Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19547 - 19550
Received 20 July 2021; Accepted 05 August 2021.

Role of Ventriculostomy in Moderate Recovery of Malignant Middle Cerebral Artery Infarct

Feda Anisah Makkiyah

[1]Neurosurgery Department, Faculty of Medicine, Universitas Pembangunan Nasional Veteran Jakarta 12450, Indonesia. Email. fedaanisah@upnvj.ac.id

Malignant MCA infarctions are associated with lethal condition. This article presents that this large infarct have good outcome after vetriculostomy for drainage liquor cerebrospinal for reducing ICP. A 65 years old female came with decreased of consciousness. The patient came with GCS 9 and CT scan showed large MCA infarct with transtentorial herniation. The ICP step ladder treatment was done by medical treatment such as osmotherapy and ventriculostomy. After two weeks admission in ICU and high care unit . The patient was discharged with motor aphasia and hemiparesis. The functional outcome was assessed with Barthel index (BI) and modified Rankin scale (mRS) during the follow up period of 6 months(35; 4). Conclusion, malignant MCA infarct can cause severe edema that result in death. Ventriculostomy inserted as a mean for reducing intracranial pressure has great influence in moderate recovery in this patient.

Keywords

Malignant MCA infarct; herniation; ventriculostomy; moderate recovery

Introduction

Malignant MCA infarction is a form of massive cerebral infarct that are associated with lethal condition.[1,2] This terminology defines infarction in completed MCA territory that results in cerebral edema. The incidence of this stroke is 2-10 % of all ischemic stroke . Patients present with hemiplegia and cerebral edema that resulted in transtentorial brain herniation and death and the majority of suvived patients in disabilities[2,3] .

Managing this elevated intracranial pressure because of malignant MCA infarct is the most challenging. The best medical treatment start with osmotheraphy (mannitol, hypertonic saline), endotracheal intubation and hyperventilation. [4] Many of clinical trials have reported that percent of people who survive with malignant MCA infarction managed with decompressive hemicraniectomy range from 67% to 84% compared with a 20–30% in conservatively treated patients[3]. Ventriculostomy as a mean to reduce ICP was considered controversial as CSF withdrawal can increase brain shift. When using a ventriculostomy to monitor ICP, withdrawing CSF to reduce ICP is controversial, as CSF withdrawal can increase brain shift. [5] As far as author known, this is the first case report that presents a case of malignant MCA infarct managed with ventriculostomy and discharge home with moderate disability.

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19547 - 19550
Received 20 July 2021; Accepted 05 August 2021.

Case report

A 69 year old female came to the emergency department with decreased consciousness and hemiparesis. This woman without any significant medical history had the vascular accident 1 day before. On physical examination, GCS score 9, right VII nerve central type paresis, motor examination showed grade 0 power on right upper and lower extremities, and she had 3+ reflexes on the right and 2+ reflexes on the left. Babinski was positive on the right side. She was sent for a CT scan which showed loss of grey white differentiation of MCA territory with > 5 mm herniation to the right. There was increased density of right and left M1 segment of middle cerebral artery (MCA)(Figure 1). It was measured infarct volume 232 cm^3 by manual tracing software. NIHSS score was 19 (severe neurological deficit).

