CASE REPORT

Haemorrhagic transformation: A serious complication of massive ischemic stroke

Mohd Ridzuan Mohd Said, MMed, Mohd Al-Baqlish Mohd Firdaus, MMed

Department of Medicine, International Islamic University of Malaysia, Pahang, Malaysia

SUMMARY

Acute ischaemic stroke is a debilitating disease and may lead to haemorrhagic transformation associated with few factors such as high National Institute of Health Stroke Scale (NIHSS), low Modified Rankin Score (MRS), cardio-embolic clot and others.[1] We report herein a 61 years old man whom presented with left sided weakness and diagnosed with acute right middle cerebral artery (MCA) infarction. Thrombolytic therapy was not offered due to low Alberta Stroke Program Early CT (ASPECT) score and hence managed conservatively. However, within 24 hours, his Glasgow Coma Scale (GCS) reduced by 4 points and urgent Computed Tomography (CT) brain confirmed haemorrhagic transformation with midline shift. He underwent emergency surgical decompression and subsequently had prolonged hospital stay complicated by ventilated acquired pneumonia. He recovered after a course of antibiotic and discharged to a nursing home with MRS of 5.

INTRODUCTION

Haemorrhagic transformation (HT) is a devastating complication of acute ischaemic stroke and the mechanism is related to migration of emboli and abnormal permeability of blood-brain barrier.[2] We report herein a case of acute right middle cerebral artery (MCA) infarction and later transformed into haemorrhagic infarction.

CASE REPORT

A 61 years old man, right handed with underlying hypertension, Type 2 Diabetes Mellitus, dyslipidaemia and Ischaemic Heart Disease (IHD) presented with sudden onset of left sided hemiparesis. The symptom started at 5.30 am when he was performing prayer and was associated with abrupt onset of aphasia and loss of sensation on left limbs. Otherwise, he denied any fall or syncopal attack prior to the current presenting complaints. In addition, he was prescribed with Clopidogrel when diagnosed with IHD previously in 2012 but confessed to non-compliance with the antiplatelet.

Clinically, his blood pressure (BP) was elevated to 189/102 mmHg with heart rate of 97 beats per minutes (bpm). He was afebrile and nil additional heart sound is auscultated. Neurological examination revealed left sided hemiparesis with power of 0/5, hypotonic and hyperreflexia. Plantar was up-going with intact proprioception. In addition, cranial nerve examination demonstrated left cranial nerve 7 palsy, dysphasia and homonymous hemianopia suggestive of a total anterior circulation stroke with NIHSS of 25. Otherwise, no carotid bruit was heard on neck auscultation.

Electrocardiogram revealed a sinus rhythm with ST depression at lateral leads (Lead 1, AVL, V5 and V6). Bloods investigations revealed mild thrombocytopenia of 134 x 109/L with normal counts of haemoglobin, 16.1 g/dL and total white cell counts of 5.5 x 10^9/L. Creatinine was elevated to 116.6 umol/L but other electrolytes including urea, potassium were within normal limit. In addition, INR was 1.23 ratio with random blood sugar of 7 mmol/L.

He arrived in Emergency department, at 8.15 am, stroke call activated and underwent urgent CT brain. CT angiography revealed loss of grey white matter junction and effacement of the sulci within the right MCA territory (Figure 1A). Right M1 thrombus was present with total ASPECT score of 3. Hence, he was classified as Total Anterior Circulation Infarction (TACI) based on Oxfordshire Community Stroke Project (OCSP). However, thrombolysis therapy not administered due to low ASPECT score.

He was admitted to Stroke Care Unit at 9.15 am, immediately commenced on Clopidogrel with regular stroke care. However, his GCS reduced from 15/15 to 11/15 at 4.00 pm and vital sign showed BP of 180/99 with heart rate of 50 bpm. Urgent CT brain was performed and revealed hyperdense lesion within right MCA territory infarct with mass effect on the frontal and temporal horns of right lateral ventricle (Figure 1B).

