Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Medicine

Radiographic Features and Preventive Progressive Act of MCA Sign Ischaemic Stroke: A Case Report

Danny Shan Veda[1*], Sudharmadji[2]

[1]Faculty of Medicine, Duta Wacana Christian University, Yogyakarta, Indonesia
[2]Radiology Department, Bethesda Hospital, Yogyakarta, Indonesia

DOI: 10.36347/sjams.2022.v10i10.010 | **Received:** 28.08.2022 | **Accepted:** 03.10.2022 | **Published:** 07.10.2022

***Corresponding author:** Danny Shan Veda
Faculty of Medicine, Duta Wacana Christian University, Yogyakarta, Indonesia

Abstract **Case Report**

One in six people in worldwide tends to have a stroke in their lifetime. Of all stroke incidents, 70% are ischemic strokes. Prevalence of stroke in Indonesia has increased from 7 to 10.9 per mile 1000 population from 2013 to 2018. The middle cerebral artery region is the foremost commonly influenced region in cerebral infarction, due to the large area of vascularisation. This article aims to report the radiographic feature of a case about MCA Sign and review if thrombectomy can be another therapy option as the preventive and progressive strategy in managing MCA Sign stroke infarct. The patient, in this case, came to the hospital with clinical presentations including loss of consciousness, hemiplegia sinistra, and dysarthria. Middle cerebral artery infarction appears as a hyperdense lesion as thrombus can be found as an early sign. Unenhanced CT of the brain should be done immediately. Thrombolytic is the main pharmacotherapy. Endovascular thrombectomy is recommended to be done within 4.5 hours after onset.

Keywords: Middle cerebral artery infarction, ischaemic stroke, thrombectomy.

INTRODUCTION

Ischemic stroke is characterized by the loss of the bloodstream to a certain location of the brain with the coming about the loss of neurologic work. It is caused by thrombosis or embolism that blocks a cerebral vessel providing a particular region of the brain. When a vessel occlusion occurs, there's a central region where harm to the brain is irreversible and a certain area of penumbra where the brain has misplaced work owing to diminished blood flow but isn't irreversibly harmed [1].

The middle cerebral artery region is the foremost commonly influenced region in cerebral infarction, due to the large area of vascularisation. The internal carotid artery has a direct flow into the middle cerebral artery, giving the most effortless way for thromboembolism. With the large area of vascularisation, an infarct of the middle cerebral artery can create hypoperfusion [2].

According to the Indonesian Basic Health Research (*Riset Kesehatan Dasar*), the prevalence of stroke in Indonesia has increased from 7 to 10.9 per 1000 population from 2013 to 2018. Demographic data shows that the incidence of stroke is more common in the elderly population. However, the prevalence of stroke at the productive age still needs to be a concern. Stroke can cause physical disability and take a long time to recover. This can have an impact on decreasing productivity of productive age. In addition, the number of routine controls in stroke patients in Indonesia is also still low [3].

One in six people worldwide tends to have a stroke in their lifetime. That makes stroke cases more than 13.7 million each year, and 5.8 million a year die as a consequence. People who have survived stroke are more than 80 million globally. Of all stroke incidents, 70% are ischemic strokes (9.5 million) [1]. Management of middle cerebral artery stroke infarct should be a concern. This article shows one stroke infarct case in Yogyakarta, Indonesia. This article aims to report radiographic features of a case about MCA Sign and review if thrombectomy can be another therapy option as the preventive and progressive strategy in managing MCA Sign stroke infarct.

CASE REPORT

Patient Identity: Male, 68 years old.

Radiographic Features

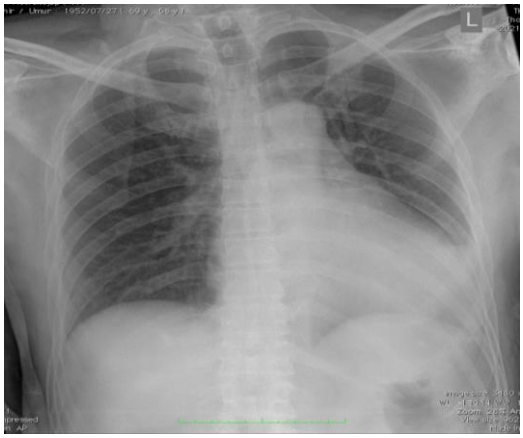

Fig. 1: Chest X-Ray

The result of the chest x-ray examination shows that:

- Coarse among bronchovascular markings.
- Air bronchogram is minimal with suspect post-bronchitis.
- Cardiomegaly with obs Left Ventricle hypertrophy.

