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Role of Mobiview Software Technique in Lumbar Mri Examination in Cases of Hernia Nucleus Pulposus (Hnp)

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Abstract. Hernia Nucleus Pulposus (HNP) is one of the pathologies commonly found in lumbar MRI examinations. This study aims to find out the procedure for lumbar MRI examination in HNP cases and the reasons for using radial myelo sequencing coupled with whole spine survey using MobiView software in one examination at Mayapada Hospital, South Jakarta. This research was conducted using a qualitative method with a case study approach to three patients and five main informants. Data was obtained through observation, in-depth interviews, and documentation, then analyzed by techniques of collection, coding, and drawing conclusions. The results showed that standard procedures included patient and tool preparation, protocol selection, and imaging sequences, including whole spine and radial myelo surveys. The use of MobiView allows the compacting of three stacks of spinal images into a single complete view, making it easier to identify the overall vertebral pathology. This technique takes longer, but provides broader diagnostic information, especially for the detection of additional pathologies such as hernias. The use of MobiView is recommended when the patient is cooperative and the request comes from a specialist. The use of MobiView improves the diagnostic quality of the overall lumbar MRI examination of HNP as a whole of the cervical vertebrae, thoracalis vertebrae, and sacrum.

Keyword : MRI lumbal, HNP, MobiView software, Whole Spine

INTRODUCTION

Vertebrae consist of 33 bones that lock into each other formed from the spinal column. Vertebrae are composed of cervical, thoracic (chest bones), lumbar, sacrum, and coccyx (tailbone). Cervical is divided into 7 parts of bones. Thoracic is divided into 12 parts of bones. Lumbar is divided into 5 parts. Sacrum is divided into 5 parts of bones and coccyx is divided into 4 parts of bones[1].

Pathologies that are often found in lumbar MRI examinations are Hernia Nucleus Pulposus (HNP), according to Hernia Nucleus Pulposus (HNP) or commonly referred to as Hernia Lumbar Disc (slipped disc) is usually caused by trauma cases or incorrect lifting positions. The soft part of the cushion between the vertebrae (nucleus pulposus) bulges out and compresses the spinal cord or nerves [2].

MRI examination has the function of diagnosing a disease, one of which is in the disease Hernia Nucleus Pulposus (HNP) which is often found in lumbar MRI examinations [3]. According to , it is stated that the sequences used for lumbar vertebrae MRI examinations are sagittal SE/FSE T1, sagittal SE/FSE T2 GRE T2, coronal SE/FSE T1, axial FSE T2, and STIR and at Mayapada Hospital South Jakarta using standard sequence with addition of MYELO_Radial and Whole Spine Survey Using MobiView Software [4][5].

Radial Myelo contains information about Radial SSFSE (Single Short Fast Spin Echo) or also called HASTE (Half Fourier Acquisition Single Shot Turbo Spin Echo) which is a technique in MRI that is very fast. The advantage of SSFSE is that the MRI acquisition time is very fast, reducing artifacts due to movement and is good for applications that require long TE times such as MRI myelography, MRI urogram, and MRCP[6][7]. *MobiView is a software in the MRI modality branded Philips that is used to combine images of up to 4 stacks in one aligned sequence. Stacks are a collection of data placed*

on top of other data, for example, the combination of cervical MRI images with thoracic MRI in one aligned section. The initial data acquisition in MobiView is in the form of a sagittal survey. The use of MobiView can make coronal survey images into sagittal surveys that are combined into aligned images. The application of MobiView software is used in whole body MRI imaging, including whole spine examinations .[8]

Based on preliminary studies at the Radiology installation of Mayapada Hospital in South Jakarta, the sequence used in the MRI examination of lumbar vertebrae with the addition of MYELO_Radial and whole spine survey using MobiView software. The observations that the author has conducted, several cases of MRI examinations with Hernia Nucleus Pulposus (HNP) cases with a long scanning time have resulted in patient discomfort.

METHODS

The type of research is qualitative research with a case study approach. The object of this research is three patients with requests for lumbar MRI with HNP cases at Mayapada Hospital in South Jakarta. The subjects in the study include: three radiographers, one radiology specialist doctor, and one referring doctor. The location for data collection that will be conducted in the preparation of this final assignment is at Mayapada Hospital in South Jakarta from February to April 2023. The data collection method is through observation, in-depth interviews, and documentation. The data is processed and analyzed with data collecting, coding, data presentation, and conclusion drawing.

