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MRI BRAIN EXAMINATION TECHNIQUE IN BRAIN TUMOR AT THE RADIOLLOGY INSTALLATION OF INDRIATI GENERAL HOSPITAL SOLO BARU

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ABSTRACT

Brain tumor is a disease characterized by the growth of abnormal cells or tissue in the brain. Brain tumors are a condition that needs to be watched out for, but tumors in this part of the central nervous system do not always lead to cancer. One examination that can be used to diagnose is an MRI of the brain.

The aim of this research is to analyze the results of MRI brain examination images in cases of brain tumors from axial, sagittal and coronal sections. The method in this research is descriptive qualitative research which is used to determine the results of MRI Brain and MRS examinations in brain tumor cases.

The MRI Brain contrast examination procedure in brain tumor cases at the Radiology Installation of Indriati Solo Baru Hospital has been able to establish a diagnosis using the Axial T2 sequence, DWI b-value 1000, Axial T2 FLAIR, Sagittal T1, Axial T1, Axial T2 *GRE, Cor T2, Axial T1 Fat Sat + Contrast, Sagittal T1 Fat Sat + Contrast, and Coronal Fat Sat + Contrast.

Keywords: MRI, brain, tumor

Introduction

The brain is the body's control center which functions to receive, store and transmit information. The brain is the main part of the central nervous system with its various components. The nervous system is divided into two, namely the central nervous system and the peripheral nervous system. The central nervous system (CNS) is formed by the brain and spinal cord. The nervous system outside the CNS is called the peripheral nervous system (SST). The function of the SST is to transmit information back and forth between the CNS and other parts of the body (Noback et al, 2005). One of the pathologies of the brain is tumor.

Brain tumor is a disease characterized by the growth of abnormal cells or tissue in the brain. Brain tumors are a condition that needs to be watched out for, but tumors in this part of the central nervous system do not always lead to cancer. Some types of stage 1 and 2 brain tumors are benign, where the cells grow slowly and there is little chance of remission (reappearing) after surgery. Meanwhile, stage 3 and 4 tumors are considered malignant tumors or commonly known as brain cancer. Where cells may grow faster and larger with the possibility of post-operative remission. Tumors can be seen and

diagnosed using MRI modalities.

Brain tumors can be supported by Magnetic Resonance Imaging (MRI) examination, one of which is. With MRI, it can help to confirm the diagnosis of an abnormality. MRI is a technique for imaging cross-sections of the body based on the principle of magnetic resonance of hydrogen atomic nuclei. The MRI imaging technique is relatively complex because the resulting image depends on many parameters. This tool has the ability to create coronal, sagittal and axial images without much manipulation of the patient's body and does not use radiation and is non-invasive. With the right parameters, MRI is able to visualize and analyze body tissue (muscles, ligaments, cartilage, joints), blood flow and metabolic functions of the body and is able to provide a clear detailed picture of the human body, so that the anatomy and pathology of body tissue can be evaluated carefully (Westbrook, 2019).

Methods

This type of research is descriptive qualitative research which is used to describe or describe the original situation systematically and accurately regarding tumor detection. The research subjects used in this study were patients with tumor cases. Time the research was conducted from March 2024 to August 2024 at the Radiollogy Instalation of Indriati General Hospital Solo Baru.

In this study, the data source was obtained directly from research respondents by carrying out MRI brain examinations in tumor cases. Data analysis was carried out using descriptive analysis by systematically and accurately describing the original situation regarding carrying out an MRI brain examination in tumor cases.

Results and Discussion

Data collection was carried out in this study using MRI examinations on tumor cases at the Solo Baru Hospital Radiology Installation using the GE 1.5 Tesla MRI aircraft modality. The samples in this study were patients with tumor cases.

A. Patient Preparation

Patients are asked to fast for at least 6 hours before the MRI examination begins. The patient is given an explanation of the information about the examination that will be carried out and signs the informed consent that has been provided as proof that the patient understands and is willing to carry out the examination and the risks of the examination that will be carried out. Screening patients regarding patient history, whether the patient uses a pacemaker, aneurysm clip, and other metal objects attached to the patient's body. Patients are asked to remove metal objects that can interfere with the MRI image results and endanger the patient.

