



ORIGINAL RESEARCH PAPER

General Medicine

CLINICAL PROFILE AND BRAIN IMAGING OF CVT - A CROSS SECTIONAL STUDY

KEY WORDS: Cerebral venous thrombosis, CVT, MRI, MRV, cortical vein thrombosis

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ABSTRACT

Aim: To study & analyze the demographic factors, clinical manifestations, risk factors, etiology and the neuroimaging findings of CVT. **Methods:** Cross sectional study conducted on 35 cases in whom the diagnosis of CVT confirmed by imaging of brain (MRI and MRV) were included after meeting the inclusion criteria. **Results:** Mean age for males was 37 years and for females it was 28.2, (overall mean age 31.47) and male to female ratio was 1:2.5. Most common symptom was headache (74.3%) followed by focal neurological deficit, convulsions, altered sensorium and C.N palsy. Most common clinical feature was Papilledema (51.4%). Most common Etiological factor was Puerperium (42.8%). Common risk factors were Dehydration, hyperhomocysteinemia, meningitis, alcohol abuse, APLA syndrome. 2 cases were found to have COVID-19 infection as a risk factor. Superior Sagittal Sinus (74.28%) was the most common sinus involved followed by transverse sinus (40%), 42.85% of patients had involvement of more than one sinus. None of our patients had isolated cortical vein thrombosis. **Conclusion:** CVT, due to its wide spectrum of clinical presentation might be confused with other pathologies and hence the diagnosis may get easily missed or delayed. The clinical picture can vary from headache refractory to analgesics to coma. CVT should be suspected whenever a young adult presents with symptoms and signs of raised intracranial tension with or without other neurological symptoms, also when presents with stroke especially in the absence of vascular risk factors. CVT should always be suspected whenever brain imaging shows hemorrhagic infarct. Since one may get misguided by a normal CT brain study, MRI and MRV is advised to confirm the diagnosis of CVT.

INTRODUCTION

Cerebral venous thrombosis (CVT) is an important cause of stroke in young adults (mean age 33 years with a two-thirds female preponderance) caused by complete or partial occlusion of the major cerebral venous sinuses² (*cerebral venous sinus thrombosis*) or the smaller feeding cortical veins (*cortical vein thrombosis*). CVT is frequently missed or diagnosed late because it can mimic other acute neurological conditions and can only be recognized with optimal and timely brain imaging. CVT accounts for 0.5–1.0% of unselected stroke admissions and is about three times as common in women than men, probably partly due to its association with pregnancy, the puerperium and the use of estrogen-containing oral contraceptives³.

Important risk factors for CVT are oestrogen-containing oral contraceptives, prothrombotic (hyper-coagulable) condition, pregnancy and the puerperium, infections, malignancy, head injury (causing direct trauma to venous structures) and inflammatory diseases. The International Study on Cerebral Vein and Dural Sinus Thrombosis found that up to 85% of adult patients have at least one risk factor. CVT can be caused by a number of prothrombotic states and disorders of clotting system such as inherited cause is Protein C resistance secondary to Factor V Leiden polymorphism, Protein C and S resistance, and antithrombin III deficiency.⁴ Other vasculitis such as Systemic lupus erythematosus (SLE) and polyarteritis nodosa (PAN) are also relevant in young adults. Dehydration is still most common cause puerperal CVT in our country.

Onset of symptoms may be acute, subacute, or chronic. Cerebral venous infarction is the most serious consequence of cerebral venous thrombosis. Chief complaints are headaches, vomiting, transient visual obscurations, focal or generalized seizures, lethargy, or coma. Papilledema is common.⁵ There may be alternating focal deficits, hemiparesis or paraparesis, or other focal neurological deficits according to the location of the venous structure involved.

Salient radiological features are the presence of low-density areas of infarction, hemorrhages, and small ventricles. There

may be visualization of thrombus within the sinus on post contrast images (empty delta sign) or direct visualization of the clot. The availability of MR venography makes it possible to diagnose early and atypical cases. MR venography is a reliable diagnostic tool and has replaced angiography for the diagnosis of cerebral venous thrombosis.

AIM & OBJECTIVES

To study the demographic factors, clinical manifestations, risk factors and the neuroimaging findings in 35 patients of cerebral venous thrombosis.

METHODS & MATERIALS

Study design: Cross sectional study.

Study Material:

The study was conducted on 35 radiologically confirmed cases of CVT admitted in Medicine and Neurology departments of Meenakshi Medical College Hospital during the period from 2019 September to 2021 February

INCLUSION CRITERIA: 1) Patients with confirmed clinical and radiological diagnosis of cerebral venous thrombosis and 2) With age > 16 years were included

EXCLUSION CRITERIA: 1) Patients whose clinical presentation could be explained by any other neurological disease. 2) Patients without radiological evidence of CVT. 3) Patients with age < 16 yrs were excluded.

PROCEDURE

This study was conducted over a period of 18 months. Obtained Informed consent from all of our patients. All 35 patients in whom the diagnosis of CVT was confirmed by computed tomography & MRI brain venogram were included in this study. All patients underwent basic investigations, such as hemogram, electrolytes, blood sugar levels, renal function tests, and chest radiographs. Liver function tests, coagulation studies, inflammatory markers, and homocysteine levels were done in selected patients because of financial constraints. Males with Hb level of < 13 g/dl and females with Hb level of < 12 g/dl were considered to have anemia in our study.