RESULTS

1. Case Exposure : Patient 1 named Mr.W aged 55 from the neurosurgery clinic, request for lumbar MRI photo with additional whole spine survey diagnosis of HNP and LBP. Patient 2 named Mr.P aged 51 from the neurosurgery clinic, request for photo with lumbar MRI additional whole spine survey diagnosis of HNP, right ischalgia, and back pain. Patient 3 named Mr.S aged 46 from the neurosurgery clinic, request for photo with lumbar MRI additional whole spine survey diagnosis of HNP and left ischalgia.
2. Patient History : Patient 1 with complaints: back pain in the lumbar region radiating to the left leg, pain has been ongoing for about 2 months. Patient 2 with Pain in the spine in the waist area when sitting for a long time and feeling tingling radiating in the right leg. Patient 3 with complaints: pain in the spine in the waist area when sitting for a long time and feeling tingling radiating in the left leg.
3. MRI Examination Procedure for Lumbar in HNP Cases at Mayapada Hospital Radiology Installation, South Jakarta using additional whole spine survey using MobiView software.

   Preparation for Examination:

   a. The patient arrives with a request sheet for non-contrast lumbar vertebra MRI from the referring doctor to the Radiology Installation at Mayapada Hospital, South Jakarta.
   b. The radiographer explains to the patient about the examination being performed, then conducts screening and anamnesis.
   c. Informed consent is obtained from the patient to agree to the actions related to the examination using the MRI modality.

   Patient Preparation:

   The patient has no special preparation because no contrast media is used, only asked to change into patient clothing, not to bring metal equipment into the MRI room, and to urinate beforehand before the examination.

   Equipment Preparation:

Philips MRI machine type Achieva 1.5 Tesla, vertebrae coil, monitor and CCTV, emergency buzzer, headset, earplug, blanket, and printer.

Examination Procedure:

Pasien supine diatas meja pemeriksaan yang sudah terpasang *Coil* Vertebra dengan posisi *head first*.

a. The patient is supine on the examination table that has been equipped with a vertebra coil in a head-first position.
b. Earplugs and headset are placed in the ears to reduce noise during the scanning process.
c. The patient uses the emergency buzzer, and the radiographer explains that its use is only in emergencies and when the patient feels uncomfortable during the examination process.
d. The staff positions the patient so that the mid-sagittal plane (MSP) is at the midpoint of the examination table. The mid-sagittal plane (MSP) is aligned with the longitudinal indicator light, both arms of the patient are arranged straight beside the body with the central point at the symphysis menti.
e. A fixing belt is applied for patient fixation to prevent movement.
f. The patient uses a blanket to avoid getting cold.
g. The patient is informed that during the examination process, they should not move to obtain optimal image results.
h. The patient on the examination table is inserted into the gantry.
i. The door is closed tightly.

Examination Technique: Data is entered into the register, selecting the lumbar protocol on the computer, then creating a 2-plane localizer, namely sagittal and coronal cuts, selecting sequences and adjusting parameters.

The sequences used are 2: **1. Survey Whole spine** : survey coronal, survey sagital, T2W TSE sagital. **2. Lumbal** : survey, T2W TSE coronal, T2W TSE sagital, T1W TSE sagital, STIR TSE sagital, T2W TSE axial, T1W TSE axial and MYELO Radial.

Tabel 1 Parameters MRI lumbar with additional whole spine survey using Mobiview

	Slice thicknes (mm)	*TR (ms)*	*TE (ms)*	*FOV*	*Flip Angle*
T2 TSE MT Sagittal MobiView	*4,8*	*3000*	*120*	*270x270x71*	*90*
T2W TSE_ Coronal	*4*	*2578*	*100*	*160x300x52*	*90*
T2W TSE_ Sagittal	*4*	*2578*	*100*	*160x352x52*	*90*
T1W TSE_ Sagittal	*4*	*400*	*9,0*	*160x325x52*	*80*
STIR TSE_ Sagittal	*4*	*3500*	*60*	*160x354x52*	*90*
T2W_TSE_ Axial	*4*	*2500*	*120*	*200x200x13*	*90*
T1W_TSE_ Axial	*4*	*492*	*8,0*	*200x200x13*	*90*
Myelo radial	*40*	*8000*	*1000*	*250x250*	*90*