He was referred to a neurosurgeon and underwent emergency decompression craniotomy. Post operatively, he was managed under ICU care with cerebral protection. Unfortunately, his recovery was complicated by seizures which resolved after commencement of phenytoin. He also acquired Ventilated Associated Pneumonia (VAP) and completed antibiotics. Upon discharge he was observed with similar degree of right hemiparesis and MRS of 5/6.

DISCUSSION

Acute ischaemic stroke is a debilitating disease and is associated with significant disability and mortality. High fatality rate has been reported during the initial 30 days of acute presentation due to cardiovascular event, infection and its consequence.[3] In addition, HT is frequently observed post-acute ischaemic stroke and worsened the prognosis with mortality rate of 50%.[3]

HT occurred when blood products extravasated into an area of infarction and Alvarez-Sabin et al. has outlined on several mechanisms for these physiological changes. During an

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Corresponding Author: Brian Mohd Ridzuan Mohd Said
Email: ridzuan.said85@gmail.com

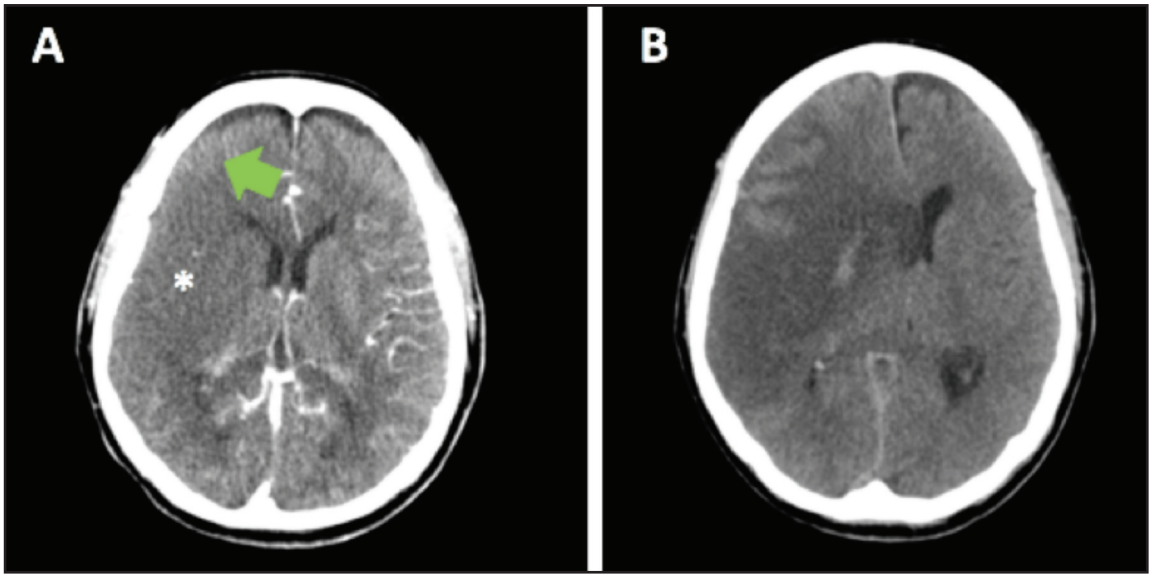

Fig. 1: CT imaging of brain. (A) Showed acute right MCA infarct with effacement of sulci (Green arrow) and loss of grey white matter differentiation (*). (B) Showed haemorrhagic transformation with mass effect on previous right MCA infarct territory.

