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*MRI Brain In Case Non-Hemmoragic STROKE At Gatot Soebroto Army Central Hospital (*RSPAD*)*

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ABSTRACT

Non-hemorrhagic stroke caused by thrombus and embolism, occurs due to decreased blood flow to certain places in the brain through the process of stenosis. Identification of the pathophysiology of non-hemorrhagic stroke due to stenosis is important in patient management, especially in providing appropriate therapy. Cerebral lesions visualized on MRI show tissue damage due to reduced blood flow to the brain, which deprives brain cells of oxygen and essential nutrients. The research was carried out from 03 to 29 October 2022 at Gatot Soebroto Army Hospital, with 1 sample analysis of a 70-year-old man with complaints of partial paralysis of the left side of the body covering the arms and legs, the study was carried out using descriptive qualitative methods with a case study approach. The results of MRI Brain imaging using a complete Head Protocol consisting of sequences T1, T2, FLAIR, DWI, ASL 3d_Tra_Iso, TOF MRA, MRV and Carotis, and SWI showed acute infarction, multiple lacunar infarction, cerebral atrophy, hypoperfusion. Conclusion: MRI examination of the head using a complete head protocol at Gatot Soebroto Hospital is very effective for assessing non-hemorrhagic stroke.

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1. INTRODUCTION

Stroke is a neurological disorder characterized by the blockage of blood vessels by forming a clot in the brain and disrupting blood flow, clogging arteries and causing blood vessels to burst, causing bleeding. The rupture of an artery that supplies blood to the brain during a stroke results in the sudden death of brain cells due to lack of oxygen. Strokes can also cause depression and dementia (1). Stroke has become a global burden in the health sector. Data on the causes of death in the world starting in the 1990s stated that stroke is the main cause of death in the world. Stroke is the main cause of death at all ages, with a proportion of 15.4% (2).

Stroke can be classified as ischemic or hemorrhagic, of which 85% of strokes are ischemic(3). Characteristics Ischemic stroke is characterized by arterial occlusion due to embolus or thrombus (4). Non-hemorrhagic stroke due to thrombus occurs due to decreased blood flow in certain places in the brain through the process of stenosis. The pathophysiological mechanisms of stroke are complex and can lead to brain cell death followed by loss of normal function of the affected neurons. Identification of the pathophysiology of non-hemorrhagic stroke due to stenosis is important in patient management, especially in providing appropriate therapy. Magnetic Resonance Imaging (MRI) is a powerful tool for detecting cerebral infarction, commonly known as ischemic stroke, which occurs due to the obstruction of blood flow to the brain. The MRI can detect cerebral infarction by highlighting changes in brain tissue due to the lack of blood supply (5).

MRI (Magnetic Resonance Imaging) is a medical imaging technique that uses magnetic fields and radio frequencies to visualize and analyze body tissues, blood flow, and metabolic functions. Since the acquisition of MR images the first time the image resolution of brain MR has grown rapidly and for this reason, this modality is frequently used (over CT) to examine anatomical brain structures, perform visual inspections of cranial nerves, and examine posterior fossa abnormalities (6). Examination using MRI is able to produce better images because it has several advantages including being able to provide images with good spatial resolution, good contrast between tissues, without ionizing radiation, and can produce images with various pieces (multi planar), namely axial, coronal. , and sagittal without prior image reconstruction (7).

Cerebral infarction is associated with secondary neurodegeneration in functionally and structurally connecte d brain regions, including areas distant to the site of the primary lesion (8). During the acute phase of ischemic stroke, MRI images are commonly used for stroke diagnosis and clinical decision making. Changes in water content in ischemic tissue occur rapidly and can be detected as increased signal (restricted diffusivity) on MRI imaging of the DWI sequence (9). Cerebral lesions visualized on MRI show tissue damage due to severely reduced blood flow to the brain, which deprives brain cells of oxygen and essential nutrients(10). White meter hyperintensities are called ischemia if they are caused by blockage of blood vessels. MRI imaging of patients with stroke can predict the onset of symptoms by identifying ischemic lesions seen in the DWI sequence in combination with the FLAIR sequence (11).

In general, in cases of non-hemorrhagic stroke, MR imaging is often used to determine the cause and mechanism of stroke, to determine the extent of brain infarction and to identify arterial occlusion. With this examination it is hoped that the patient will benefit more from independent revascularization therapy(12).

