

A Study of Clinical Profile, Risk Factors and Outcome of Cerebral Venous Sinus Thrombosis

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Abstract

INTRODUCTION: Cerebral venous thrombosis is thrombosis of cerebral veins and dural sinuses which can cause a stroke. Timely diagnosis of cerebral venous thrombosis is needed to decrease morbidity and can be life-saving. **MATERIAL & METHODS:** It was a prospective observational study done from October 2017 to September 2019. The present study was carried out on 30 patients admitted in the Department of Medicine and Neurology with a confirmed diagnosis of Cerebral Venous Sinus Thrombosis. All patients assumed to have CSVT/CVST were investigated BUT only those candidates who are confirmed with MRI, MR venogram were taken up for study **RESULTS:** Mean age of patients was 37.6. Majority of patients belonged to nonpuerperal CSVT at 86.7%. The most common risk factors found in females was anemia and puerperium whereas in males it was hyper homocysteinemia and protein S deficiency. Radiological finding commonly seen was hemorrhagic infarction in 43.3% whereas non hemorrhagic infarction seen in 33.3%. The classical cord sign was seen in 13.3%. LMWH was used for 90% of 70 cases and intravenous unfractionated heparin was given for 10% of cases, whereas 13.33% of cases needed decompressive craniotomy. As a whole there was a favourable outcome in 67.86% of cases having complete recovery at the time of discharge and the mortality rate was around 10%. **CONCLUSIONS:** In order to prevent further relapses evaluation should be done in search of procoagulant condition and if present lifelong anticoagulation needs to be given. Medical management usually suffices. In spite of appropriate medical management if patient continues to deteriorate then surgical decompression can be opted.

Key Words: Cerebral Venous Sinus Thrombosis, clinical profile, risk factors, outcome

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I. Introduction

Cerebral Venous Thrombosis (CVT/CVST) is thrombosis of cerebral veins and dural sinuses which can cause a stroke. With the help of Magnetic resonance imaging (MRI) and awareness CVT is easily diagnosed. Commonly encountered in persons aged below 40, thrombophilias, pregnant women or women using contraceptive pills, CSVT is diagnosed by neurologists, neurosurgeons, emergency physicians, obstetricians and physicians.

Though there are numerous causes of cerebral venous sinus thrombosis¹ even after thorough investigation aetiology is not found in 20 – 25% of the cases².

The clinical presentation can be varied depending on the sinus involved. The most common complaint is a headache (70-90%). Hemiparesis and hemisensory disturbance, epilepsy, decreased glasgow coma scale and papilloedema are seen in many patients. CVT commonly involves superior sagittal sinus (72%) and the lateral sinus (70%).^{2,3,4}

In 30-40%, more than one sinus is thrombosed⁵. Neuroimaging is essential for diagnosis and imaging modalities of choice in CVST are CT scan and MRI with MR Venogram. CT scan is of no clue in 15-30%, but MRI with MRV is almost 100% diagnostic.

Treatment options include anti-thrombotic therapy with un-fractionated heparin, low-molecular-weight heparins (LMWH), oral anticoagulants, intravenous thrombolysis, local thrombolysis by selective sinus catheterization and a combination of thrombolysis and anticoagulation plus symptomatic therapy⁶. Case fatality rate is less than 5% and in 80% there are no permanent sequelae^{7,8}. Timely diagnosis of cerebral venous

thrombosis is needed to decrease morbidity and can be life-saving. Hence a prospective observational study has been taken to describe the aetiology, clinical features, diagnosis, and prognosis of CVST.

II. Material & Methods

STUDY DESIGN – a prospective observational study

STUDY POPULATION - patients admitted in King George Hospital between October 2017 to September 2019 in Department of General Medicine and Neurology with a confirmed diagnosis of Cerebral Venous Sinus Thrombosis were taken up for study and followed up for about six months after discharge.

SAMPLE SIZE – 30 patients admitted in KGH were taken up for study

INCLUSION CRITERIA – all patients assumed to have CSVT/CVST were investigated BUT only those candidates who are confirmed with MRI, MR venogram were taken up for study with valid informed consent.

EXCLUSION CRITERIA – Age below 18 years & Arterial infarcts

LABORATORY INVESTIGATIONS –

1. Complete blood count, Erythrocyte sedimentation rate,
2. Random blood sugar, liver function tests , serum creatinine, blood urea nitrogen, serum electrolytes
3. Prothrombin time, activated partial thromboplastin time.
4. Serum homocysteine, antithrombin III, protein C, protein S, anticardiolipin antibody, factor V Leiden mutation, lupus anticoagulant.
5. Other needed investigations depending upon symptoms and signs.

