Treatment of Cerebral Venous Sinus Thrombosis : A Nepalese Perspective

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ABSTRACT

Introduction: Cerebral venous sinus thrombosis (CVST) is a rare form of stroke, accounting for less than 1% of all cases, with a notable female-to-male ratio of 3:1. It results in venous congestion, increased intracerebral pressure, cerebral edema, and can lead to either cerebral infarction or hemorrhage.

Methods: : A retrospective study was conducted among patients admitted and diagnosed with CVST at Annapurna Neurological Institute and Allied Sciences from January 2016 to December 2023 Patients with stroke and outpatient department were excluded in the study. The data were entered in MS Excel and descriptive analysis was performed using SPSS Version 25.

Results: Out of 66 patients included in the study, majority of the patients were between the age group of 31 to 40 years. Most common presenting features were headache and vomiting (n=43, 65.2%) whereas few (n=10, 15.2%) had symptoms of blurred vision. In this study, 52.1% of patients were admitted due to idiopathic causes. Oral anticoagulants were prescribed and low molecular weight heparin was used for the treatment of CVST.

Conclusion: This study provides insight into the epidemiology, clinical outcomes, and risk factors of CVST. Early diagnosis and prompt treatment are crucial for improving patient outcomes. However, the retrospective nature and small sample size limit the findings. Future research should focus on large-scale, prospective studies and explore novel therapeutic strategies.

Keywords: Cerebral Venous Sinus Thrombosis; Intra Cerebral Hemorrhage; Low Molecular Weight Heparin; Oral Anticoagulant

INTRODUCTION

CVST is a rare cause of stroke. It happens following a clot's blockage of the cerebral veins and dural venous sinus.[1] The diagnosis of CVST was first made in 1825 after the autopsy of a 45-year-old man who had thrombosis involving the lateral and superior sagittal sinuses.[2] The yearly incidence of cerebral venous thrombosis is estimated to be three to four per million population. Women suffer from cerebral venous thrombosis three times more commonly as males do owing to the use of oral contraceptives (80% cases), pregnancy and postpartum period (5%-20% cases).[3] CVST has an incidence of 12 per 100,000 newborns per year, with more than 40% of childhood CVST occurring in the neonatal period. The disease is extremely painful and emotionally taxing for young adults, pregnant women, and children. The disease is extremely painful and emotionally taxing for young adults, pregnant women, and children. The diagnosis rate of stroke patients with CVST has increased to less than 1%, owing to the advancements in diagnostic procedures and neuro-imaging.[4] The non-specific clinical symptoms of CVST, such as headache, seizures, altered consciousness, and focal neurological signs, make it challenging for an early diagnosis and prompt initiation of therapy.[3] Early treatment with clot busters such as LMW Heparin and anticoagulant medication improves the disease's prognosis; in conditions with poor prognosis, additional therapeutic options include chemical thrombolysis and mechanical thrombectomy.[5] To lower intracranial pressure (ICP), surgical procedures such as decompressive craniotomy for cerebral edema and hematoma evacuation done. mRS is dependent on cerebral herniation brought on by ICH, or cerebral edema.[1]

METHODS

A retrospective study was conducted among patients diagnosed with CVST admitted at Annapurna Neurological Institute and Allied Sciences from 2016 to 2023 where a total of 84 patients with CVST visited the hospital. Only 66 patients were included in our study excluding the remaining 18 OPD Cases and those with stroke CVST confirmed in patients by venous angiography, meeting the study's inclusion criteria. The data were entered in MS Excel and descriptive analysis was done using SPSS Version 25.

The patients were diagnosed with CVST radiologically utilizing MRV/MRI since 2016. The Medical Health Record served as the source of the retrospective data. The demographic data, clinical history, investigations like Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Magnetic Resonance Venography (MRV), Mode of treatment, Modified Rankin Score (mRS), were entered into SPSS Version 25. Consent was taken from the patient, and phone calls were made to find out the mRS of the patients. The ethical approval for the study was approved by Institutional Review Commitee, ANIAS.

RESULTS

Among 66 participants of the study, the majority of the patients (27.94%) were from the age group of 31-40. Likewise, the females were more affected than males i.e 65.2% (n=43). Regarding the address, 67.67% (n=46) were from inside the Kathmandu valley. Very few patients had slight disability i.e 27.3% whereas majority of the patients had no significant disability as measured by the modified rankin scale(Table 1).

Table 1: Socio-demographic profile of the participants

Characteristics	Frequency	Percentage
Age		
21-30	14	20.58
31-40	19	27.94
41-50	16	23.52
51-60	17	25
Sex		
Male	23	34.8
Female	43	65.2
Address		
Married	37	36.3
Unmarried	63	61.8
Modified ranking outcome		
No Significant disability	47	71.2
Slight disability	18	27.3
Moderate disability	1	1.5

Table 2: Clinical patterns of the participants

Patterns	Frequency	Percentage (%)
Headache and Vomiting	43	65.2
Seizure	6	9.1
Neurological deficit	7	10.6
Blurry vision	10	15.2
Moderate disability	1	1.5

Table 2 shows the clinical patterns of the patients, the majority of patients had symptoms of headache and vomiting (n=43) followed by blurry vision and neurological deficit. 9.1% of patients had seizures before CVST.

Table 3: Risk Factors

Factors	Frequency	Percentage (%)
Head Trauma	3	4.5
Pregnancy	7	10.6
Neurological Surgery	2	3.0
OCP Use	2	3.0
Idiopathic	37	56.1
Hyperlipidemia	1	1.5
Defect in clotting	12	18.2
Infection	2	3.0

Majority of the patients (56.1%) had an idiopathic CVST. But defect in clotting factor also played a significant role in the study where 18.2% (n=12) were affected. Likewise, pregnancy was also one of the risk factors affecting 10.6%, (n=7) in the study as shown in table 3.