B. Patient Position

The patient is positioned supine on the examination table with both hands on the stomach. The patient's position is head first. Provide a fixation device and earplugs/headphones to reduce the sound of the MRI aircraft's magnetic noise, so that the patient is comfortable when the MRI examination is carried out. The patient uses the provided head coil. The patient is given an emergency button. The patient is given a blanket.

C. Object Position

The position of the patient's head is in the head coil with the isocentre at the glabella so that the object is right in the middle of the gantry.

D. Sequence and Results of Contrast Brain MRI Images

The plane localizer consists of 3 slices, namely coronal, sagittal and axial, which aims to see the patient's preparation and as a guide in carrying out the next scan.

After that, an T2 Axial sequence is taken which aims to describe the pathological condition of the object.

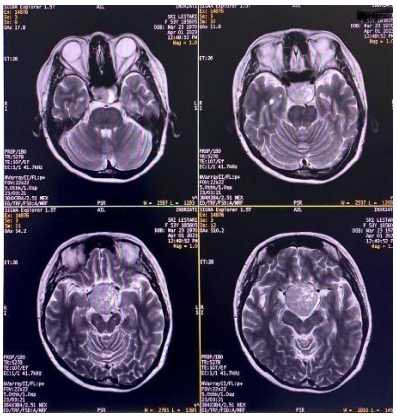

Figure 1. MRI Brain T2 Axial image

This sequence produces a T1 Axial slice which aims to describe the anatomical and physiological conditions of the object. With the Spin Echo pulse sequence.

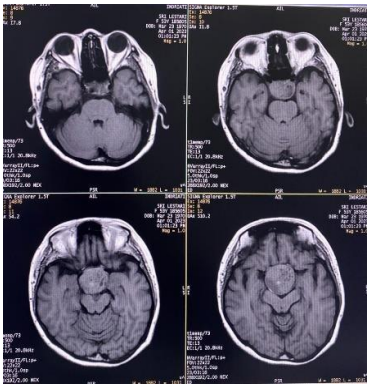

Figure 2. MRI Brain T1 Axial image

This Sagittal T1 sequence produces a sagittal section with the aim of illustrating the anatomical condition of the object.

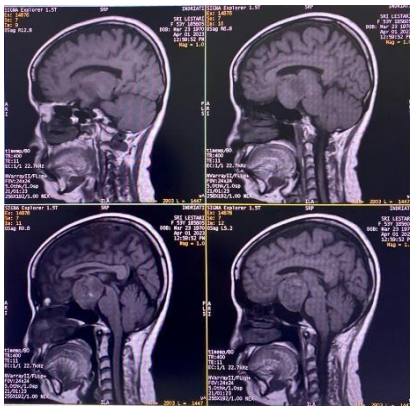

Figure 3. MRI Brain T1 Sagittal image

This coronal T2 sequence produces a coronal section with the aim of illustrating the pathological condition of abnormalities in the object with the Turbo Spin Echo pulse sequence.

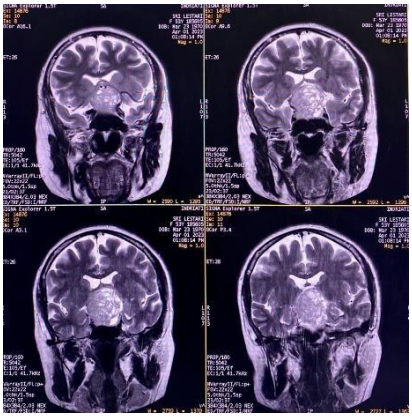

Figure 4. MRI Brain T2 Coronal image

The T2 Flair Axial sequence produces a T2 axial cut which aims to describe the pathological condition of the existing abnormality.

Figure 5. MRI Brain T2 FLAIR Axial image.

The purpose of the DWI b-1000 sequence is to determine the presence of restricted diffusion areas in the brain, with a shorter scan time. This sequence can provide information about the state of cell damage and the metabolic status of brain parenchymal tissue.

