Hospital Course and Outcome of Patients Admitted to Critical Care Unit with Cerebral Venous Sinus Thrombosis

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Abstract

Introduction: Cerebral venous sinus thrombosis (CVST) is a potentially serious neurological condition. Yet, non-specific clinical and radiological features of cerebral venous sinus thrombosis, making it delay in the diagnosis and subsequent management. This study aims to find the hospital course and outcome of patients.

Methods: A descriptive cross-sectional study was done in patients with diagnosis of cerebral venous sinus thrombosis confirmed by computed tomography or by magnetic resonance imaging with magnetic resonance venography. Demography, clinical features, hospital course and outcome at hospital discharge were recorded and analysed.

Results: A total of nine patients included in the study. Mean age of patient was 33.22 ± 9.24 years with male to female ratio of 1:2. Headache was the most common presenting symptom found in eight patients. GCS at admission of all of the patients were 15 except for 2 patients. Surgical intervention was required in two patients. Good outcome with mRS score of 0 was found in eight patients at hospital discharge. No mortality was observed in this study.

Conclusions: Favorable outcome was found in most of the patients at hospital discharge. Nonetheless, complications can occur during the hospital course which might require surgical intervention.

Key words: Cerebral venous sinus thrombosis, hospital course, outcome

Introduction

In cerebral venous sinus thrombosis (CVST), there is a total or partial obstruction of dural venous sinuses or the cortical veins that can give rise to clogging in the vessels leading to focal or generalized neurological deficits.[1] CVST is a uncommon cause of stroke, usually attacking young to middle-aged patients. It accounts for 0.5–1% of all causes of stroke.[2]

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CVST often pose challenges regarding diagnosis among physicians or specialists, due to the nonspecific symptoms and myriad of presentation.[3] The diagnosis of CVST is usually rely on high degree of clinical suspicion and imaging. magnetic resonance imaging (MRI) combined with magnetic resonance venography (MRV) is the best imaging modality when computed tomography scan (CT scan) of the brain is ambiguous for CVST.[4] Owing to advances in the diagnostic sensitivity of imaging modalities and the overall quality of treatment, mortality linked to CVST has drop down from >30% in 1960 to 5–15% in recent years.[5]

The outcome of CVST ranges from a complete recovery to death. Favorable outcome is seen in most of the patients with CVST; nonetheless, death and dependency are observed in 18.9% of patients according to the international study on cerebral vein and dural sinus thrombosis (ISCVT).[6] This study aims to find the hospital course and outcome of patients at hospital discharge who were admitted to critical care unit with diagnosis of CVST.

Methods and materials

A descriptive cross-sectional study was conducted in the department of neurosurgery at Kathmandu Medical College Teaching Hospital (KMCTH), Sinamangal, Kathmandu between February, 2022 and April, 2022. This study was approved by institutional review committee

(IRC) of KMCTH. All patients who are more than 18 years with diagnosis of cerebral venous sinus thrombosis, admitted to critical care unit of neurosurgery department were included and those with bleeding disorder and prior anticoagulation therapy were excluded from this study.

All the patients received standard treatment with unfractionated intravenous heparin followed by oral warfarin treatment irrespective of presence of intracranial hemorrhage. Unfractionated heparin treatment was closely monitored by checking serum activated partial thromboplastin time (APTT) every 4 hourly. Target APTT level was in between 55 to 80. Treatment with warfarin started concomitantly with unfractionated heparin after 48 hours to maintain the target international normalized ratio (INR) between 2 to 3 and continued at the time of discharge also. Once the target INR level was achieved, unfractionated heparin treatment was stopped. Patients were monitored during hospital stay for deterioration of clinical symptoms in terms of decrease in level of consciousness, features suggestive of raised intracranial pressure, focal deficit, seizure and papilloedema. CT scan head plain was repeated in these patients only. When surgery was planned then both heparin and warfarin were stopped and fresh frozen plasma was transfused if required to prepare the patient for immediate surgical interventions. For patient with papilloedema, lumber puncture was done to measure the intracranial pressure to see whether patients were benefitted by shunt procedure. Unfractionated intravenous heparin was resumed after 48 hours of surgery to maintain target APTT level between 55 to 80.