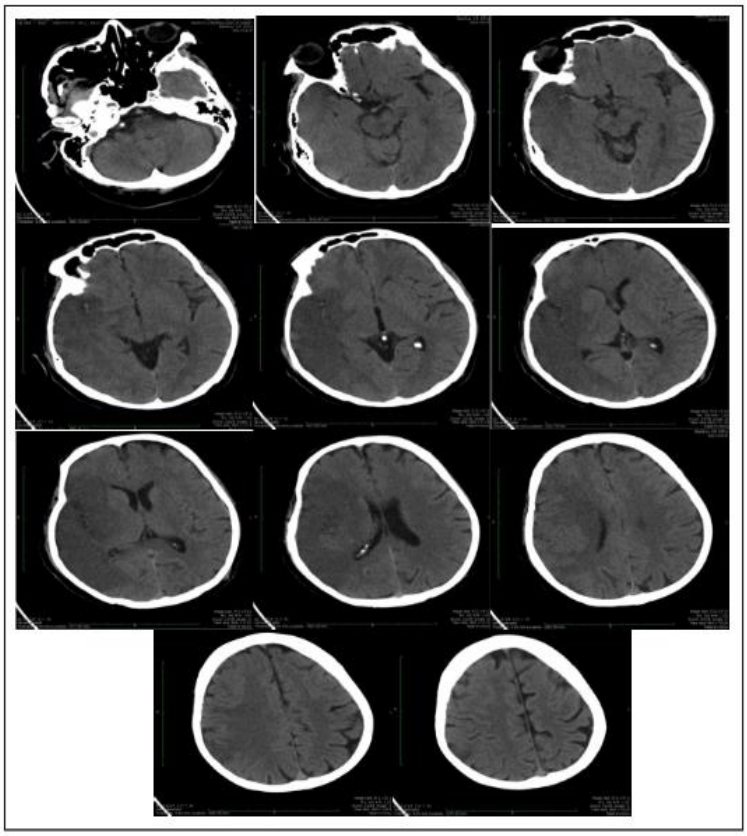

Fig. 2: MSCT HEAD

The result of the MSCT HEAD examination shows that:

- Extracranial soft tissue within normal limits.
- Continuous tabula and petrosum.
- MCA sign at the right lobe.
- Parenchymal differentiation is less clear.
- Sulci corticalis within normal limits.
- Gyri corticalis within normal limits.
- Sylvius fissure within normal limits.
- Slightly narrowed right lateral ventricular system.
- Midline structure looks in the middle.
- Right temporoparietal occult hypodense lesion appears, s.7-19.
- Cisterna within normal limits.
- Calcification of the pineal and choroid plexus.

Impression:

Cerebrovascular Non Hemoragic suspect subacute right temporo-parietal infarct.

Pharmacotherapy

Pharmacotherapy that the patient received includes analgesic, antipyretic, anti-inflammatory, and antiplatelet therapy such as acetylsalicylic acid. In other supportive therapy, the patient received such as atorvastatin, pantoprazole, metformin, and ceftriaxone.