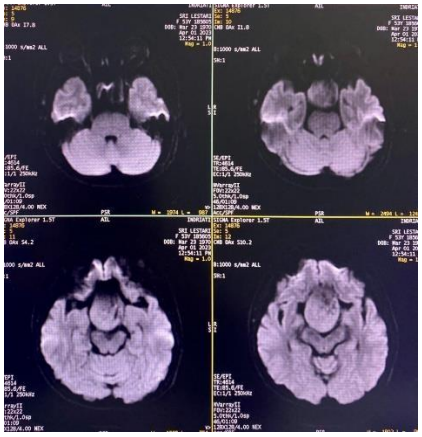

Figure 6. MRI Brain DWI Image

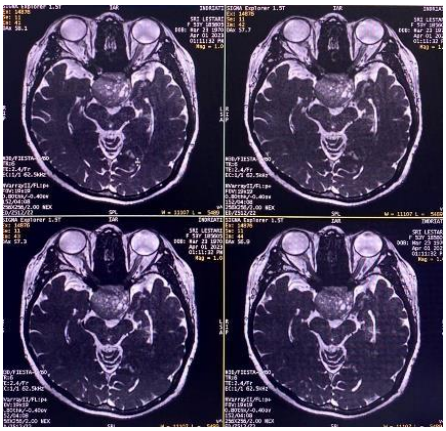

Figure 7. MRI Brain
FIESTA-C Axial image

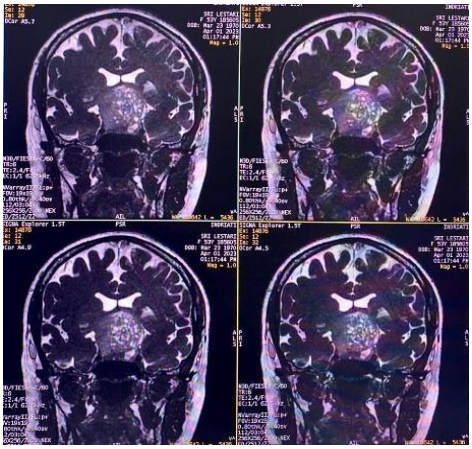

Figure 8. MRI Brain
FIESTA-C Coronal image

The Fat Sat + C sequence produces a contrast-enhanced T1 sagittal section that aims to depict the contrast filling the vascularity of the tumor.

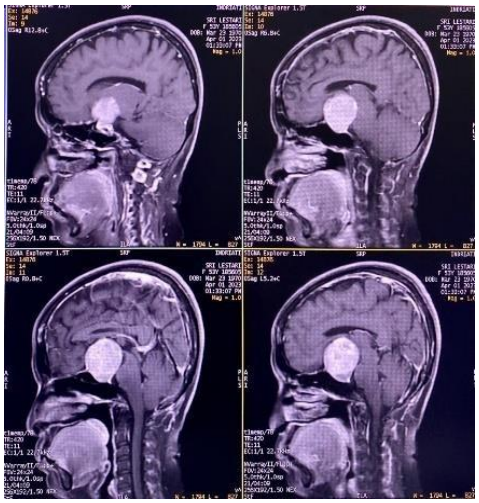

Figure 8. MRI T1 Fat Sat + Contrast Sagital Image

Coronal Fat Sat + C produces T1 coronal cuts with contrast which aims to clarify the shape and size of the tumor as well as the edges of the tumor

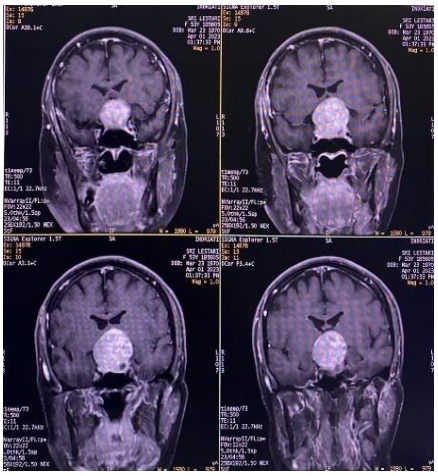

Figure 9. MRI T1 Fat Sat + Contrast Coronal Image

Axial Fat Sat + C produces T1 coronal cuts with contrast which aims to clarify the shape and size of the tumor as well as the edges of the tumor