4. The process of making MRI whole spine survey

The initial step in creating the MRI whole spine survey at Mayapada Hospital Jakarta Selatan is by making a survey. The survey image is made from the upper limit in the head area to the lower part of the sacrum. The survey begins by creating a coronal image, then a sagittal image is made, and from both coronal and sagittal images, a T2 TSE Sagittal image can be created. To display the survey image that has been made, MobiView is used. The coronal survey slice is used to set the sequence with the sagittal slice. The sagittal survey slice is used to set the T2 Weighted sequence with the sagittal slice. The sagittal slice is used to set the sequence with the axial slice. The axial slice is used to set the radial myelo sequence. Radial myelo is a 3D sequence to view the 3D image of the spinal cord in the spine and aims to evaluate other pathologies located in the spine. First, set the FOV radially or rotate according to what is desired in the axial slice. In the axial slice, it is divided into 4 parts to display the myelo image in 3D, then proceed by pressing the Proceed button and start scan.

4. Results Radiograph
   a. Survey coronal *MobiView*

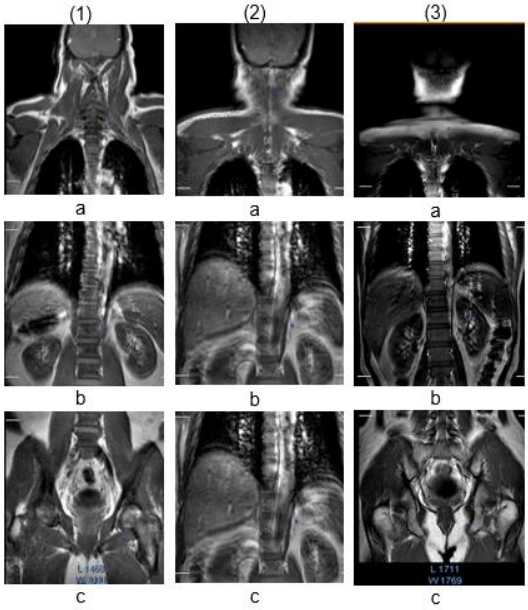

Figure 1 Three data stacks from the coronal slice survey scanning MobiView (Mayapada Hospital South Jakarta)

Description:

a. (1) a data stacks MobiView survey whole spine includes cervical region, image b data stacks MobiView survey whole spine includes thoracal region, image c data stacks MobiView survey whole spine includes sacral region patient 1
b. (2) a data stacks MobiView survey whole spine includes cervical region, image b data stacks MobiView survey whole spine includes thoracal region, image c data stacks MobiView survey whole spine includes sacral region patient 2
c. (3) a data stacks MobiView survey whole spine includes cervical region, image b data stacks MobiView survey whole spine includes thoracal region, image c data stacks MobiView survey whole spine includes sacral region patient 3

From the results of image 1 in the form of three stack images combined or integrated with MobiView software aimed at viewing the entirety of the spine as a whole from the coronal slice.

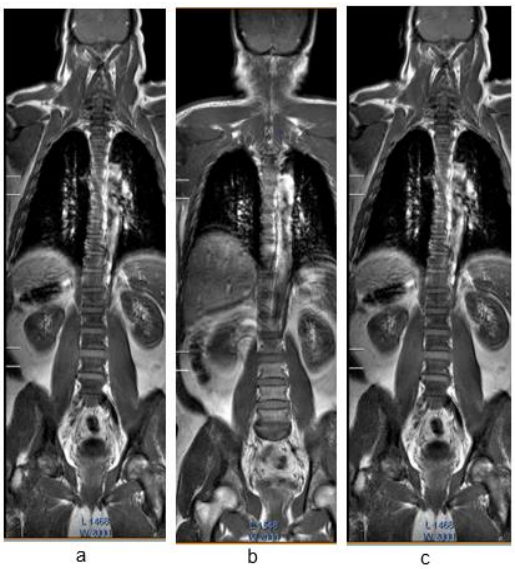

Figure 2 Coronal survey using MobiView (Mayapada Hospital Jakarta Selatan)

