A Case of MR Imaging Detection of Hemorrhages in Cerebral Amyloid Angiopathy

Ruby FA¹, Ahsan S², Chandy MJ³, Alam J⁴

Abstract
A 70-year-old diabetic and hypertensive male patient with mild renal impairment presented with recurrent stroke. CT scan of brain demonstrated acute hemorrhagic/nonhemorrhagic infarcts in the brain. Gradient sequences in the follow-up MRI showed extensive blooming in the cortex of both cerebral hemispheres. There were multiple foci of blooming in basal ganglia and cerebellar hemispheres. Hemosiderin staining was present in posterior fossa. MR findings were consistent with extensive primary cerebral amyloid angiopathy (CAA).

Key words
Cerebral amyloid angiopathy (CAA), Susceptibility weighted image (SWI), T2 Gradient Echo (T2GE), subarachnoid hemorrhage (SAH), subdural hemorrhage (SAH), intraventricular hemorrhage (IVH).

Introduction
Amyloidosis is a rare systemic disease caused by extracellular deposition of beta-amyloid. Generally underlying causes of chronic renal failure, diabetes mellitus, and malignancy are present. Primary cerebral amyloid angiopathy (CAA) is a neurological condition where there is deposition of beta-amyloid in the media and adventitia of small and medium sized arteries of the brain. This can occur sporadically in absence of systemic amyloidosis. CAA accounts for 1% of stroke patient. Patient usually presents with drowsiness, headache, neurologic changes. Most of the time plain CT fails to identify the microhemorrhages occurring in the brain. CAA related ICHs are multiple, lobar and generally sparing the deep white matter, basal ganglia and brain stem. Other manifestations are subarachnoid hemorrhage (SAH), subdural hemorrhage (SDH), intraventricular hemorrhage (IVH) and superficial hemosiderosis. Amyloid deposition in cerebral veins has also been described.

Case report
A 70 year-old-man presented with recurrent stroke, vomiting for several times and excessive sweating for one week. On admission neurological examination showed GCS E4V2M5, temperature normal, blood pressure normal, planter reflex – no response on right side and equivocal on left side. Bilateral crepes were present in chest.

Patient is known diabetic and hypertensive. Biochemical tests were generally normal except serum creatinine was slightly raised. CT

1. Registrar, Department of Diagnostic and Interventional Radiology, Apollo Hospital Dhaka. 2. Consultant, Department of Diagnostic and Interventional Radiology, Apollo Hospital, Dhaka. 3. Sr. Consultant, Department of Neuro surgery, Apollo Hospital, Dhaka. 4. Sr. Consultant & Coordinator, Department of Diagnostic and Interventional Radiology, Apollo Hospital Dhaka.

Pulse Volume 7 2014 53
scan of brain showed acute hemorrhagic infarcts in right temporal lobe and bilateral occipital lobes, subacute right cerebellar hematoma, chronic infarcts are noted in bilateral basal ganglia, left subinsular and periventricular white matter. Chronic infarcts are also seen in left cerebellar hemisphere and pons. Since then there was progressive slowing of psychomotor activity. MRI of brain was done to exclude CAA.

MRI of brain showed multiple acute infarcts in both temporo-occipital regions. Multiple lacunar infarcts are also present in centrum semiovale and periventricular white matter. Extensive focal parenchymal hemorrhages are also noted in cerebellum and almost all lobes of both cerebral hemispheres. Old hemorrhagic infarcts are noted in both basal ganglia and left cerebellar hemisphere. Gradient weighted images demonstrated foci of blooming in sites of previous hemorrhages. There were few foci of cortical blooming - “black dots” in the cortex.

There was hemosiderin staining in posterior fossa. Ventricles are dilated. Periventricular hyperintensity was noted. Features were consistence with extensive CAA. During the course of illness he was evaluated for underlying bleeding diathesis and connective tissue disorder which were negative.

**Discussion**

Cerebral amyloid angiopathy (CAA) is a degenerative vasculopathy. It is well known to manifest as amyloid protein deposition in small arteries. CAA is now proven to be unrelated with systemic amyloidosis; it is associated with increasing age, dementia, Alzheimer’s disease and thus denoted as primary cerebral amyloidosis. As the beta amyloid protein builds up within the elastic lamina vessel walls, vessels lose elasticity and become fragile. Fragile vessels are more easily damaged and
Extensive focal parenchymal hemorrhages are semiovale and periventricular white matter, both temporo-occipital regions. Multiple MRI of brain showed multiple acute infarcts in done to exclude CAA. Since then there was progressive slowing of psychomotor activity. MRI of brain was pons. Chronic infarcts are noted in both cerebral hemispheres. Old hemorrhagic hematoma, chronic infarcts are noted in occipital lobes, subacute right cerebellar cortex. There was hemosiderin staining in posterior cortex. Certain patterns of lobar hemorrhage, which can be detected on CT and conventional MR images are suggestive of CAA. Hemorrhage involving the cortex and sub cortical white matter in frontal and parietal lobes are most common. As CAA is a vascular disease it is insensitive to diagnosis by conventional angiography. Susceptibility weighted images (SWI) can detect more micro hemorrhage than the conventional MR angiography and digital subtraction angiogram and T2 GE technique. Micro hemorrhage contains hemosiderin which is paramagnetic relative to normal tissue and leads to large variation in local magnetic field. SWI with its sensitivity to blood products and hemorrhages is suitable to detect imaging changes consistent with CAA.

**Conclusion**

MRI with gradient Echo sequence is essential for diagnosis of cerebral amyloid angiopathy. This sequence is mandatory in evaluation of elderly patient (above 60). Early detection of micro hemorrhage is important in management and monitoring of the therapeutic response of patients; especially as new therapeutic options suggest low molecular weight proteins that reduce amyloid fibril formation.

**Reference**

3. European journal of neurology @ 2010 EFNS. Volume 18(4); p. 597-603, April 2011. Cortical subarachnoid hemorrhage in the elderly: a recurrent event probably related to cerebral amyloid angiopathy.