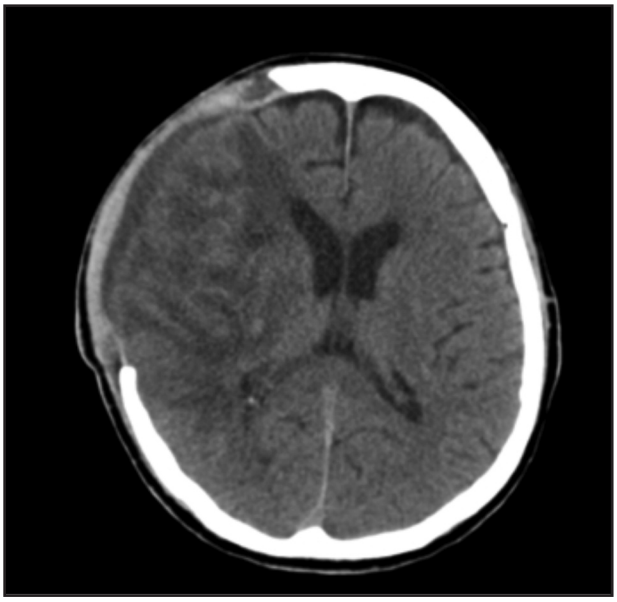

Fig. 2: Repeated CT Brain post right parito-temporal craniotomy. Previously seen right MCA infarct with haemorrhagic transformation showed involution changes with less perilesional oedema.

acute ischaemic event, cytokines are released and together with leucocyte migration impaired the blood - brain barrier and thus triggering extravasation of blood products.[2]

In addition, migration of emboli distally also contributes to HT.[2] Collateral circulation to the ischaemic tissue is promoted once the emboli migrate and augmented by hypertensive episode lead to HT.[2] Another mechanism is related to thrombolytic agents such as Alteplase with 6% risk of developing HT.[3] As the thrombolytic agent is dissolving the clot and restoring the perfusion to ischaemic tissue, the process is linked with endothelial cell damage and disrupts the blood-brain barrier permeability.[3]

In term of risk factors, Kablau et al. had demonstrated on few predictor factors for HT including NIHSS score.[1] NIHSS score of more or equal than 9 and MRS scores of 3 or above on admissio were associated with higher risk of developing HT as well as territorial infarctions when compared to lacunar stroke.[1] Moreover, it was postulated that higher incidence of HT is observed with cardio-embolic stroke due to higher chance for reperfusion when the clots resolved spontaneously or migrated distally.[1]

Furthermore, hyperglycaemia or uncontrolled Diabetes Mellitus during admission is also a crucial predictor factor as 42.4% of patients with HT were observed with blood glucose more than 11 mmol/L.[4] Moreover, non-favourable outcomes were observed in these patients with 29.2% being disabled and 11.5% dead.[4] In addition, impaired kidney function is observed with greater risk of developing HT especially when Glomerular Filtration Rate is less than 30.[4]

Classification of stroke syndrome based on OCSP offers an essential prognostication value but it was unfortunate for our patient who presented with high NIHSS and TACI which was associated with worst prognosis.

Antithrombotic therapy is the mainstay of treatment of acute ischaemic stroke, but the question remains on the safety of the therapy post HT events. Concern for worsening of HT might lead to hesitancy among physicians on commencing the medication promptly.[5] However, Kim et al found no significant association between the use of antithrombotic and neurological deterioration or aggravation of HT, thus suggested for adjustment of practice among physicians.[5]

Apart from surgical intervention for HT, Lapchak et al. had postulated on several potential pharmacological approaches

such as free radical- spin trap compound, membrane metalloproteinase inhibitor and platelet inhibitors.[3] Free radical - spin trap agent such as α- phenyl-N-t-butylnitrone (PBN) reduces HT by scavenging free radical at the blood-endothelial cell interface and thus lead to normalization of blood-brain barrier.[3] The inhibition of membrane metalloproteinase (MMP) reduces brain oedema or haemorrhage as MMP activation contribute to activation of TNF - α and thus damaged brain tissue and its micro vessels.[3]

CONCLUSION

The care for acute ischaemic stroke especially with haemorrhagic transformation requires multi - disciplinary approach including a physician, surgeon, physiotherapist, dietitian and nursing staff as the condition is associated with poor prognosis with devastating disability.

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