

Case Report

Acute Subdural Hemorrhage: A Presenting Feature of Ruptured Distal Anterior Cerebral Artery Aneurysm

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Abstract

Aneurysmal bleed commonly results in subarachnoid hemorrhage. Rarely can it manifest as acute subdural hemorrhage. The presentation can be of varied severity which includes acute severe headaches, altered sensorium with rapid neurological deterioration if SDH worsens causing mass effect and signs of herniation. Here we report case of a 48 year old male presented with acute severe headache, vomiting followed by new onset focal seizures and altered sensorium. CT Brain revealed acute interhemispheric, convexity and tentorial hemorrhage. Non contrast MR angiogram was normal. Cerebral DSA revealed a small 2 mm aneurysm anteriorly projecting arising from distal anterior cerebral artery. Aneurysm was successfully coiled and patient responded to conservative management with antiepileptics and intensive care monitoring. Patient was discharged without any neurological deficit. Acute Non traumatic SDH with characteristic location on CT scan could be a result of aneurysm rupture hence must undergo vascular imaging in the form of CT angiogram or Cerebral DSA depending on the general condition of patient. Timely intervention can prevent further clinical deterioration and may result in a better outcome.

Keywords: Subdural hemorrhage; Distal anterior cerebral artery; Aneurysm

Introduction

Acute Subdural Hemorrhage (SDH) often occurs due to head trauma resulting from tearing of bridging and/or cortical veins. Other less common causes of SDH which usually are nontraumatic include coagulopathies, vascular malformations, intracranial hypotension, cerebral sinovenous thrombosis, brain neoplasms, inflammatory conditions (certain vasculitis and vasculopathies involving the CNS), dissection of intraparenchymal hematomas into subdural space, and aneurysmal rupture [1]. Amongst the nontraumatic causes of acute SDH, Aneurysm rupture is one of the rare but important cause to be identified as it is potentially devastating and could result in rapid clinical deterioration if untreated. Reported incidence of acute aneurysmal SDH varies from 0.5% to 7.9% [2,3]. Aneurysm of Internal Carotid Artery (ICA) Posterior Communicating artery (Pcom) is the most common site, followed by aneurysms of Middle Cerebral Artery (MCA) and Distal Anterior Cerebral Artery (DACA) [4,5]. Acute SDH due to DACA aneurysm rupture is very rare. Here the authors describe case of a middle aged gentleman presenting with acute headache and focal onset generalized seizures followed by altered sensorium and left sided weakness. CT brain was suggestive of acute interhemispheric, convexity and tentorial SDH. Digital Subtraction angiogram DSA revealed DACA aneurysm which was successfully

coiled and patient discharged without any neurological deficit.

Case Presentation

A 48 year old man presented to emergency department with acute onset severe headaches since afternoon. It was holocranial, throbbing and worst headache of his life associated with vomiting. On arrival to emergency department he was drowsy with a Glasgow Coma Scale GCS of 14/15. Blood pressure was 180/100 mmhg. There was no focal neurological deficit. CT Brain plain revealed an acute interhemispheric subdural hemorrhage with a small right frontal SDH along with convexity and tentorial SDH (Figure 1A and B). Patient developed flurry of left focal onset generalized seizures for which injection midazolam bolus was given and loaded with injection levetiracetam. Post seizure he developed left sided weakness. Hence an urgent MRI Brain plain was done which showed SDH as described without any parenchymal abnormality like infarct or any other structural abnormality (Figure 1C and D). MR angiogram was normal (Figure 1E and F). Patient was intubated in view of further episodes of seizures and loaded additionally with inj fosphenytoin and continued on midazolam infusion. EEG was done which was suggestive of right frontal interictal epileptiform discharges. Biochemical tests and coagulation parameters were normal. There was no recent head trauma however there was prior history of headaches 3 to 4 times which were severe and alarming but managed with analgesics. In view of non-traumatic SDH with location in interhemispheric SDH, a cerebral angiogram DSA was performed which confirmed presence of small 2 mm bilobed aneurysm in the left ACA A2 to A3 junction which was projecting anteriorly (Figure 2A).

