

Acute subdural hematoma secondary to cerebral venous sinus thrombosis: Case report and review of literature

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ABSTRACT

Cerebral venous sinus thrombosis is a rare type of stroke primarily affecting young women. Diagnosis is generally delayed or overlooked due to a wide spectrum of clinical symptoms. Subdural hematoma secondary to cerebral venous sinus thrombosis is very rare. We report a case of 40-year-old female with cerebral venous sinus thrombosis who presented to us with an acute subdural hematoma and subarachnoid hemorrhage besides venous infarct. Management of such patients is complicated due to the rarity of the condition and contraindication for the use of anticoagulation. We conducted a thorough literature search through PubMed and could find only nine cases of spontaneous subdural hematoma secondary to cerebral venous sinus thrombosis.

Key words: Prothrombotic, stroke, thrombosis

Introduction

Cerebral venous sinus thrombosis involves thrombosis of the dural sinus and/or cerebral veins. Patients generally present with a headache or focal neurological deficit but less frequently may present as acute neurological deterioration which may be fatal. We report a case of 40-year-old female on oral contraceptives who presented with a very acute onset headache and vomiting with a very poor neurological score. She was diagnosed to have superior sagittal sinus thrombosis with left acute fronto-temporo-parietal subdural hematoma with venous infarct. She was operated but could not survive due to irreversible damage. Subdural hematoma secondary to cerebral venous sinus thrombosis is very rare, and high suspicion should be kept in high-risk cases. Prognosis in patients presenting with rapid onset and the low neurological score remains dismal.

Case Report

A 40-year-old female presented to an emergency in altered sensorium with right hemiplegia with a history of a severe headache and multiple episodes of vomiting 1 day prior to admission. She was on oral contraceptives for last 2 years. Her Glasgow Coma Scale at admission was E1M3V1 and left pupil was dilated and not reacting to light. Computed tomography (CT) of head revealed venous infarct in left temporo-occipito-parietal region with linear area of hemorrhage within it with large left fronto-temporo-parietal acute subdural hematoma with midline shift of 9 mm toward right side with subfalcine herniation with descending transtentorial herniation with sub-arachnoid hemorrhage in the left parietal and occipital sulci with diffuse cerebral edema [Figure 1].

CT venography revealed thrombosis in superior sagittal sinus extending to adjacent cortical veins [Figure 2]. She was immediately taken for surgery, and a left fronto-temporo-parietal

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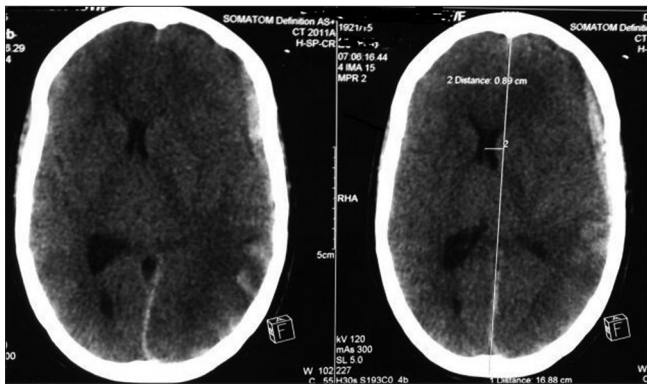


Figure 1: Computed tomography head showing left fronto-temporo-parietal acute subdural hematoma

decompressive craniectomy was performed with the evacuation of acute subdural hematoma and lax duroplasty. However, she continued to deteriorate in the postoperative period and died on the first postoperative day.

Discussion

Cerebral venous sinus thrombosis accounts for only 0.5 to 1% of all strokes usually affecting young individuals. It is slightly more common in young women due to pregnancy, puerperium, and oral contraceptive use. Cerebral venous sinus thrombosis may occur due to partially obstructing thrombus or extrinsic compression.

Causes of cerebral venous thrombosis include number of prothrombotic states (congenital or acquired) such as deficiencies in anti-coagulation-promoting proteins (factor V Leiden mutation, protein C and protein S resistance, prothrombin gene abnormalities and antithrombin III deficiency), usage of oral contraceptives, pregnancy, malignancy, dehydration, trauma, inflammatory diseases, operative procedures, infections, and hematological conditions.

Despite advances in the recognition of cerebral venous sinus thrombosis in recent years, the diagnosis of cerebral venous sinus thrombosis is still frequently overlooked or delayed as a result of diverse underlying risk factors, wide spectrum of clinical symptoms and the often sub-acute or lingering onset.