DISCUSSION

Clinical presentation and Radiographic Features

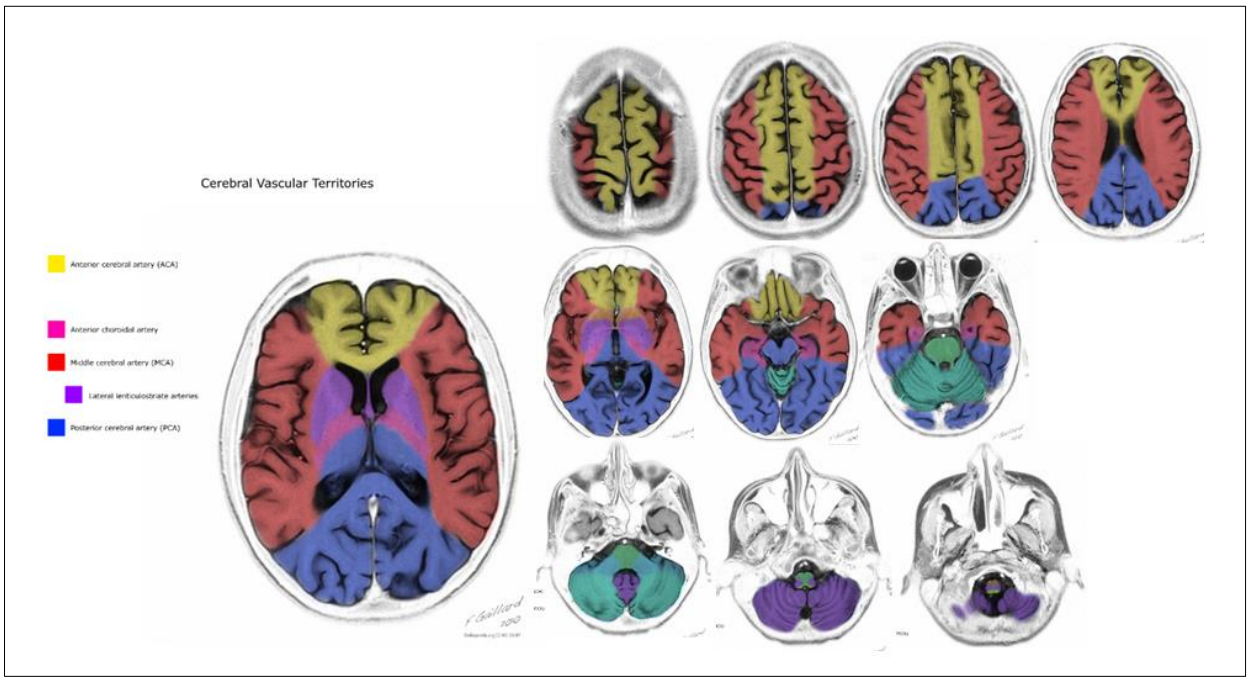

Fig. 3: Illustration of Cerebral vascular territories
Source: radiopaedia.org

From the picture above, it can be seen that the middle cerebral artery has a large territory of vascularisation in the human brain. Therefore when thromboembolism occurs in the middle cerebral artery, it can make a large area turn into a hypoperfusion state in the brain [4].

Unenhanced computerized tomography (CT) of the brain should be done in the primary 3 hours after indication onset of acute stroke patients as imaging standard. This examination can exclude intracerebral hemorrhage and inspect the early sign of ischaemic stroke. Based on this exclusion, inserting tissue plasminogen activator via intravenous route can be done safely within the range of a 3-hour window [5].

Clinical findings would be based on the area of the infarct and dominance among the brain hemisphere. These include contralateral hemiparesis, contralateral hemisensory loss, and hemianopia. Aphasia occurs if the dominant hemisphere is involved. It may be expressive in anterior MCA territory infarction, receptive in posterior MCA stroke, or global with extensive infarction. In the case above, the patient's neurological deficits were contralateral hemiparesis and dysarthria [3].

A hyperdense lesion of the middle cerebral artery can be seen as the beginning of the occlusion. This visualization happened because of thromboembolism. In the case above, based on MSCT Head, a hyperdense lesion at MCA can be seen as MCA Sign [3].

Subtle blurring decreased attenuation and swelling of the gray-white matter junction of a certain region can appear as early parenchymal signs. Deep gray matter structures are affected before the cortex due

to lenticulostriate arteries being end arteries, and cytotoxic edema (intracellular fluid accumulation) occurring earlier. Based on MSCT Head, the right temporo-parietal hypodense lesion appears in the case above. Radiographic features suggest that the patient came to Cerebrovascular Non-Hemoragic suspect subacute right temporoparietal infarct [3].

