Cerebral Venous Sinus Thrombosis Presenting as Intracerebral Hemorrhage and Subarachnoid Hemorrhage: A Case Report

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ABSTRACT

We present a 66-year-old male presenting with sudden onset of headache. Medical decompression was done and neuroimaging of plain cranial CT angiogram (CTA) and CT venogram (CTV) showed components of subarachnoid hemorrhage, intracerebral hemorrhage and hyperdense appearance of the superior sagittal sinus and proximal left transverse sinus. The following were done to look for etiologic factors: 1. fungal swab to determine the cause of the intracerebral hemorrhage secondary to venous thrombosis as the patient presented with a chronic history of sinusitis, 2. coagulopathy workup to look for a hypercoagulable state, and 3. workup for systemic disease of autoimmune in etiology. Anticoagulation was safely initiated within several days given the regression of the intracerebral hemorrhage along with stable findings of subarachnoid hemorrhage. Here we report cerebral venous sinus thrombosis rarely presenting as acute subarachnoid hemorrhage and intracerebral hemorrhage.

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INTRODUCTION

The cerebral veins are an unusual site of thrombosis and cerebral venous sinus thrombosis (CVST) is a distinct cause of stroke. It is an uncommon cause of stroke affecting young adults and children between the ages of 20 and 50 and less than 10% are older than 65.*[1]* There is paucity of Southeast Asian data and in the Philippines, the workup and management is limited by cost. The first systematic data on CVST in the Philippines and Southeast Asia done with Filipino patients at a tertiary hospital from 2013-2018 showed comparable findings with investigations done in other races.[1] Baseline symptoms can vary considerably between patients, but most of them present with headache, seizures, or focal neurological deficits.

Due to this variability in clinical manifestations and rarity of the condition, CVST can be difficult to diagnose. Approximately 30–50% of patients have an intracerebral hemorrhage, which can range from a small juxtacortical hemorrhage to large space-occupying lesions.[2] Cerebral venous thrombosis rarely presents as acute SAH, and the clinical presentation may mimic an aneurysmal bleed. CVST should be considered in the differential diagnosis of patients presenting with SAH without evidence of an aneurysm.[3]

Based on limited evidence from clinical trials, the primary therapy for CVST is anticoagulation with heparin.[4] Uncontrolled studies have shown promising results for the use of endovascular treatment in severely affected patients, but these studies require confirmation in prospective clinical trials. In patients who develop clinical and radiological signs of impending herniation, decompressive surgery can be both lifesaving as well as result in a good functional outcome.

Case Presentation

A 66-year-old Filipino male was admitted at our institution due to decrease in sensorium. This was preceded by a 2-day history of sudden onset of generalized headache described as tightness and heaviness with no precipitating factors. Apparent was the partial resolution of headache with one dose of paracetamol with no accompanying symptoms of dizziness, vomiting, doubling of vision, or unilateral weakness. The last known well time was when the patient went to sleep. He was arousable only to vigorous stimuli with preferential movement of the right extremities. A long tract sign of Babinski was noted of the left as well. Apparent as well were the 50-pack year smoking history, heavy alcoholic beverage drinker, and a chronic medical history of sinusitis.

The decrease in sensorium was initially thought to be secondary to increase in intracranial pressure from an intracerebral hemorrhage at the right basal ganglia. Plain cranial CT scan with CT angiogram showed empty delta sign along the superior sagittal sinus, an acute intracerebral hemorrhage at the right frontal lobe with perilesional edema causing mass effect and a bilateral frontal subarachnoid hemorrhage.

A venous sinus thrombosis was considered and given the other findings; medical decompression was started using Mannitol. Nimodipine 30 mg/tab two tablets every four hours was started because of subarachnoid findings on CT angiogram. With the risk factors of hypertension, a high fasting blood sugar and risk factors for atherosclerotic cardiovascular disease, high-dose statin therapy of atorvastatin 80 mg/tab, one tab once a day at night was started.

