

Malignant Infarction Of The Middle Cerebral Artery In Elderly: A Point Of Controversy For Decompressive Surgery: A Case Report

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Abstract

Malignant infarction of the middle cerebral artery (MCA) is a remarkable life-threatening cerebrovascular condition. It represents up to 10% of all ischemic strokes and is characterized as a massive hemispheric or malignant space-occupying supratentorial infarct. An early diagnosis is essential to improve functional outcome and depends on clinical assessment and neuroimaging of patients with large MCA infarction to aid the prediction of an unfavorable course. However, there are still important questions about the management of patients with malignant MCA infarction, particularly with regard to the ideal timing for decompressive surgery and age limit for the surgical procedure. We present a case of an elderly man that sustained a large MCA infarction and debate, on the basis of available data, the management performed on our patient.

INTRODUCTION

Rapid neurological deterioration due to the effects of space occupying cerebral edema following middle cerebral artery (MCA) territory stroke is the best definition for malignant MCA infarction (1-5). Generally, it is found in up to 10% of all patients with supratentorial ischemia and, despite optimal medical therapy, the mortality rate approaches 80% (1, 6, 7). The mechanisms underlying the pathophysiological pathways of malignant MCA infarction leading to death have been extensively demonstrated (8-10), however there are several questions that need to be resolved regarding the clinical and surgical approach of patients, mainly the definition of a potential cut-off age, after which the effects of comorbidities might affect negatively the operation (11-13). Using a clinical case of our institution, we discuss the current available data for the treatment of large MCA infarction in elderly.

CASE REPORT

A 63-years-old right-handed man was brought to the Emergency Department complaining of difficulty raising his left arm. The patient reported that in the morning of admission suddenly began feeling weakness of the left hand that progressively worsened to profound left arm reduced

strength. His past medical history was notable for hypertension and heavy cigarette smoking during 35 years. On clinical assessment, blood pressure: 170/90mmHg, pulses: 80/min and temperature: 37.3oC. The neck was supple without abnormal carotid artery sounds, lungs were clear and the heart rate was regular with no murmurs. Neurological examination was notable for left facial weakness sparing the forehead, mild dysarthria, 3/5 strength in the left arm. The remainder of the exam was essentially normal, including visual fields and normal leg strength. Brain magnetic resonance (MR) imaging 24-hours after admission confirmed a right MCA superior division infarction with hemorrhagic transformation (Figure 1A and Figure 1B) and MR angiography (MRA) was consistent with severe stenosis of the right internal carotid artery just beyond the carotid bifurcation (Figure 2). The patient presented a remarkable recovery of the motor functions and was referred to neurovascular intervention, however on the fourth day of hospitalization, suddenly appeared mental confusion, moderate headache and increasing difficulty to arouse associated with left face, arm and leg plegia with left Babinski's sign, right gaze preference and no blink to threat on the left side. Glasgow coma score 12. New MR imaging showed a large infarct in the right MCA territory associated

with brain swelling and right-to-left midline shift (Figure 3). Complete occlusion of the right internal carotid artery was identified on MRA. The patient was maintained in close clinical monitoring with hemodynamic support and no further clinical deterioration was verified during the next four days after the second ischemic event. No signs of uncal herniation were verified. The patient was discharged home with good recovery of mental status and persistence of the motor deficits on the tenth day.

Figure 1A

A1 – MR FLAIR image showing hyperintense sign in the right frontal lobe. A2 – MR EPI image showing hypointense sign in the right frontal lobe.

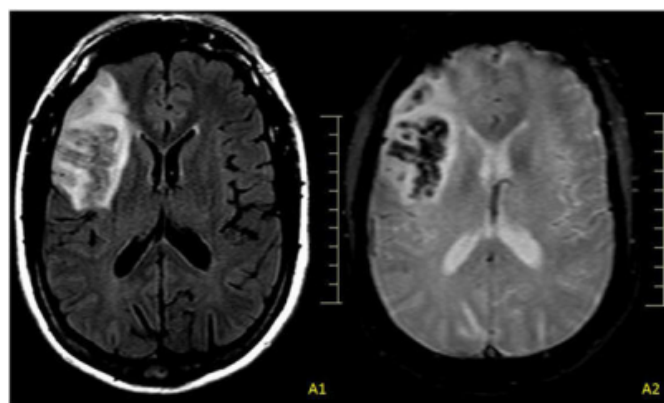


Figure 1B

Diffusion-weighted MRI showing restriction on the in the right frontal lobe.