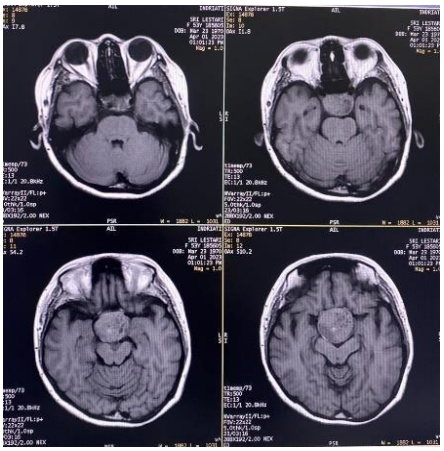

Figure 10. MRI T1 Fat Sat + Contrast Axial Image

E. Expertise Results

Inhomogeneous solid mass with well-defined boundaries, which increased strongly after administration of intrasellar contrast, extended to the suprasellar measuring +/- 3.67x3.95x4.21 cm; supports the picture of a pituitary macroadenoma.

The mass appeared to be pressing on the optic chiasma and bordering the left-right internal carotid pars cavernosa.

The contrast head MRI examination procedure for clinical brain tumors at the Radiology Installation of Indriati Solo Baru Hospital begins with the patient registering at the radiology registration counter and the patient has made preparations such as fasting 6 hours before the examination begins, checking urea and creatine. Then the preparations made before the examination begins include anamnesis and screening up as well as informed consent, the patient or patient's family is given an explanation about the examination that will be carried out and the risks that will occur if the patient does or does not carry out the examination. The patient is then fitted with a wingneedle (25) for facilitates the injection of contrast media, and is carried out by a nurse.

Contrast head MRI examination for clinical brain tumors at the Radiology Installation of Indriati Solo Baru Hospital begins with inputting patient data and selecting a contrast brain examination protocol. Then position the patient with the patient supine on the examination table, place both arms on the patient's stomach so that it is comfortable, position the patient head first, set the isocenter right on the glabella so that the object's position is right in the middle of the gantry, then finally give the patient headphones/earplugs to dampen field sounds. Magnetize the MRI plane and attach the head coil then start scanning. The examination uses 10 cc dotarem contrast media with the aim of clarifying malignant or benign tumors as well as highlighting the boundaries of malignancy and showing feeding arteries and distinguishing tissue that is actively dividing.

In contrast brain MRI examinations using sequences including T2 Axial, DWI b-value 1000, T2 FLAIR Axial, T1 Sagittal, T1 Axial, T2* GRE Axial, T2 Coronal, FIESTA-C Axial, FIESTA-C coronal, T1 Fat Sat + Contrast Axial, T1 Fat Sat Sagittal + Contrast, and Coronal Fat Sat + Contrast. The injected contrast media aims to clarify the image of the tumor on the object so that the shape, size, vascularization that supplies the tumor and the edges of the tumor can be identified.

Based on the expertise of the radiologist, the results showed that there was a tumor in the intrasella on the T2 sequence, FLAIR as a solid, inhomogeneous mass with clear boundaries that became very strong after administration of contrast media. On the FIESTA-C sequence, a brain mass is visible pressing on the optic chiasma and bordering the right and left internal carotid arteries.

According to the author, the contrast head MRI examination procedure in brain tumor cases at the Radiology Installation of Indriati Solo Baru Hospital is appropriate and can confirm the diagnosis, so that the diagnostic information obtained is accurate. The presence or absence of a tumor will be better visualized with the addition of contrast media. And because the patient complained of having dark vision in his left eye, it was necessary to add a FIESTA-C sequence to see the anatomy and possible pathology of the cranial nerves, especially the optic nerve.

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