A workup for extracranial atherosclerosis was done because of cranial CT scan result of atherosclerosis of the intracranial vessels. A 2D echocardiogram with carotid Doppler and 24-hour Holter monitoring showed normal results. A nasal fungal swab was done to look for an etiologic factor of intracerebral hemorrhage secondary to venous thrombosis because a sinusitis could cause presentation of septic thrombosis. As such investigators looked for a focus since the patient had a recent history of sinusitis. The result showed positive for budding yeast cells on KOH smear. There was no indication to start antifungal as *Candida albicans* is a normal flora of the nasopharynx.

In looking for an etiology of hypercoagulable state, a coagulopathy workup was done which showed normal Protein C activity at 104.0%, Protein S activity at 118.1% and AntiThrombin III activity at 78.9%. Normal prothrombin time and partial thromboplastin time were also recorded.

Summary table of the CVST workup:

Anti-SSA	NEGATIVE
Anti-SSB	NEGATIVE
Anti-RNP	WEAK POSITIVE
Anti-Nuclear Antibody	NEGATIVE
Anti-Double-stranded DNA (ELISA)	NEGATIVE
Anti-SM	NEGATIVE
Compliment Factor 3	NORMAL
Protein C activity	NORMAL
Protein S activity	NORMAL
AntiThrombin III activity	NORMAL

A CT venogram was done to investigate an arteriovenous malformation due to the location of the hemorrhage. Results are still suggestive of venous thrombosis and a temporal evolution of intracerebral hemorrhage at the right frontal lobe with no change of left frontal subarachnoid hemorrhage. The patient was started on antihypertensives on day 6 post-ictus and mannitol was gradually decreased. The patient now tolerated clear liquids per orem with noted improvement of motor function of his left extremities. With improvement in symptoms, the patient was started on an oral anticoagulation of rivaroxaban.

DISCUSSION

The diagnosis of CVST requires a high level of clinical suspicion and confirmation by neuroimaging. The clinical manifestations of cerebral venous thrombosis are headache (90%), seizures (40%), focal deficit (eg. hemiparesis), aphasia (20%), decreased level of consciousness (14%), isolated headaches (15%), and visual loss (13%).*[5]* Examining the risk factors will help and guide in the management of the patient. The risk factors may consist of transient and chronic triggers. In a retrospective cohort of Filipino patients with CVST admitted in a tertiary hospital from 2013–2018, it showed thrombophilia as the most common predisposing factor followed by high estrogen states exclusively in females. Headaches were the most common initial complaint and seizures were the most common reason for admission.[1,6]

Transient risks and triggers are considered to be related to a temporary condition, such as pregnancy or puerperium, CNS (ear, sinus, mouth, and face infections), exposure to drugs (oral contraceptives, steroids, oncology treatments), head trauma, or procedures (eg, lumbar puncture, jugular catheter placement). Chronic triggers include hereditary or acquired thrombophilias (disorders that increase the likelihood of blood clotting) that are established causes of venous thromboembolism.*[3]* Specific types include deficiencies of protein S, protein C, or antithrombin III, as well as antiphospholipid antibody syndrome. With the patient having a weak positive anti-RNP, it would suggest a mixed connective tissue disease.

CVST can be difficult to diagnose, and is further complicated when patients initially present with acute subarachnoid hemorrhage (SAH). Although CVST is observed with increasing frequency, it has a variety of nonspecific clinical symptoms that overlap with other disorders, and its presentation with an associated SAH or ICH is infrequent. SAH is becoming more frequently recognized as a potential complication of CVST. In a retrospective review, CVST resulted in 3% of SAH indicating that the presence of cortical SAH without involvement of the basal cisterns may be an early indicator of underlying CVST.*[3]* Acute SAH suggests the presence of a vascular lesion such as ruptured aneurysm and CVST is not generally considered in the diagnostic workup of SAH. Patients with CVST and radiologic signs of SAH are seldom reported. SAH in these cases is probably due to raised venous pressure of draining venous tributaries. Isolated subarachnoid hemorrhage may also occur due to CVST, although this is rare (0.8% of patients).