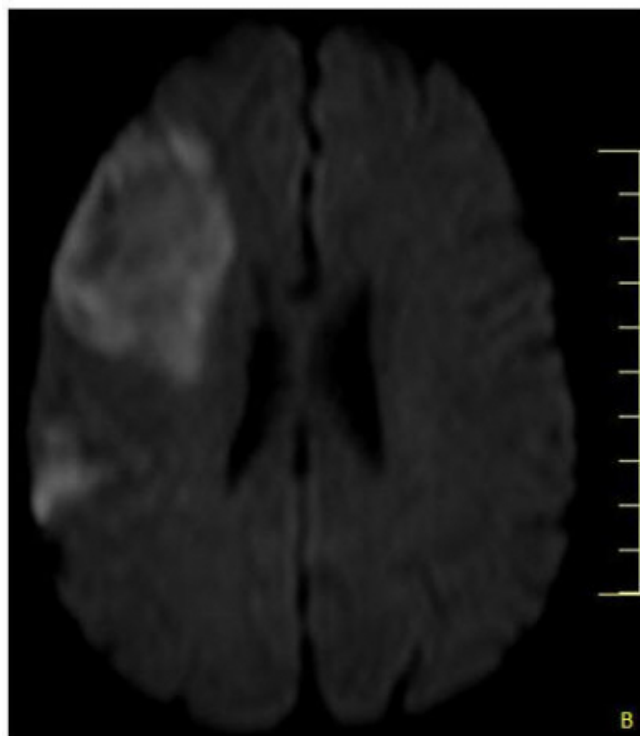


Figure 2

MRA showing severe stenosis (arrow) of the right internal carotid artery just beyond the carotid bifurcation.

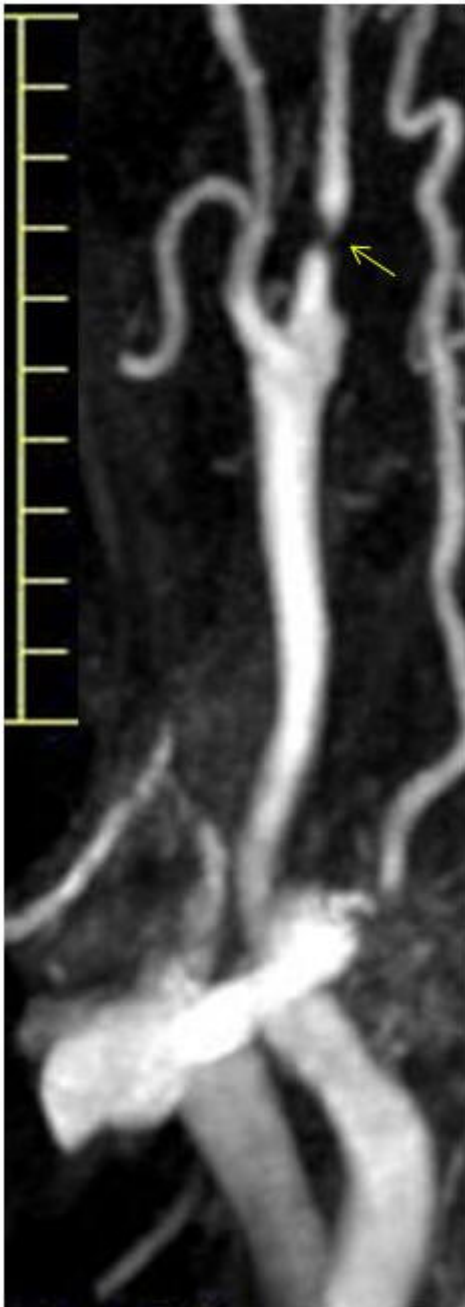
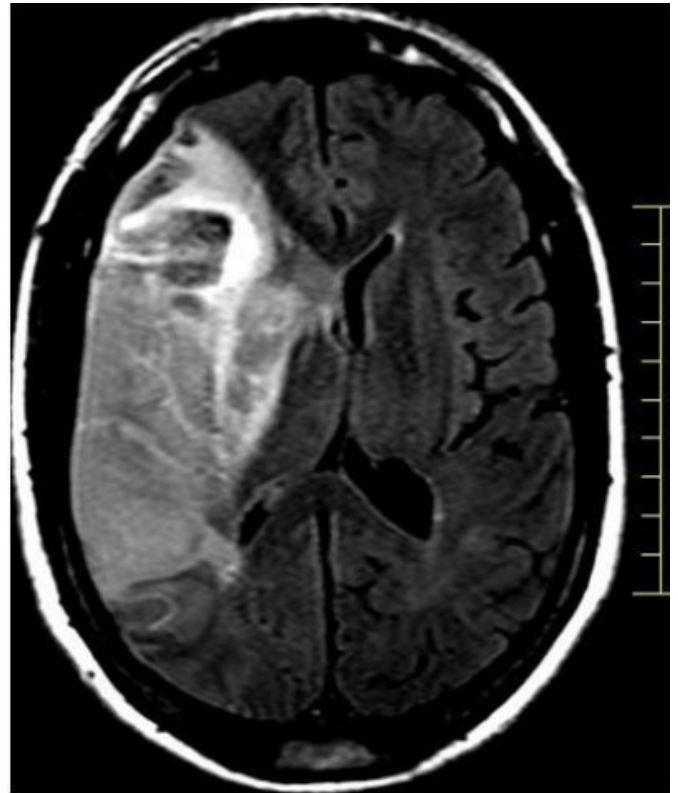


