 60% of subjects had Papilloedema which is comparable with DR. Akila et al 60%. In other studies conducted by Bousser et al and Kumar S et al Papilloedema was present in 45% and 32% respectively.

The cranial nerve involvement in CVT is around 30 % in our study which is comparable to study conducted by DR A.Akila et al 22% and Daif et al 14

%. The most common CT brain finding in the present study is Haemorrhagic infarction present in 54% of study subjects which is comparable with other studies like Nagaraj et al and Dixit et al with 40.9% and 48.4% respectively. Non-Haemorrhagic infarct seen in 20.8 % of subjects in the present study whereas in other studies like Nagaraj et al and Dixit et al it is seen in 51.6% and 32.3% respectively. Cord sign is seen in 25% subjects in the present study which is comparable with other studies like Nagaraj et al and Dixit et al 21.9% and 23.3 % respectively.

In the present study most common cerebral venous sinus involved is Superior sagittal sinus 62.5% followed by Transverse sinus, Sigmoid sinus, Straight sinus, Deep cerebral veins and Superficial cerebral veins 52.5%, 22.5%, 15%, 10% and 5% respectively which is comparable with other studies like DR. A. Akila et al, Daif et al and Bousser et al.

Conclusion

Clinical presentation in CVT is extremely varied and symptoms may evolve over hours to weeks. Important clinical features to suggest this disorder are presentation with headache, seizures, papilloedema and focal deficits.

Important radiological features in this study are cerebral edema, haemorrhagic and non-haemorrhagic infarct. MRV shows that most common sinus involved is Superior sagittal sinus, Transverse sinus, sigmoid sinus and Straight sinus. Less common involved are deep cerebral veins, superficial cerebral veins and Inferior sagittal sinus

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