In patients with CVST, spontaneous intracranial hemorrhage accounted for 30% to 40% of ICH. [3] CVST-induced ICH includes simple cerebral hemorrhage and venous infarction hemorrhage. There are multiple causes of CVST but in general are linked to the classic Virchow triad of blood stasis, changes in the vessel wall, and changes in the composition of blood.[7] Of note is that ICH due to CVST is not a contraindication for anticoagulation because of recommendations that ICH is often due to venous-sinus distention and congestion secondary to thrombosis within the venous system.[7] In a recent 2015 report, the use of direct oral thrombin inhibitor can be used as an alternative in the management of CVST. In that series of 15 patients who were treated with dabigatran with median follow-up time of 19 months, excellent outcome was observed in 87% of patients with recanalization rate at 80%. In a case series done in 2019 of ICH patients secondary to CVST, one patient received lifelong rivaroxaban due to recurrent venous thrombosis while another was treated with standard dose apixaban for up to two years without any bleeding complications or recurrence of ICH.[7] Anticoagulation was safely initiated within several days in clinically stable patients with non-temporal-lobe hemorrhagic infarcts of unchanging volume, and highlighted that the location and unchanged volume on serial CT may be important factors influencing the safety of anticoagulation therapy in patients with CVST and hemorrhagic infarcts.[8]

Factors commonly found to predict a poor outcome include male sex, older age, coma, hemorrhage, infection of the central nervous system (CNS), and cancer. While these factors can provide some indication of the possible outcome, reliable prediction is impossible; which in turn complicates therapeutic strategies. Direct oral anticoagulant (DOAC) studies have shown these to be no less

effective than warfarin in both the treatment of VTE and prevention of recurrence.[9]

CONCLUSION

This case report shows the complex nature of a cerebral venous sinus thrombosis co-existing with an intracerebral hemorrhage and subarachnoid hemorrhage. Management done was medical decompression, antibiotics and anticoagulation accounting for clinical presentation of the patient. Diagnostics were towards looking for coagulopathy and systemic disease that could contribute to a hypercoagulable state. The patient was discharged stable and improved with MRS 3.

Ethical Considerations

The study was conducted in accordance to the accepted ethical research practice of the CARE guidelines. An English informed consent was directly obtained by the Principal Investigator using the Informed Consent for Case Reports as the subject is a vocational graduate of mechanics and is competent to understand English.

The study is not company sponsored or industry funded. It is investigator-initiated and the subject is a patient of the co-author of this case report. The patient's identity and personal data was not included in the study, and identifiers are removed from the manuscript. The data will be accessed securely by the Principal Investigator and will be protected from illegal or inadvertent access by other people. It will also be stored for four years and will be deleted thereafter.

There were no experimental interventions done to the patient and there are only minimal risks for physical, psychological, social or economic harm since it only involves description of the case, subject's symptoms, course of illness, and treatment regimens that are known.

All data conveyed from this case will be for the welfare of our future patients with the same clinical course and presentation. The subject has no direct benefit from this study.

Plain Cranial CT scan with CT Angiogram

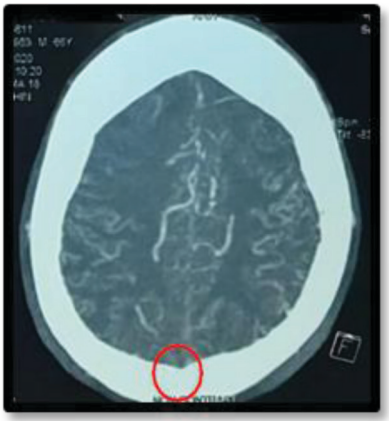

Figure 1. Empty delta sign along the superior sagittal sinus.