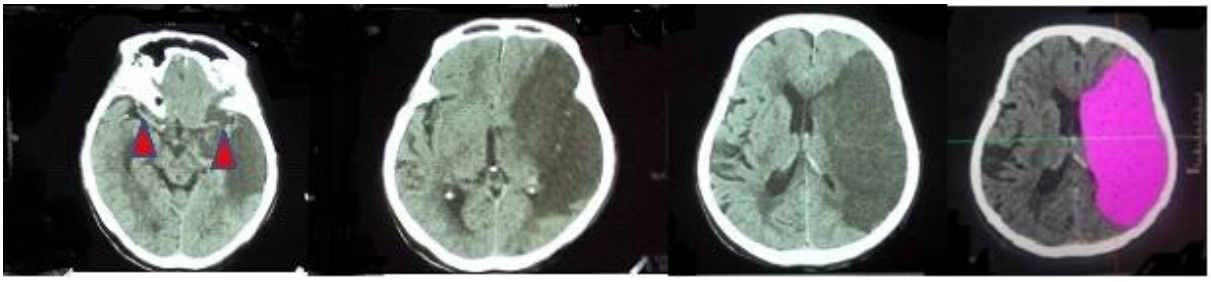

Figure 1: Non contrast CT done on presentation to emergency ward showed there was hyperdens sign in right and left M1 (see red arrowhead) (A), loss of differentiation of grey and white matter in the left MCA area (B) and herniation > 5mm to the right, there was effacement of sulci and gyri in the left hemisphere (C). Using CT scan manual tracing software, it was measured infarct volume 232 cm^3.

She was admitted to intensive care unit. **Mannitol**administration was given 1 g/kg intravenously, repeated every 4 to 6 h. Strict fluid goals and volume replacement were essential. She was intubated and done other supportive measurements such as mobilization, enteral feeding by nasogastric tube. The external ventricular drain was inserted to the left frontal horn. The height of EVD drain was 15 cmHg. Every day for 2 weeks 250-300 cc liquor cerebrospinal was drained into the bag. We did not performed ICP monitoring, since it was not available. The patient was consulted to the cardiologist and diagnosed with atrial fibrillation.

After the fifth day, GCS was improved to 12 and she has been weaned from the ventilator and moved to high care unit ward. She started to mobilized soon. After two weeks, she was discharge with Barthel index (BI) and modified Rankin scale(mRS) 35 and 4. She had motor paresis and aphasia. The functional outcome was assessed with Barthel index (BI) and modified Rankin scale(mRS) 1 month (40; 3).

One month later, she came to the our OutPatient Department. Her GCS score was still 12. Another CT scan non contras was taken. It was measured infarct volume 135 cm^3. Edema in the distribution of the left middle cerebral artery. There was cortical ribbon hyperdensity due to proteinaceous material. (Figure 2).

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19547 - 19550
Received 20 July 2021; Accepted 05 August 2021.

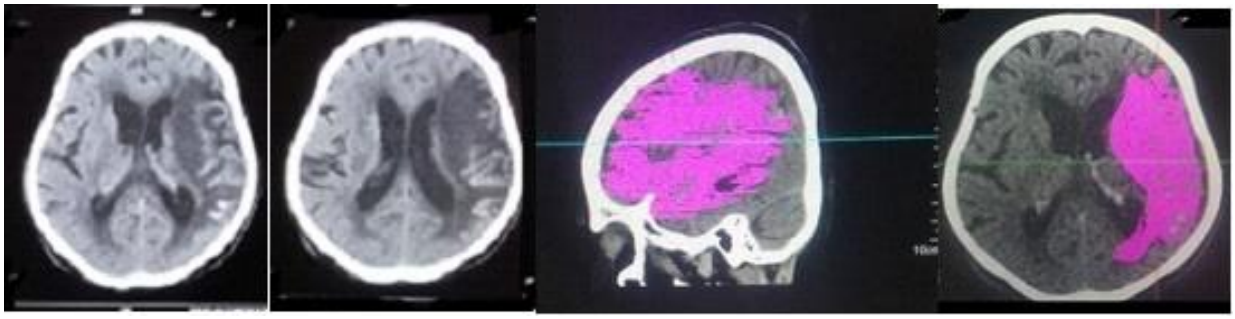

Figure 2 Figure 2. Non contrast CT after one month infarct. The infarct volume was 135 cm^3. There was cortical ribbon hyperdensity due to proteinaceous material.