Thrombectomy as a Potential Option in this Case

The patient above received analgesic, antipyretic, anti-inflammatory, and antiplatelet therapy such as acetylsalicylic acid. In other supportive therapy, the patient received such as atorvastatin, pantoprazole, metformin, and ceftriaxone. In this article, the author aims to review thrombectomy as a potential therapeutic option in this case. In the first 24-hour, urgent CT and CT angiogram with round-the-clock IV-tPA service should be done on patients with suspicious stroke symptoms, such as acute hemiplegia or dysphasia. Thrombectomy eligibility is determined by CT angiography [6].

Thrombectomy was done with the approval of the neuro interventionalist and performed with any FDA-affirmed thrombectomy device. For patients with stenosis or impediment of the cervical inner carotid supply route due to atherosclerosis, carotid angioplasty with or without stenting was allowed as an intervention. The convention required that femoral cuts happen within 90 minutes after the conclusion of qualifying imaging. The utilization of general anesthesia was not recommended, and intra-arterial tissue plasminogen activator (tPA) was not permitted (intravenous t-PA was permitted in the case started within 4.5 hours after indication onset). The convention indicated that standard treatment, based on current American Heart Association (AHA) rules, would be managed for patients in both bunch of the trial [7].

Thrombectomy can be done with or without combination with intravenous alteplase. In a study among Chinese patients, 656 individuals were selected, with 327 patients relegated to the thrombectomy-alone bunch and 329 relegated to the combination-therapy bunch. Endovascular thrombectomy alone was non-inferior to combined intravenous alteplase and endovascular thrombectomy concerning the essential result but was related to lower rates of patients with fruitful reperfusion sometime recently thrombectomy (2.4% vs. 7.0%) and in general fruitful reperfusion (79.4% vs. 84.5%). Mortality at 90 days was 17.7% within the thrombectomy-alone group and 18.8% within the combination- therapy group. In Chinese patients with ischemic stroke from large-vessel infarct, endovascular thrombectomy alone was non-inferior concerning utilitarian result, inside a 20% edge of certainty, to endovascular thrombectomy gone before by intravenous alteplase managed inside 4.5 hours after indication onset [8].

Some patients are not lucky enough to be treated in less than 4.5 hours after onset. Endovascular thrombectomy that is done within more than 6 hours after the onset among patients with acute ischaemic stroke showed that outcomes for disability at 90 days were better with thrombectomy plus standard care than with standard care alone. The eligible criteria were the patient who was last known to be well 6 to 24 hours earlier and had a mismatch between clinical deficit and infarct [9].

Another endovascular thrombectomy study has shown that for ischemic stroke 6 to 16 hours after a persistent was final known to be well furthermore standard restorative treatment come about in superior useful results than standard restorative treatment alone among patients with proximal middle-cerebral-artery or internal carotid artery infarct and a locale of tissue that was ischemic but not however infarcted [7]. These studies make the thrombectomy still possible to do for some ischaemic stroke patient who is more than 6 hours after onset with certain eligible criteria.

Success rates from the treatment depend on histological aspect, biochemical, and composition of the clot structure. Red Blood Cells which have rich thrombi tend to associate with higher good results such as success of recanalization, efficient time of intervention, and increased tissue Plasminogen Activator (tPA) sensitivity. Fibrin-rich thrombi on the other hand tend to have a less favorable outcome. This happened because of their stiffness and resistance to both mechanical thrombectomy and thrombolysis. Therefore, treating ischaemic stroke as soon as possible should be the priority in acute stroke management [10].

Craniotomy

There was another option which was decompression craniotomy. A meta-analysis study aimed to determine if craniotomy is worthwhile based on particular regard to views on the quality of life of professionals and patients. The result of surgical decompression is lowered mortality but high morbidity, especially in the elderly. An increase in Quality Adjusted Life Years is found but at high costs. Surgery is not worth the high disability rate based on professionals' opinions. Even if patients and caregivers are satisfied with their postoperative quality of life, the final decision to treat surgically should be based on an individual decision [11].

CONCLUSION

Middle cerebral artery infarction appears as a hyperdense lesion that can be found in the early stage of ischaemic stroke with the hypodense lesion at temporoparietal lobes. Unenhanced CT of the brain should be done immediately to confirm the site of the thrombus. Thrombolytic is the main pharmacotherapy. Endovascular thrombectomy within 4.5 hours after

onset would give a more beneficial effect on the patient even if it still can be done after 6 hours with certain eligible criteria.