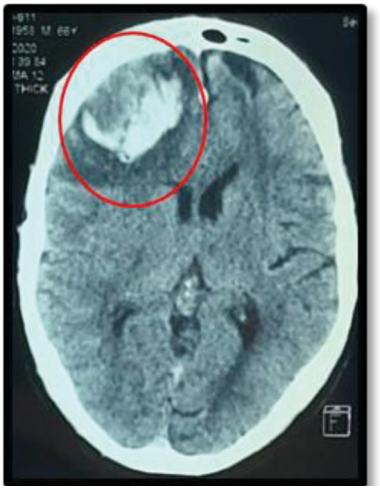

Figure 2. Acute intracerebral hemorrhage at the right frontal lobe with perilesional edema causing mass effect.

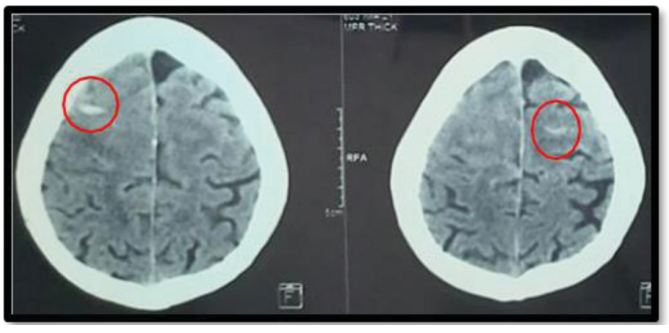

Figure 3. Bilateral frontal subarachnoid hemorrhage.

Non-contrast and contrast enhanced cranial CT venogram

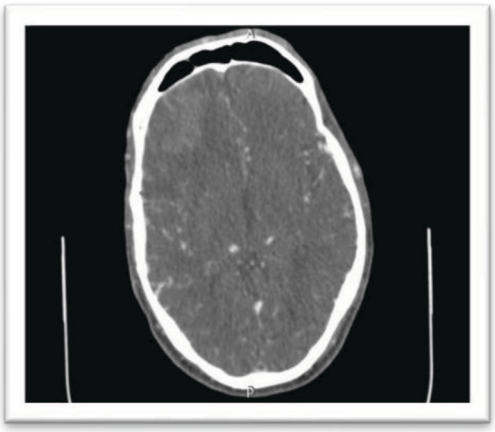

Figure 4. Empty delta sign on axial cut.

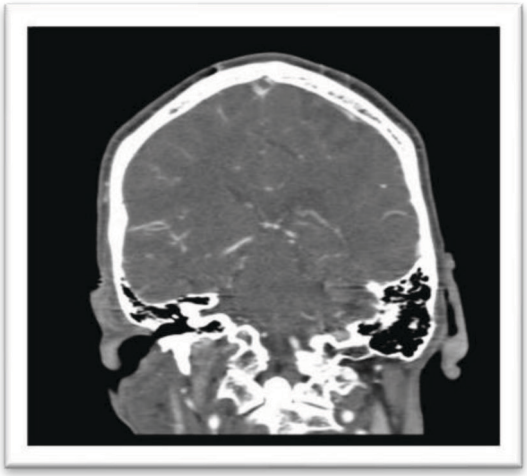

Figure 5. Empty delta sign on coronal cut.

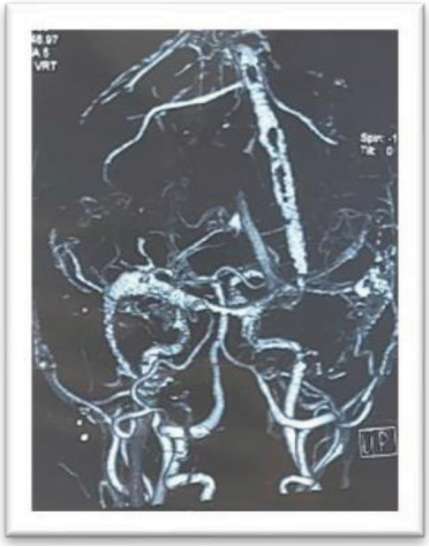

Figure 6. Contrast filling defect along the entire length of the superior sagittal sinus and proximal aspect of the left transverse sinus.

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