Data were recorded using proforma in terms of clinical presentations, Glasgow coma scale (GCS) at admission, plain CT scan or magnetic resonance imaging (MRI) findings, location of venous sinus involved, hospital course (including new onset clinical feature, surgical interventions and mortality) and modified Rankin Scale (mRS) at hospital discharge. Functional outcome taken at hospital discharge was classified as good recovery for mRS 0 to 2 and poor recovery for mRS 3 to 6.

Statistical analysis was performed using IBM SPSS Statistic version 25 (IBM Corporation, USA). Continuous variable was expressed in terms of mean and standard deviation and categorical data was expressed in terms of frequency and percentage.

Results

There were total of nine patients included in the study. Age of the patients ranged from 18 to 47 years with mean age of 33.22 ± 9.24 years. There were six female (66.7%) and three male (33.3%) patients. Headache was the most common presenting symptom found in eight patients (88.9%) followed by seizure occurred in six patients (66.7%), vomiting in six patients (66.7%), limb weakness in two patients (22.2%) and blurring of vision in one patient (11.1%). Duration of symptoms before admission to this center ranged from one hour to seven days with median duration of 48 ± 57.51 hours. GCS at admission of all of the patients were 15 with only two exceptions, who had GCS of 12 and 10 at admission. Gynecological cause was the common risk factor found to be associated with CVST. Out of six females, two (33.3%) were using oral contraceptive pill and one (16.6%) were in post-partum state. Others risk factors observed overall were right sided mastoiditis and alcohol abuse in one patient (11.1%) each, remaining four patients had no identifiable risk factors.

All the patients were evaluated with CT scan head plain during admission which showed intraparenchymal hematoma in four patients (44.5%), subarachnoid hemorrhage in two patients (22.2%), however two patients had normal CT scan head. Diagnosis of CVST was done by MRI with MR venography in eight patients (88.9%) and with CT cerebral angiogram in one patient (11.1%). Superior sagittal sinus thrombosis was commonest to involve, found in 8 patients (88.9%) followed by multiple venous sinus involvement along with superior sagittal sinus in three patients (33.4%) and transverse sinus involvement in one patient (11.1%).

Out of nine patients, two patients (22.2%) required surgical intervention. Among these, one patient had papilledema on fundoscopy so lumber puncture was done which showed opening pressure of 55 cm of cerebrospinal fluid (CSF); managed with thecoperitoneal shunt and other patient who had significant hematoma volume in temporoparietal region with gross mass effect was managed with decompressive craniectomy plus hematoma evacuation surgery.

Regarding outcome at hospital discharge, eight patients (88.9%) had GCS of 15 while only one patient (11.1%) had GCS of 14. Eight patients (88.9%) had mRS score of 0 while one patient (11.1%) had mRS score of 3 during discharge from the hospital. So good outcome was observed in eight patients (88.9%) where as poor outcome was found in one patient (11.1%). No in-hospital mortality was observed in this study.

Discussion

Cerebral venous sinus thrombosis is familiar for its myriad of clinical presentations with unpredictable outcome. The clinical diagnosis of CVST is usually challenging. Nevertheless, with the advent of modern radiological imaging techniques, sensitivity to diagnose parenchymal and blood flow studies have aided easier, early diagnosis, and initiation of treatment.[7]

According to the largest cohort study, 78% cases occurred in patients younger than 50 years.[6]

It is well recognized that CVST is most common in young adults, especially female, and this study also demonstrated mean age of 33.22 ± 9.24 years and female patients were 66.7%.[8,9] Headache was the most common presenting symptom found in 88.9% of the patients in this study. Similar to this study Gunes et al,[10] Azin et al,[11] and Patil et al,[12] also found headache in 86.7%, 91.8% and 90% respectively. Median duration of symptoms before arrival to this center was 48 ± 57.51 hours. Study by Sim et al,[13] found 32±4.8 hours in contrast Lal et al,[14] observed 7.4 ± 3 days and Al Hashmi et al,[15] showed 10 days. Differences could be due to geographical location and availability of transport facility. In this study, GCS at admission of all of the patients were 15 with only two exceptions. Study by Sim et al also showed comparable result of admission GCS of all of the patients were 15 with only one exception.[13]