ACKNOWLEDGEMENT

The authors are grateful to the Medical Faculty, Duta Wacana Christian University, for their support. The authors would like to thank the Radiology Department, Bethesda Hospital, Yogyakarta, Indonesia for approving this case report.

REFERENCES

1. Phipps, M. S., & Cronin, C. A. (2020). Management of acute ischemic stroke. *Bmj*, *368*. https://doi.org/10.1136/bmj.l6983
2. Gaillard, F., & Botz, B. (2022). Middle cerebral artery (MCA) infarct. Reference article, Radiopaedia.org. (accessed on 21 Sep 2022) https://doi.org/10.53347/rID-1617
3. Kemenkes, R. I. (2018). Hasil Riset Kesehatan Dasar Tahun 2018. *Kementrian Kesehatan RI*, *53*(9), 1689-1699.
4. Gaillard, F. (2022). Cerebral vascular territories (illustration). Case study, Radiopaedia.org. (accessed on 21 Sep 2022) https://doi.org/10.53347/rID-10814
5. Abdelrasoul, A. A., Elsebaie, N. A., Gamaleldin, O. A., Khalifa, M. H., & Razek, A. A. K. A. (2019). Imaging of brain infarctions: Beyond the usual territories. *Journal of Computer Assisted Tomography*, *43*(3), 443-451. https://doi.org/10.1097/RCT.0000000000000865
6. Tsang, A. C. O., Yeung, R. W. L., Tse, M. M. Y., Lee, R., & Lui, W. M. (2018). Emergency thrombectomy for acute ischaemic stroke: Current evidence, international guidelines, and local clinical practice. *Hong Kong Medical Journal*, *24*(1), 73-80. https://doi.org/10.12809/hkmj176296
7. Albers, G. W., Marks, M. P., Kemp, S., Christensen, S., Tsai, J. P., Ortega-Gutierrez, S., McTaggart, R. A., Torbey, M. T., Kim-Tenser, M., Leslie-Mazwi, T., Sarraj, A., Kasner, S. E., Ansari, S. A., Yeatts, S. D., Hamilton, S., Mlynash, M., Heit, J. J., Zaharchuk, G., Kim, S., … & Lansberg, M. G. (2018). Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging. *New England Journal of Medicine*, *378*(8), 708-718. https://doi.org/10.1056/nejmoa1713973
8. Yang, P., Zhang, Y., Zhang, L., Zhang, Y., Treurniet, K. M., Chen, W., Peng, Y., Han, H., Wang, J., Wang, S., Yin, C., Liu, S., Wang, P., Fang, Q., Shi, H., Yang, J., Wen, C., Li, C., Jiang, C., … & Liu, J. (2020). Endovascular Thrombectomy with or without Intravenous Alteplase in Acute Stroke. *New England Journal of Medicine*, *382*(21), 1981-1993. https://doi.org/10.1056/nejmoa2001123
9. Nogueira, R. G., Jadhav, A. P., Haussen, D. C., Bonafe, A., Budzik, R. F., Bhuva, P., Yavagal, D. R., Ribo, M., Cognard, C., Hanel, R. A., Sila, C. A., Hassan, A. E., Millan, M., Levy, E. I., Mitchell, P., Chen, M., English, J. D., Shah, Q. A., Silver, F. L., … & Jovin, T. G. (2018). Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct. *New England Journal of Medicine*, *378*(1), 11-21. https://doi.org/10.1056/nejmoa1706442
10. Jolugbo, P., & Ariëns, R. A. S. (2021). Thrombus Composition and Efficacy of Thrombolysis and Thrombectomy in Acute Ischemic Stroke. *Stroke*, *March*, 1131-1142. https://doi.org/10.1161/STROKEAHA.120.032810
11. Das, S., Mitchell, P., Ross, N., & Whitfield, P. C. (2019). Decompressive Hemicraniectomy in the Treatment of Malignant Middle Cerebral Artery Infarction: A Meta-Analysis. *World Neurosurgery*, *123*, 8-16. https://doi.org/10.1016/j.wneu.2018.11.176