RESULTS:

SYMPTOMS AND CLINICAL FEATURES

Most common symptom was Headache (74.3%), 81% had diffuse type of headache and rest had localised headache, Most common clinical feature was Papilledema (51.4%), M.C pattern of weakness was hemiparesis (11/16, 68.8%) followed by monoparesis (5/16, 31.2%), Cranial Nerve involvement was noted in 17.1%. Most common cranial nerve affected was unilateral 6th Nerve palsy (66.7%) followed by facial (16.7%) and ninth and 10th palsy in one patient. Vomiting was present in 14 patients (40%), Seizures was observed in 34.3% of the patients. The generalised tonic clonic seizure type was the most common semiology observed (83.3%). 2 patients had focal seizures. Aphasia was observed in 11.4% and all of them were brocas aphasia, Sensory symptom was present in 14.3% of patients, of which numbness was the predominant sensory symptom

Table 1 Symptoms and Clinical features

Presentation	No of patients	Percentage
Headache	26	74.3%
Motor deficit	16	45.7%
C.N palsy	6	17.1%
Altered Mentation	11	31.4%
Convulsions	12	34.3%
Vomiting	14	40%
Papilledema	18	51.4%
Sensory symptoms	5	14.3%
Aphasia	4	11.4%
Stupor	2	5.7%

ETIOLOGY

Most common Etiological factor was Puerperium Among 25 females, 15 were in puerperium, that was 60% of total females in our study, Mean age of females with puerperal CVT is 24.93, less than that of other females (39.2 yrs), Among 15 cases, 7 patients had symptoms onset with in 14 days postpartum. 7 were second gravida, 4 third gravida and 4 were primi. Among the 15 patients 4 (26.6%) were post LSCS patients and none of these females had PIH in the antepartum period, Dehydration, one of the important causes of CVT was noted in 8 of our patients, 3 of them were alcoholics. 2 known case of Polycythaemia vera presented with Superior sagittal sinus thrombosis in our study. 2 patients had CVT associated with meningitis, two patients had hyperhomocysteinemia, both of them were alcoholics. 2 cases found to be having Nephrotic syndrome as an Etiology for CVT. 2 patients were got admitted with CVT and tested COVID Positive, both of them were having symptoms related to Covid-19 for >7 days duration, according to the history One of our patient was a case of SLE. She was 23-year-old, presented with acute onset headache and GTCS. 5.7% cases turned out to be APLA syndrome. One patient found to have disseminated intravascular coagulation. She had haemorrhagic infarct in CT brain and MRI with MRV showed superior sagittal sinus thrombosis.

TABLE 2 Etiology

Etiology	No of cases	Percentage
Puerperium	15	42.8
Dehydration	8	22.8
APLA	2	5.7
SLE	1	2.8
Meningitis	2	5.7
DIC	1	2.8
Polycythaemia Vera	2	5.7
Hyperhomocysteinemia	2	5.7
Nephrotic syndrome	2	5.7

BRAIN IMAGING

All the 35 patients underwent both CT brain and MRI brain with MRV. CT brain was done as an initial investigation and 25.72% had normal study. Haemorrhagic infarct,

characteristic of venous infarct was noted in 57.14% of patients and Non haemorrhagic infarct occurred in 17.14% of patients.

Dense delta sign suggesting superior sagittal sinus thrombosis was noted in 17.14% in CT Brain MRI with MRV showed that among the individual sinuses, superior sagittal sinus (SSS) was the most common sinus involved (74.28% of patients), followed by the transverse sinus (40% of patients). Less commonly involved were the sigmoid and the straight sinus. 42.85% of patients had involvement of more than one sinus, most commonly involvement of both SSS and transverse sinus (22.85%). 5 (14.28%) patients showed involvement of more than 2 sinuses of which 2(5.71%) had involvement of all 4 sinuses. None of our patients had isolated cortical vein thrombosis.

Table 3 Brain Imaging

CT Brain Findings	No of cases	Percentage
Normal Study	9	25.72
Haemorrhagic infarct	20	57.14
Non-Haemorrhagic infarct	6	17.14

MRI with MRV Sinus involved	No of Cases	Percentage
SSS	26	74.28
Transverse	14	40
SSS & Transverse	8	22.85
Sigmoid	5	14.28
Straight	3	6.67

CONCLUSIONS

Cerebral Venous Sinus Thrombosis still remains the most common cause of treatable and reversible causes of stroke in young. CVT, due to its wide spectrum of clinical presentation might be confused with other pathologies and hence the diagnosis may get easily missed or delayed.

The clinical picture can vary from headache refractory to analgesics to coma. Since headache is the most common symptom, CVT should be suspected whenever a young adult presents with symptoms and signs of raised intracranial tension with or without other neurological symptoms.

Since presentation with headache as a sole symptom is not uncommon, CVT should be a differential diagnosis of significant headache in young adults even in the absence of other signs and symptoms and examination of the fundus to rule out papilledema might serve as an important tool in arriving at a diagnosis when suspected.

CVT might be the underlying cause when a patient presents with diffuse encephalopathy, focal deficit, seizures, psychiatric symptoms or migraine. Hence CVT should be suspected when a young adult presents with stroke especially in the absence of vascular risk factors.

There is a definite variation in the risk factor profile of CVT from that of the west. Peripartum CVT is the leading risk factor in our setting thus enforcing the importance of suspecting CVT in every peripartum female with neurological symptoms and also educating these females about the symptoms of the disease and the importance of reporting early to hospitals once symptoms appear.

CVT should always be suspected whenever imaging of the brain shows haemorrhagic infarct especially in non-arterial territories. Since one may get misguided by a normal CT brain study, it is better to do more sensitive investigations like MRI and MRV whenever possible to confirm the diagnosis of CVT.

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