Follow up:

During follow up information regarding disability as per modified Rankin Scale (mRS) , recurrent attacks with new onset of symptoms, death, seizures, headache episodes were enquired.

STATISTICAL ANALYSIS – The statistical software namely SAS 9.2 , SPSS 15.0 , Stata 10.1, MedCalc 9.0.1 and Systat 12.0 were used for the analysis of data and Microsoft Word and Excel were used to generate graphs, tables, pie charts ,etc.

III. Results:

A total of 30 cases of cerebral venous sinus thrombosis were evaluated in this study. Majority of them were in age group of 18-30 years of about 50%. The youngest being 18 years and eldest 80 years of age. Sex ratio in present study is 1:1. The mean age of female patients is 36.53 years with a standard deviation of 18.27, whereas that of males is 35.73±14.34 years.

Type of CVST: Out of 30 patients, 26 i.e. about 86.7% belong to non puerperal group whereas 4 i.e. about 13.33.% are of puerperal group. Out of non puerperal group 15 cases were males, 11 cases were females.

MODE OF ONSET: The onset is said to be acute if the symptoms exist for less than 2 days, subacute if the duration of symptoms is more than 2 days but less than 1 month and chronic if the duration of symptoms is more than a month. In this study 16 cases i.e 53.33% had subacute presentation whereas 11 cases i.e 36.7% had acute presentation. 10% i.e 3 patients had chronic presentation.

LEVEL OF CONSCIOUSNESS AT TIME OF PRESENTATION : In this study 18 patients i.e 60% were conscious at presentation whereas 9 patients i.e 30% were drowsy, 2 patients were stuporous and 1 patient in coma.

Table No 1: LEVEL OF CONSCIOUSNESS AT TIME OF PRESENTATION

Level of consciousness	Number of patients(n)	Percentage (%)
Conscious	18	60
Drowsy	09	30
Stuporous	02	6.7
Comatose	01	3.3

INITIAL SYMPTOMS AT PRESENTATION: The commonest symptom is headache seen in 73.33% i.e noticed in 22 cases followed by focal deficits in 14 cases i.e 47%. Convulsions were observed in 13 cases i.e.43%.

Clinical signs at presentation: In this study, hemiparesis is noticed in 40% of subjects whereas papilloedema is noticed in 33.3% of people. Facial palsy is seen in 7 patients i.e. 77.7% whereas 3rd , 6th cranial nerve palsies were seen in 1 patient each i.e 11.11%.

Haemoglobin levels: 14 patients were anemic contributing about 46.7%. There seemed to be direct correlation between degree of severity of anemia and mortality. Other investigations like serum electrolytes, RBS, renal function tests, liver function tests neither had a diagnostic value nor are specific. In view of suspicion of

meningitis, CSF analysis was performed in 11 patients in which 10 turned to be normal i.e. 33.3% and pleocytosis was seen in 1 patient i.e 3.3%.

ETIOLOGY OR RISK FACTORS: The commonest risk factor seen in about 53.2% is high levels of serum homocysteine. The second commonest risk factor seen is protein S deficiency observed in 33.4% of cases. Radiological findings: 13 cases i.e about 43.3% had hemorrhagic infarction , whereas 10 cases i.e about 33.3% had non hemorrhagic infarction.

SINUS INVOLVED (MAGNETIC RESONANCE VENOGRAM FINDINGS): In this study commonly involved sinus was superior sagittal sinus in about 13 patients i.e. 43.33% followed by left transverse sinus in 11 patients i.e 36.67%.

Table No 2: Sinus involvement

Sinus involved	Number of patients	Percentage
Superior sagittal sinus	13	43.3
Left transverse sinus	11	36.67
Left sigmoid sinus	05	16.67
Right sigmoid sinus	04	13.33
Straight sinus	04	13.33
DCV	03	10
SCV	02	6.67
Inferior sagittal sinus	01	3.33

TREATMENT: All patients were anticoagulated but the mode of administration differed. In about 27 patients (90% of study subjects) subcutaneous low molecular weight heparin was given whereas in 3 cases(10 %) intravenous unfractionated heparin infusion was given. All were later changed to oral anticoagulants. Supportive management included antiepileptics in 19 patients (63.33%) and to reduce the raised intracranial tension in 20 patients (70%).