The clinical presentation of cerebral venous sinus thrombosis is different from arterial stroke and symptoms may develop slowly over days or weeks with acute, sub-acute or insidious onset. Clinical findings in cerebral venous sinus thrombosis may be related to increased intracranial pressure attributable to impaired venous drainage or related to focal brain injury from venous ischemia/infarction or hemorrhage.^[1]

Patients with cerebral venous sinus thrombosis commonly present with headache, although some patients may present with focal neurological deficit (such as hemiparesis and hemisensory disturbance), altered consciousness, seizures,

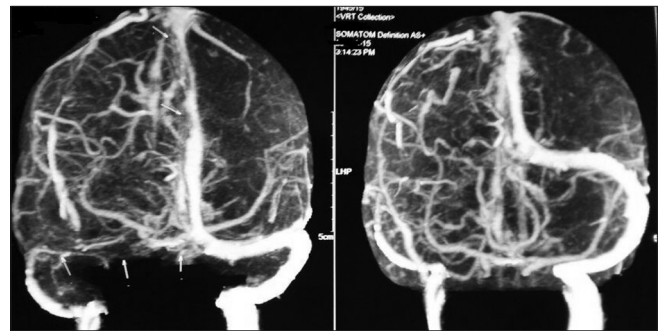


Figure 2: Computed tomography venography showing superior sagittal sinus thrombosis

or symptoms of raised intracranial pressure without focal neurological signs. The Less frequent presentation includes rapidly progressive illness with deepening coma, headache, nausea and pyramidal signs, due to extensive involvement of the deep cerebral veins.

There appears to be no clear correlation between disease severity and outcome but several factors such as infancy and advanced age, rapid onset with coma and focal deficits, and thrombosis affecting largely the deep venous system are associated with a poorer prognosis.^[2]

The primary sign of acute cerebral venous sinus thrombosis on a noncontrast CT is hyperdensity of a cortical vein or dural sinus which may be seen in only one-third of cases. Commonly, unenhanced CT shows indirect signs of cerebral venous sinus thrombosis such as diffuse brain edema, hypodensity of the brain (seen in 20–50% of cases) or decreased ventricular size. Most specific indirect sign on unenhanced CT images is venous infarction which may be hemorrhagic or nonhemorrhagic.^[3] Hemorrhagic infarction occurs in approximately 10–50% of cases and primarily affects the cortex and adjacent white matter.

Hemorrhage in the parasagittal frontal and parietal lobes may occur in cases of superior sagittal sinus thrombosis while hemorrhage in the temporal or occipital lobes is more typical of transverse sinus occlusion.^[4] Magnetic resonance imaging combined with magnetic resonance venography has largely replaced invasive cerebral angiography and conventional CT for diagnosis of cerebral venous sinus thrombosis. Kumral *et al.* in study of 220 consecutive patients with cerebral sinus venous thrombosis noted that majority of patients (45%) had nonlesional sinus-venous thrombosis, 23% had nonhemorrhagic infarct, 20% had hemorrhagic infarct, and 12% had intracerebral hemorrhage.^[5]

We report a very rare case of cerebral venous sinus thrombosis in a 40-year-old female with acute subdural hematoma secondary to cerebral venous sinus thrombosis. The subdural hematoma was possibly due to rupture of bridging veins resulted from high backpressure by the obstructed thrombosed vein.

We conducted a thorough literature search on cerebral venous sinus thrombosis with a spontaneous acute subdural hematoma. Very few cases of cerebral venous sinus thrombosis with acute subdural hematoma have been reported so far. To best of our knowledge, we could search only nine cases of subdural hematoma secondary to cerebral venous sinus thrombosis [Table 1]. Due to the rarity of this complication at present there are no fixed guidelines for its management.

Akins *et al.*, reported a case series of three patients with cerebral venous sinus thrombosis complicated by a subdural hematoma.^[6] One case was managed successfully conservatively while two cases required surgery and evacuation of hematoma. Takashi *et al.*, reported a case of 55-year-old male with acute onset headache while weightlifting with acute subdural hematoma with superior sagittal sinus thrombosis. They proposed that hemodynamic stress caused by cerebral venous sinus thrombosis resulted in the collapse of a bridging vein and caused an acute subdural hematoma.^[7]

Bucy and Lesemann reported a case of 37-year-old male with idiopathic recurrent thrombophlebitis with cerebral venous thrombosis with acute subdural hematoma. The patient underwent craniotomy and subdural hematoma evacuation with subtemporal decompression and proposed a mechanism for subdural hematoma was due to cerebral venous bleeding due to obstructed venous return.^[8]

Chu *et al.*, reported a case of 40-year-old woman with aplastic anemia on oxymetholone (a synthetic androgen) who developed left-sided tentorial subdural hematoma, and focal cerebral thrombosis of the left superficial sylvian vein and sigmoid sinus. On discontinuation of oxymetholone, her symptoms and signs disappeared.^[9] Sirin *et al.* reported a case

of a 77-year-old male patient with polycythemia vera with lower back pain, paraparesis, and urinary retention following a sudden onset headache. Imaging revealed concomitant cranial and spinal subdural hematoma related to superior sagittal sinus, right transverse and sigmoid sinus thrombosis and patient was managed successfully with systemic anticoagulation.^[10]