Most common risk factor observed were use of OCP in 33.3% of female patient which is identical to study by Yadegari et al who showed that 37.5% of female patient had used OCP.[16]

Ideally, MRI plus MRV is the preferred imaging approach to confirm a diagnosis of CVT.[2,17,18] In this study, for diagnosis of CVST , all patients were evaluated with CT scan head plain on admission followed by most of the patients with MRI with MR venogram and only one patient with CT cerebral angiogram.

Superior sagittal sinus was commonest sinus to be involved. The predilection for superior sagittal sinus is due to its size, location, flow dynamics and the pattern of drainage.[19] Superior sagittal sinus thrombosis was commonest to involve, found in 88.9% of the patients in this study. In patients with CVST, the proportion who present with intracerebral hemorrhage is 30 to 40 percent.[20,21] This study showed comparable results where intraparenchymal hematoma was demonstrated in 44.5% of the patients.

Heparin continues to be the principal treatment for CVST owing to its efficacy, safety, and feasibility.[3] This treatment is intended at halting the thrombus extension and maintaining the venous pathways. It has been found to be the most productive treatment option; even though its pro and cons need to be assessed on an individual basis.[22] The treatment of CVST with heparin has been arguable for many years. This dispute was depend on the fact that 30-40% of all patients with CVST have few proportion of cerebral hemorrhage during the time of admission. Most experts now comply that the patients with CVST should get a instant and full course of anticoagulation immediately after the diagnosis is made. Anticoagulation is the management in patients with significant, and even life threatening complications.[23] The role of heparin in the management of CVST was well emphasized in the European Federation of Neurological Societies (EFNS) guidelines.[24] All patients with CVST without contraindication for anticoagulation should be treated with dose-adjusted intravenous heparin or body weight adjusted subcutaneous fractionated heparin (LMWH). Presence of intracranial hemorrhage related to CVST should not be a contraindication for heparin therapy.[25] All the patients were treated with intravenous unfractionated heparin irrespective of intracranial hemorrhage followed by dose adjusted oral warfarin in this study. Oral warfarin was started concomitantly usually after 48 hours of heparin therapy, heparin therapy was stopped when targeted INR level between 2 to 3 was achieved.

Decompression surgery is a life-saving modality to decrease intracranial pressure in severe CVST cases, as in the context of haemorrhagic infarction with significant mass effect.[26] In this study, one patient had undergone decompressive craniectomy which is comparable to study done by Sim et al,[13] where they have also performed decompressive craniectomy in one patient.

In this study, no mortality was observed at discharge. Identical to a study done by Al Hashmi et al who observed no mortality at discharge.[15]

In recent years, the overall outcome for patients with CVST has become better, probably because of advancement of diagnostic modality, immediate anticoagulation treatment and refinements in the quality of critical care.[5,27,28] Moreover, those who become better after acute CVST episodes usually recover with very negligible focal neurological deficits as opposed to arterial stroke patients. Nonetheless, death or a condition of dependency results in about 15% of CVST patients.[26] ISCVT and VENOST studies showed poor outcome in 18.9% and 10%, respectively.[6,29] Yadegiri et al reported good outcome in 84% of the patients.[16] There was no death and all the patients were discharged with favorable outcome of mRS of 2, this was observed by Thapa et al in their study.[30] Comparable to all these studies, this study showed good outcome in 88.9% where as poor outcome in 11.1% of the patient at hospital discharge.

Conclusion

After standard treatment with heparin and warfarin, irrespective of involvement of number of cerebral venous sinuses, good outcome was found in most of the patients at hospital discharge. Nonetheless, complications can occur during the hospital course which might require surgical intervention in terms of surgical decompression or CSF diversion procedure. A larger multicentric prospective study to find out the early outcome in patients with CVST is recommended.

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