PROGNOSIS : Average hospital stay was 13.9 days in this study ranging from 4-42days. The disability score used to assess the functional status of patients is Modified Rankin Scale score, and it showed that 10 patients scored 0, 8 patients scored 1, 6 patients scored 2, 2 patients scored 3, one patient scored 4, and 1 patient scored 5

During hospitalization 3 patients died; two due to transtentorial herniation and other due to MI. Out of the 27 survived patients 19 had complete recovery i.e 70.03% whereas 6 had residual hemiparesis, 1 had diplopia, 1 had dysphasia, 1 had persistent headache at time of discharge. During the follow up period 3 patients had seizure attacks, while 0 had recurrent thrombosis. 2 patients were lost to follow up.

IV. Discussion

AGE INCIDENCE : 20-40 years age group was found to be commonly involved in various series. (Mehta SR et al.⁹, 77.8% and Ameri et al.,61%)². Even in our present study similar results were found that 56.67% belonged to same group i.e 20-40 years, with average age of onset being 37.6 years. Male to female ratio in previous studies showed that it is around 1:1.4 in Mehta SR et al, 1:1 in Daif et al, whereas 1.24:1 in Bousser et al¹. In present study, male female ratio is 1:1 (comparable to Daif et al).¹⁰

The presentation can be acute if the symptoms appeared and patient comes to hospital within 48 hours, subacute if duration is more than 2 days but less than 1month and chronic if duration is more than one month. In present study about 36.7% showed acute presentation, 53.33% showed subacute presentation and 10% showed chronic presentation. This was comparable to Bousser et al¹ (Acute 36.84%, Subacute 26.32%, Chronic 36.84%) and Daif et al¹⁰ (Acute 35%, Subacute 40%, Chronic 25%).

The most common symptom is headache in present study with around 73.3%. It is almost similar to other studies like Mehta SR et al.⁹ in which it is about 77.8%, Bousser et al.¹ with 74%, and Strolz et al.¹¹ with 73%. Seizures was seen in 43% in present study which is comparable with Strolz et al¹¹. Seizures and paralysis are usually indicative of cerebral cortical venous involvement. Altered sensorium was found in 37% of patients which is once again comparable to Storlz et al¹¹. Papilloedema was seen in 33.3% of patients, even it was around 30.3% in Strolz et al.,¹¹ and 32% in Kumar S et al¹².

RADIOLOGICAL FEATURES : In present study the hemorrhagic infarction was present in 43.3% of cases, whereas non hemorrhagic infarction was found to be most common feature in study of Nagaraja et al¹³ conducted in 1989. The frequency of involvement of different cerebral sinuses in present study is comparable to Ferro et al¹⁴ and Bousser et al.¹

RISK FACTORS OR CAUSES IDENTIFIED :

A underlying risk factor can be identified in 80% of patients of CSVT. In present study no risk factor could be identified in only 8 patients 26.67% similar to other studies. In females anemia and puerperium were found to be the most common risk factors, whereas hyperhomocysteinemia and protein S deficiency were found to be common in males. Only 2 out of the 15 female patients were on OCP or HRT at presentation which were less compared to Western population. More than one risk factor can be present in same patient.

Treatment of CSVT ranges from observation to anticoagulation¹⁵. But in this study all patients were treated with anticoagulants though route of administration differed¹⁶. Previously CSVT had a poorer prognosis and higher mortality rates of about 30-50%¹⁷. Due to neuroimaging techniques, low molecular weight heparin administration and endovascular intervention mortality rates significantly dropped down to 8-14% and improved morbidity. A meta analysis of 19 studies conducted by Dentali et al¹⁸ showed that mortality rates during perihospitalization period was about 5.6% and during follow up period it increased to 9.4%²³. In this study mean hospital stay was 13.9 days and 67.86% had complete recovery at time of discharge. The mortality rate in our study was 6.67% which is comparable to Ameri et al², and Mehta et al.⁹ with 5.45% and 4.44%.

V. Conclusions:

This study shows that CSVT/CVST is a common condition. There could be varied clinical presentation which may evolve over hours to weeks. Clinical clues which are important include recent headache, papilloedema, focal deficits, seizures. The cornerstone for early diagnosis is neuroimaging. MRI with MR venogram is diagnostic modality. In order to prevent further relapses evaluation should be done in search of procoagulant condition and if present life long anticoagulation needs to be given. Medical management usually suffices. In spite of appropriate medical management if patient continues to deteriorate then surgical decompression can be opted. In contrary to arterial thrombosis, CVST can be considered as “all or nothing” disease with relative better outcomes in shorter duration of time.

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