Endovascular procedure was done in the form of coiling of the aneurysm. Post coiling angiogram revealed isolation of aneurysm from the circulation (Figure 2B). Gradually sedation was withdrawn, seizures were controlled and patient was extubated. Mild headaches gradually resolved. CT Angiogram done on day 7 revealed partial resolution of SDH with obliteration of aneurysm and no vasospasm

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(Figure 3A, B and C). Patient was discharged on day 14 with oral antiepileptic medications and nimodipine.

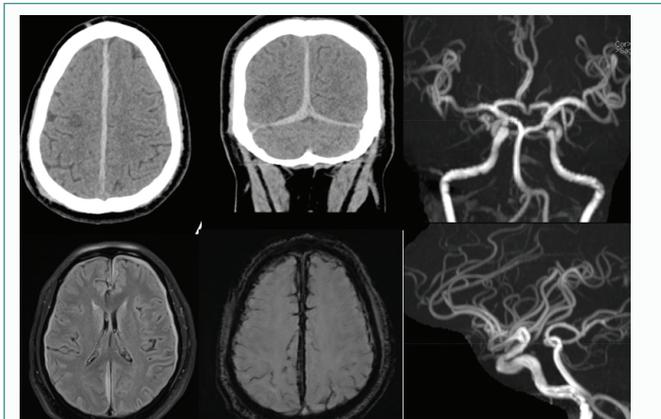


Figure 1: A and B) CT scan brain plain axial and coronal reconstruction image showing acute hyperdense interhemispheric and transtentorial subdural haemorrhage. C) T2FLAIR axial image showing hyperintense collection in interhemispheric and b/l cerebral convexities. D) SWI showing susceptibility artefact in interhemispheric and convexity region s/o haemorrhage. E and F) TOF Angiogram AP and lateral view showing no obvious vascular abnormality.

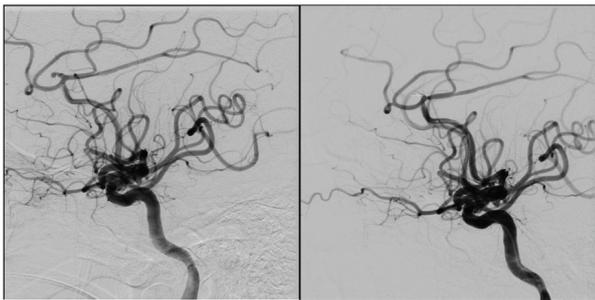


Figure 2: A) Digital subtraction angiogram of intracranial vessels lateral view showing anteriorly projecting small 2 mm aneurysm arising from the A1 to A3 Junction just distal to origin of pericallosal artery. B) Post coiling DSA showing complete obliteration of aneurysm with coil mass.



Figure 3: A and B) Follow up CT Brain plain showing reduction in thickness and attenuation of subdural hemorrhage suggestive of partial resolution. C) CT Angiogram showing coil mass in Distal ACA aneurysm with complete obliteration.

Discussion

Aneurysm rupture results in different types of intracranial bleeding. Most common being subarachnoid hemorrhage (about 60%) followed by intracerebral hematoma (30% to 40%) and rarely intraventricular hematoma (12% to 17%) [6]. Few cases can have SDH associated with SAH however pure SDH is very uncommon due to aneurysm rupture. About 170 patients with aneurysmal SDH with or without SAH have been reported [7]. Pure a SDH due to ruptured intracranial aneurysm is extremely rare. Only 20 cases have been reported so far, including 14 cases during the last two decades [8]. In most cases of aneurysmal a SDH, the history will distinguish a traumatic from a spontaneous cause. Amongst patients with aneurysmal SDH, Most common site of aneurysm rupture was PCOM originating from ICA followed by MCA followed by DACA [9].