Figure 3

MR FLAIR image showing a large infarct in the right MCA territory associated with brain swelling and right-to-left midline shift.



DISCUSSION

Malignant middle cerebral artery (MCA) infarction is a life-threatening cerebrovascular event characterized by complete or partial occlusion of the MCA often causing hemiplegia, gaze deviation, aphasia when the dominant hemisphere is involved and neglect of the paralyzed when it is not (14). Generally, large MCA infarct is found in up to 10% of all patients with supratentorial ischemia and, although uncommon, the mortality rates approach 80%, despite optimal medical therapy (1, 6, 7).

This type of extensive stroke has been usually accompanied by severe brain edema, leading to raised intracranial pressure (ICP) and subsequent brain herniation (6, 11). The resulting ischemic injury causes further brain swelling and increases ICP, reducing cerebral blood flow (15). This vicious cycle is the most important mechanism of death in patients with malignant MCA infarction and, reasonably, the main therapeutic target to prevent clinical deterioration.

A great effort has been dedicated to determine an ideal therapeutic approach for patients with malignant MCA infarction. Decompressive craniectomy was first described by Scarcella, in 1956, (16) for patients with large MCA

infarction and has been demonstrated as a valuable tool preventing increases in ICP and brain herniation (13). Three European randomized controlled trials (the French DECIMAL, the German DESTENY and the Dutch HAMLET) have shown good scientific evidence of favorable functional outcome and survival for young patients who are treated early (17-19). However, the results can probably not be generalized to older patients and less is known about the benefits of the procedure in the elderly population.

Age is an important factor to consider in patient selection for surgery. Nobre et al (2007) (12), in a retrospective study of Brazilian patients that underwent decompressive craniotomy, showed that age over 50 years and male gender were associated with a high death risk. In addition, Arac et al (2009) (20), reviewing the studies in which patients over 60 years of age were operated for malignant MCA infarction, demonstrated that mortality rate and functional outcome were significantly worse following decompressive craniotomy. In the present report, our patient showed no signs of uncal herniation and was maintained in close clinical monitoring with hemodynamic support. As there is no consistent evidence demonstrating that surgical procedure is an appropriate approach for our patient, decompressive craniotomy was not considered as a beneficial therapy. The planned DESTENY-II trial is currently ongoing and studying patients older than 60 years of age which will, hopefully, provide more information in regard of this controversial question (21). In the present study, the neurosurgical team decided to maintain clinical treatment once the patient was stable hemodinamically and decompressive craniectomy was not performed.

In conclusion, the present report highlighted that age seems to be the main factor affecting outcome of patients submitted to decompressive craniotomy for the treatment of malignant MCA infarction. As a great amount of patients with large ischemic stroke are older than 60 years of age and the benefits from surgery in this group remains unclear, further scientific investigation is extremely necessary to determine the real value of the surgical procedure in elderly people.

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