2. RESEARCH METHOD

The study was conducted from 03-29 September 2022 using a descriptive qualitative method with a case study approach in patients with a diagnosis of Hemiparese sinistra ec. Suspected CVD infarction. The data from the sample of this study were collected using participatory observation where the researcher participated in conducting observations and data collection samples with qualitative data analysis, aiming to explain the MRI Brain examination with a complete protocol in Ischemic Stroke patients at Gatot Soebroto Hospital, Central Jakarta. MRI Brain examination using a Siemens Aera Team + Dot system (MRI 1.5 Tesla) brand MRI using a complete Head Protocol consisting of Sequences T1, T2, FLAIR, DWI, ASL 3d_Tra_Iso, TOF MRA, MRV and Carotis, and SWI.

The research instruments consisted of an MRI unit, an MRI console computer, a head coil and a body coil, headphones, and an emergency bell.

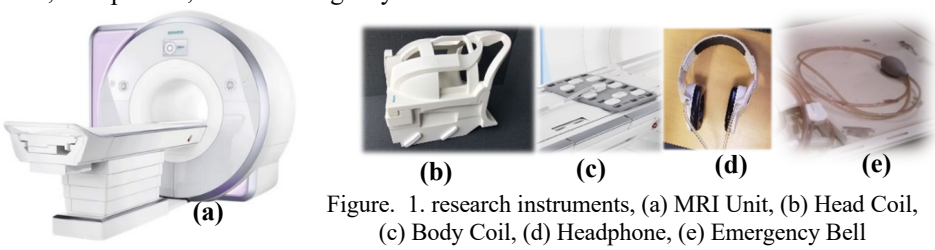

Figure. 1. research instruments, (a) MRI Unit, (b) Head Coil, (c) Body Coil, (d) Headphone, (e) Emergency Bell

Preparation before the examination: the patient or family are asked to fill in the informed consent for the MRI examination which contains patient data about height, body weight, medical history, history of equipment installation, surgery history, and then remove metal objects that are on the patient's body.

The patient is put into the MRI examination room and the patient is positioned supine head first with the patient's head placed on the head coil and position the MSP head straight with Alignment Light on the Glabella, attach the body coil to the patient's upper body, provide and educate the patient about the use of the emergency bell and attach headphones to the patient to drown out the noise, instruct the patient to remain calm and not move during the examination.

Enter patient data into the MRI console computer program by clicking on the new patient registration and then filling in the patient's identity, then complete data such as the patient's height and weight, performing pycisian, study patient and patient positioning. Then run the MRI Brain examination program with a complete head protocol that has been arranged as follows:

a. *Plane Localizer*
b. *Ax T2*
c. *Ax T1*
d. *Ax T2 FLAIR*
e. *Ax DWI*
f. *ASL_3D_Tra_iso*
g. *TOF_3D_Multi-slab*
h. *MRV*
i. *Carotis_3D_Multi-slab*
j. *SWI_ax*

3. RESULTS AND ANALYSIS

A male patient from the ER with a diagnosis of Hemiparese Sinistra Ecausa with suspected CVD Infarction was brought by a nurse to the radiology department for an MRI Brain examination using the guidelines and protocols that have been set by the hospital for a complete head MRI examination.

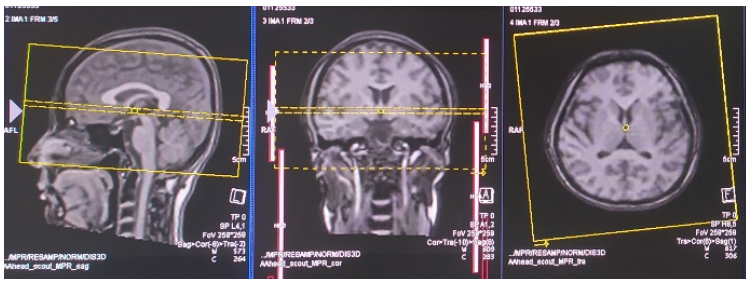

Figure. 2. Plane Localizer

Plane Localizer is used as a reference image in determining Slice Oriented, for Axial/ Transverse Sections the slices are made parallel to the Anterior and Posterior Commissura (Fig. 2).