Discussion

Cerebral edema is the leading cause of early deterioration and death in patients with large supratentorial infarcts. This edema develops between day two dan day five, but up to third patients develop neurological deficit 24 hours after the onset of symptoms[6]. Edema results in mass-effect with distortion, shift of tissue and elevated intracranial pressure. These effects lead to herniation and futher death. [5,7].

Treatment starts with sedation, analgesia, head support, maintaining a neutral neck position, osmotherapy with mannitol or hypertonic saline . Maintaning optimal cerebral pressure and reduction of intracranial pressure should be done simultaneously, this can be done with decompressive craniectomy and/or external ventricular drainage. [8].

External ventricular drainage was chosen as a mean to measure ICP or drainage liquor cerebrospinal due to acute hydrocephalus in stroke ischemia patients. Doctrinmonroekellie dictates that brain is located in a rigidcompartement. Increased volume of one of the parts of the brain can cause elevation of intracranial pressure. In trauma cases, External Ventricular Drainage is one of steps to reduce intracranial pressure.

External ventricular drainage was inserted in left Kocher (left frontal) for two weeks in this patient. This reduced intracranial pressure and gave space to edematous brain. Infact volume was 233 cm^3 first time measured and after series treatment of reducing intracranial pressure, the patient was discharge home . One month later, infarct volume was reduced to 135 cm^3 and the patient progressed towards neurological improvement.

A journal mentioned that globally increased ICP was not a common cause of initial detoriation of neurologic status from mass effect of large ischemia. It was mentioned the mean ICP was 13.4+/-10mmHg [7]from large hemispheric infarction with edema mass effect.

Since ICP monitoring was not available, the level of ICP was unknown in this patient. However, the midline shift from the CT scan and the effacement of sulci and gyri was clues for high intracranial pressure. After placement external ventricular drainage and medical treatment, the patient was improved.

Conclusion

Malignant MCA infarct can cause severe edema that result in death. Ventriculostomy inserted as a mean for reducing intracranial pressure has great influence in moderate recovery in this patient.

Compliance with Ethical Standards: The author has already got the consent from the family of patient.

What is already known on this topic?

Malignant middle cerebral artery promotes massive cerebral edema that needs conservative and operative treatment to reduce intracranial pressure. The role of ventriculostomy was not much disscused as in cerebral edema cause by traumatic brain injury. Ventriculostomy can reduce intracranial content in the same time decrease intracranial pressure.

What this study adds?

This case report denotes the role of ventriculostomy in reducing intracranial pressure caused by cerebral edema.

Funding: There was no support from any parties.

Conflict of interest: There is no conflict of interest.

Ethical Clearance: The consent has been taken from the patients's family.

References

1. Wartenberg KE: Malignant middle cerebral artery infarction. Current opinion in critical care. 2012;18(2):152-63.
2. Subramaniam S, Hill MD: Massive cerebral infarction. The neurologist. 2005;11(3):150-60.
3. Chen C-C, Cho D-Y, Tsai S-C: Outcome of and prognostic factors for decompressive hemicraniectomy in malignant middle cerebral artery infarction. Journal of clinical neuroscience. 2007;14(4):317-21.
4. Simard JM, Sahuquillo J, Sheth KN, Kahle KT, Walcott BP: Managing malignant cerebral infarction. Current treatment options in neurology. 2011;13(2):217-29.
5. Frank JI: Large hemispheric infarction, deterioration, and intracranial pressure. Neurology. 1995;45(7):1286-90.
6. Dostovic Z, Dostovic E, Smajlovic D, Ibrahimagic OC, Avdic L: Brain edema after ischaemic stroke. Medical Archives. 2016;70(5):339.
7. Schwab S, Aschoff A, Spranger M, Albert F, Hacke W: The value of intracranial pressure monitoring in acute hemispheric stroke. Neurology. 1996;47(2):393-8.
8. Jeon S-B, Koh Y, Choi HA, Lee K: Critical care for patients with massive ischemic stroke. Journal of stroke. 2014;16(3):146.