Sahoo *et al.* reported a case of 60 years old known diabetic and hypertensive patient with spontaneous subdural hematoma over the left frontal convexity and right transverse, sigmoid sinus and superior sagittal sinus thrombosis that was treated with low molecular weight heparin, followed by oral warfarin.^[11] Kim and Yoo reported a case of 55-year-old female with rectal cancer who presented with a severe headache. She was diagnosed as having superior sagittal sinus thrombosis with left frontal parenchymal hemorrhage, subdural hematoma along the left cerebral convexity and subarachnoid hemorrhage in the left sylvian fissure and was treated with anticoagulants.^[12]

In our literature search, it was not clear in some of the cases whether subdural hematoma was caused by cerebral venous sinus thrombosis or was secondary to some other pathology. Dangra *et al.* reported a case of 55-year-old male who presented with a headache and was diagnosed as a case of cerebral venous sinus thrombosis for which he was anti-coagulated. After an initial period of slight improvement, he complained of a severe headache in all positions. Repeat scan revealed left-sided subdural hematoma for which he underwent craniotomy and evacuation of hematoma. Re-evaluation of initial scans suggested diagnosis consistent with spontaneous intracranial hypotension, and it can be contested that subdural

Table 1: Reported cases of acute SDH due to cerebral venous sinus thrombosis

	Brief case	Imaging	Management
Akins <i>et al.</i> ^[6]	38-year-old female on oral contraceptives 68-year-old woman with polycythemia vera 60-year-old male	Left frontal SDH and left temporal venous infarct with a left transverse sinus thrombosis Extensive left 20 mm acute SDH with 16 mm of midline shift with partial superior sagittal sinus thrombosis Noncontrasted head CT demonstrated a 19 mm left isodense SDH with 10 mm of midline shift with filling defect in the left transverse sinus	Systemic anticoagulation Emergent craniotomy and hematoma evacuation Mini-craniotomy and evacuation of hematoma
Takahashi <i>et al.</i> ^[7]	55 year male with dehydration	Acute SDH with superior sagittal sinus thrombosis	Systemic anticoagulation
Bucy and Lesemann ^[8]	37 year male with idiopathic recurrent thrombophlebitis	Acute SDH with cerebral venous sinus thrombosis	Craniotomy and SDH evacuation with subtemporal decompression
Chu <i>et al.</i> ^[9]	40-year-old woman with aplastic anemia on oxymetholone	Left-sided tentorial SDH, and thrombosis of left superficial sylvian vein and sigmoid sinus	Discontinuation of oxymetholone
Sirin <i>et al.</i> ^[10]	77-year-old male patient with polycythemia vera	Cranial and spinal SDH with superior sagittal sinus, right transverse and sigmoid sinus thrombosis	Systemic anticoagulation
Sahoo <i>et al.</i> ^[11]	60-year-old patient known diabetic and hypertensive	Thin subacute SDH over left frontal lobe convexity and right transverse, sigmoid sinus and superior sagittal sinus thrombosis	Low molecular weight heparin
Kim and Yoo ^[12]	55-year-old female with rectal cancer	Left frontal parenchymal hemorrhage with left cerebral convexity SDH	Anticoagulation

CT – Computed tomography; SDH – Subdural hematoma

hematoma, in this case, was due to spontaneous intracranial hypotension or result of anti-coagulation.^[13]

Similarly, Singh *et al.* reported a case of a 39-year-old woman who presented with a headache and magnetic resonance imaging showed bilateral subdural hematomas with veno-occlusive disease of the superficial and deep venous systems. Some elements in the report suggested that intracranial hypotension was the initial condition with secondary cerebral venous sinus thrombosis and secondary subdural hematoma.^[14] Matsuda *et al.* reported a case of a 33-year-old woman with superior sagittal sinus thrombosis treated with intravenous thrombolytics who later developed subdural hematoma. Preceding use of thrombolytics can be proposed likely cause of subdural hematoma in that case.^[15]

Systemic anticoagulation remains the treatment of choice in cases of uncomplicated cerebral venous sinus thrombosis. Thrombolytic therapy is reserved for patients who continue to deteriorate due to thrombus extension despite dose adjusted heparin. Regarding management of patients with cerebral venous sinus thrombosis with associated parenchymal hemorrhage in the area of venous infarction, intravenous heparin is favored by most investigators and seems to be safe unless patient requires surgical intervention. There is also limited evidence on the role of decompressive craniectomy in cerebral venous sinus thrombosis with refractory brain edema, venous infarction, and impending cerebral herniation. Systemic anticoagulation can be started after surgery, but the timing and dosage remain debated.

Conclusion

Acute subdural hematoma secondary to cerebral venous sinus thrombosis is rare. Management of cerebral venous sinus thrombosis complicated by subdural hematoma is controversial and not well established due to the rarity of this complication and limited literature. There are no clear guidelines for the management of patients with cerebral venous sinus thrombosis with subdural hematomas (with or without associated intracerebral hemorrhage). Due to contra-indications for anticoagulation in patients with symptomatic subdural hematomas, management gets more complicated, and guidelines need to be developed.

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Conflicts of interest

There are no conflicts of interest.

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