The aneurysms of DACA are seen in 2% to 6.7% of the intracranial aneurysms and they are usually saccular, small-lobed and single [10,11]. Most patients with ruptured DACA Aneurysm present with classical SAH. However DACA ruptured aneurysm resulting in interhemispheric SDH associated with convexity SDH without subarachnoid hemorrhage have been reported in only few cases to date [12-15]. Various mechanisms have been proposed to explain the causes of SDH after rupture of saccular aneurysms [8,16,17]: (1) Successive small hemorrhages (sentinel hemorrhages) lead to formation of adhesions between the aneurysm and the arachnoid creating a path from the dome to the subdural space and the final rupture occurs in the subdural space; (2) High pressure emanating from the ruptured aneurysm results in tearing of the arachnoid membrane through which blood extravasated into the subdural space; and (3) A massive hemorrhage results in rupture of the cortex and arachnoid membrane. A Distal ACA aneurysm primarily adherent to the flax or the dura bleeds into the subdural space upon rupture [9]. Our case had sentinel headaches in past which may have lead to path formation from the dome of aneurysm into the subdural space. Also the location of aneurysm and its anterior projection, morphology and proximity to dura and result in interhemispheric SDH. Clinical presentation is usually headaches, altered consciousness, and seizures with or without focal neurological deficit.

Prognosis and management depends on hemodynamic status, and level of consciousness, rapidity of clinical deterioration. Usually it is a catastrophic presentation; hence emergency care physicians should be aware of this rare entity and keep in mind that an aneurysmal SDH may present without accompanying SAH without any history of preceding head injury. In emergency settings, most of the causes for acute SDH can be ruled out by an emergency contrast-enhanced CT or MRI [1]. Conventional four vessel angiography is the gold standard for detecting the presence of an aneurysm; however, it is time consuming and not safer than 3D CT angiography, particularly in poor grade patients [6,18,19]. Recommendations by Park SM [20] regarding neuroimaging are 3D CT angiography is mandatory in patients with (1) Acute SDH and no history of head trauma, (2) SDH and a history of probable sentinel bleeding, (3) Rapidly progressing symptoms and signs that suggest bleeding of arterial origin, or (4) Mild head trauma whose CT findings show disproportionately massive SDH with or without SAH. Also CT Angiogram is recommended in SDH along convexity and along the tentorium or the falx, multicompartmental hematoma, (3) Pure SDH over the tentorium, or (4) Pure SDH in the interhemispheric fissure. Our case had rapid clinical deterioration, no head trauma and CT brain suggestive of tentorial, convexity SDH with maximum amount in interhemispheric region.

Treatment involves hemodynamic stabilization, symptomatic treatment for seizures, raised intracranial pressure and simultaneous preparation for treating the underlying cause. Urgent evacuation and decompression must be performed first before further evaluations about vascular abnormalities in spontaneous a SDH causing life-threatening brain swelling and herniation, [7,21]. Aneurysm clipping or coil embolization must be carried out in accordance with the site of the aneurysm under optimal operating conditions when patient is hemodynamically stable and SDH is well tolerated. According to a meta-analysis by Marbacher S et al. [22], urgent surgical decompression and immediate occlusion of the aneurysm seem to be an acceptable treatment strategy in order to achieve better outcome. Good outcomes are found in patients maintaining stable neurological condition irrespective of whether intervention was immediate or delayed. Also Patients with pure a SDH due to a ruptured aneurysm demonstrated better outcomes than patients who suffered aneurysmal a SDH associated with SAH. Patients in unstable cardiopulmonary condition, with unstable blood pressure and serious ventricular arrhythmias, have the highest risk of unfavorable outcomes. Poor outcome appeared to be associated with worse SAH grade at the time of admission, a greater midline shift, and greater SDH volume.

Shi-Yi Hsu et al. [23] reported a case of SDH due to DACA aneurysm rupture with poor outcome whereas Tae-Wook Song et al. [9] reported case of a SDH due DACA aneurysm with good outcome.

Conclusion

Aneurysmal SDH is a rare entity. Cases presenting with acute SDH on CT scan with classical location without any head trauma should prompt a suspicion for underlying aneurysmal bleed and an emergency CT angiogram should be ordered. Timely neurosurgical intervention can prevent further deterioration and result in a better outcome.

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