After scanning, the results showed that there :

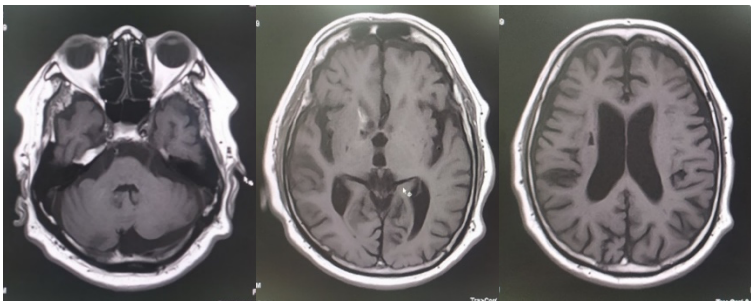

Figure. 3. T1 Axial/ Tra Sequence

were bilateral hypointense basal ganglia, right lateral paraventricular and pons (Fig. 3).

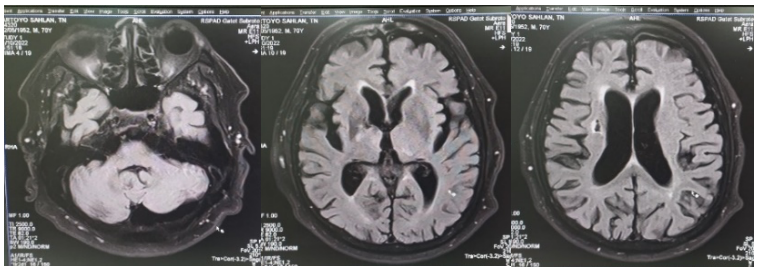

Figure. 4. T2 FLAIR Sequence

Bilateral basal ganglia, right lateral paraventricular and pons hyperintense lesions were seen. Subcortical hyperintense foci in the bilateral frontal lobes and bilateral lateral periventricular (Fig. 4).

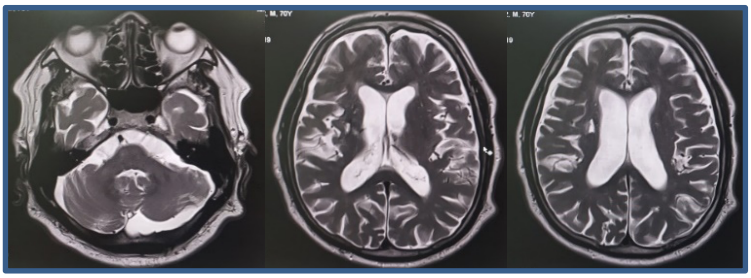

Figure. 5. T2 Axial/Tra Figure

Bilateral basal ganglia, right lateral paraventricular and pons hyperintense lesions were seen. Subcortical hyperintense foci in the bilateral frontal lobes and bilateral lateral periventricular (Fig. 5). There were also diffuse restriction lesions in the right internal capsule, the caliber of the right vertebral artery was smaller than the left, bilateral middle cerebral arteries were stenotic, the caliber of the transverse sinuses, the left sigmoid sinus was smaller than the right, and bilateral frontoparietooccipital lobe hypoperfusion and bilateral cerebellum were also seen. From all the images from the MRI Brain examination with a complete head protocol, it was found that the patient had acute infarction in the right internal capsule and multiple lacunar infarcts in bilateral basal ganglia, right lateral paraventricular and pons.

4. CONCLUSION

From the results of MRI Brain imaging using a complete head protocol in patients from the ER who were sent to radiology with an initial diagnosis of Hemiparese Sinistra ec Suspected CVD Infarction above, it can be concluded that the patient suffers from Ischemic Stroke or Non-Hemorrhagic Stroke, which is indicated by acute infarction in the right internal capsule area. and multiple lacunar infarcts in bilateral basal ganglia, right lateral paraventricular and pons. The MRI Brain Examination Technique for patients suffering from non-hemorrhagic stroke at Gatot Soebroto Hospital using the complete Head Protocol, which is a routine protocol for MRI examination of the head at the hospital, is optimal for assessing the causes and mechanisms of stroke, expansion of brain infarction and to identify arterial occlusion. So with this patient will benefit more from revascularization therapy.

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