Table 4: Location of CVST

Location	Frequency	Percentage
Transverse Venous	22	33.3
Superior Sagittal Sinus	11	16.7
Sigmoid Sinus	3	4.5
Deep Venous Sinus	8	12.1
Combined Venous Sinus	22	33.3

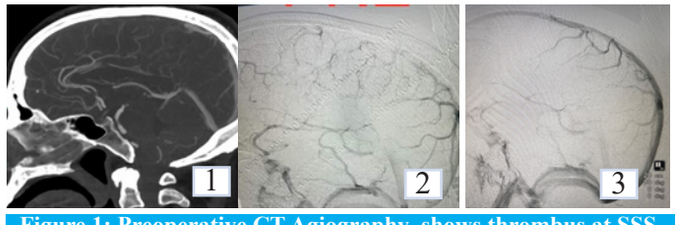

Figure 1: Preoperative CT Agiography shows thrombus at SSS and feeling defect

Figure 2: DSA shows feeling defect at SSS

Figure 3: Post thrombectomy image , shows complete recanalization

Majority of CVST affected Transverse and Combined Veins with 33.33% each. Likewise Superior sagittal, sigmoid and deep vein were other affected veins.(Fig.1-3)

DISCUSSION

Clinical signs of cerebral venous and sinus thrombosis (CVST) can vary widely, ranging from a single headache to severe coma. Anticoagulation is recommended as the first-line therapy for CVST, supported by therapeutic data from controlled trials.[1] This study highlights the rarity of CVST, its significant impact, and its predominance among females. Notably, CVST is unique in its use of low molecular weight heparin for treatment, where balancing hemorrhage risk with heparin therapy is crucial. In our study, women of childbearing age (31–40 years) were predominantly affected, accounting for 65.2%. These findings are consistent with studies conducted in Sudan, Iran, Oman, and Saudi Arabia.[7,8,9] However, a contrasting study in Nepal attributed a higher prevalence in men to early detection and increased awareness.[10] This study found that 43% of patients presented with headache and vomiting. Similar findings were reported in a study conducted in Sudan, where 94.6% of patients had headache as a common symptom.[8] Additionally, 7% of patients had neurological deficits, 6% experienced seizures, and 15.2% reported blurry vision. A prospective study in the Netherlands, which included 59 patients, reported that 10% had seizures and 13.5% had blurry vision, aligning with our results.[9] In contrast, a multicenter study in Sudan found that 67.6% of patients had blurry vision and 45.9% had seizures, indicating a higher prevalence of these symptoms compared to our study.[8]

In our study, 56% of patients had idiopathic cerebral venous sinus thrombosis (CVST), while 18.2% had a clotting disorder, 3% were using oral contraceptive pills (OCP), and 2% had an infection. This distribution is similar to the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT), which reported 54.3% idiopathic cases and identified OCP use as a significant risk factor, especially in females. The infection rate in our study (2%) is comparable to the 3.22% reported in a case series from Iran.[9]

ANIAS receives patient referrals for tertiary level care for neurological and neurosurgical illnesses. To detect and diagnose CSVT, highly qualified medical professionals are constantly on the lookout. Online reporting and in-house MRI radiological diagnosis can speed up the diagnosis process. The radiological diagnosis was made by MRI and MRV, and Computed tomography was used to see the size and progression of hematoma and infarction with the shift in midline.[11] The location of the CVST was majorly in Transverse sinus and Combination of sinuses and Veins with 33.33% each. Likewise, Superior Sagittal, Sigmoid and Deep Vein were other affected veins. Nearly same results are reported from the studies conducted at Netherland and India, whereas, the results contradict from the study conducted at Saudi Arabia[12,13,14] After being sent to the intensive care unit, the patient begins therapy. Unfractionated heparin is the primary line of treatment for all patients and is easily accessible following a diagnosis of CVST. Making a difficult decision while balancing between a clots and bleeding on a razor's edge Patients with intracerebral hemorrhage are also treated with unfractionated heparin followed by 65% of patients were treated by Dabigatran, and rest by Warfarin, Rivaroxaban for a period of 6 months. PT INR observations are made while titrating the Warfarin dosage and conducting routine patient follow-up.

The early indicators of elevated ICP would be close observation of the patient by skilled nurses and residents, including the Glasgow Coma Scale (GCS), vitals, and pupil size. In order to treat any higher intracranial pressure resulting from a bigger hematoma or a midline shift caused by edema and infarction, a decompressive craniotomy and evacuation of hematoma was carried out. Two patients with cerebral venous sinus thrombosis (CVST) underwent venous thrombectomy using a Penumbra suction device with a RED 72 catheter, placed triaxially with Neuromax and Terumo guide wires, at the superior sagittal sinus (SSS). The clot was successfully extracted, and venous flow was restored.[11]

The mRS was observed and showed no significant disability among 71% patients 27.3% showed slight disability and 1.5% showed moderate disability. In summary, the management of cerebral venous sinus thrombosis (CVST) requires a multifaceted approach tailored to the individual patient's clinical presentation and underlying risk factors. Early initiation of anticoagulation therapy remains the cornerstone of treatment, as it can significantly reduce mortality and improve functional outcomes. However, the choice of anticoagulant, duration of therapy, and monitoring must be carefully adjusted based on the patient's response and any potential contraindications. Additionally, addressing and managing secondary causes, such as infection or systemic conditions, is crucial for effective treatment.

Ultimately, a multidisciplinary approach involving neurologists, interventionists, and neurosurgeons is essential to optimize treatment and enhance patient recovery. Continued research and clinical

trials are needed to refine management strategies and improve prognostic predictions for CVST.

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