Description:

a. Survey Coronal using MobiView patient 1
b. Survey Coronal using MobiView patient 2
c. Survey Coronal using MobiView patient 3

b. Survey sagital *MobiView*

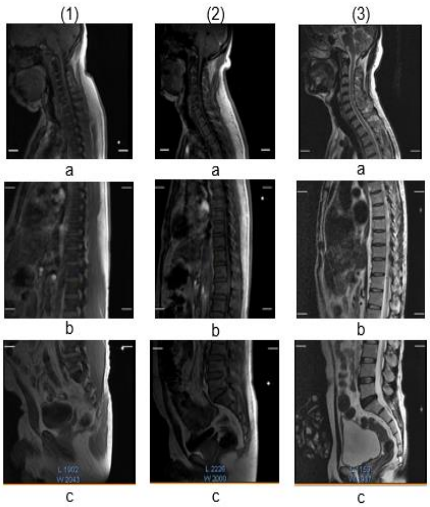

Figure 3 Three data stacks from the Whole Spine survey coronal section (Mayapada Hospital Jakarta Selatan)

Description:

a. Image (1) a data stacks MobiView whole spine survey covering the cervical region,b. data stacks MobiView whole spine survey covering the thoracal region,c. data stacks MobiView whole spine survey covering the sacral region patient 1.
b. Image (2) a data stacks MobiView whole spine survey covering the cervical region,b. data stacks MobiView whole spine survey covering the thoracal region,c. data stacks MobiView whole spine survey covering the sacral region patient 2.

c. Image (3) a data stacks MobiView whole spine survey covering the cervical region,b. data stacks MobiView whole spine survey covering the thoracal region,c. data stacks MobiView whole spine survey covering the sacral region patient 3.

From the results, the images in the form of three stacks are combined or integrated with MobiView software to see the overall structure of the spine in its entirety from the coronal sections.

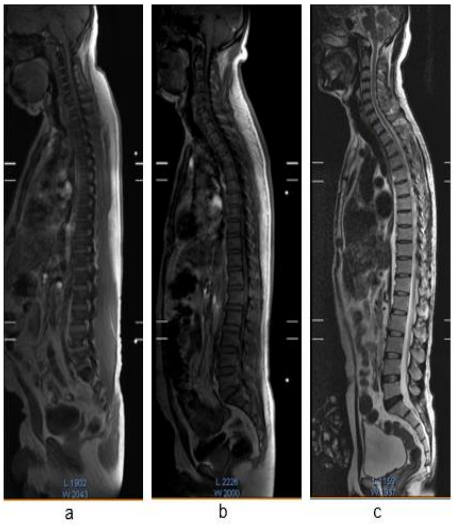

Figure 4 Sagital section survey using MobiView (Mayapada Hospital South Jakarta)

Description :

a. Survey Sagital using MobiView patient 1
b. Survey Sagital using MobiView patient 2
c. Survey Sagital using MobiView patient 3

c. Sequence T1 Weight TSE Sagital

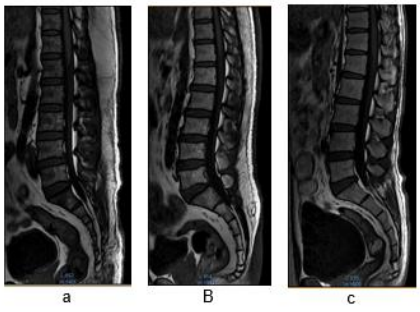

Figure 5 Sequence T1 Weight TSE Sagittal

Description :

a. Slice of sequence T1 Weight TSE Sagittal patient 1
b. Slice of sequence T1 Weight TSE Sagittal patient 2
c. Slice of sequence T1 Weight TSE Sagittal patient 3

d. Sequence T2 Weight TSE Sagital

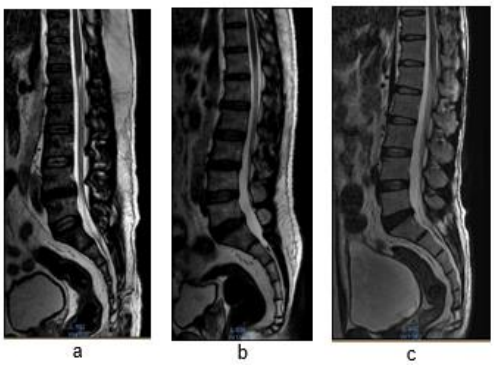

Figure 6 sequence T2 Weight TSE Sagittal

Description :

a. Slice of sequence T2 Weight TSE Sagittal patient 1
b. Slice of sequence T2 Weight TSE Sagittal patient 2
c. Slice of sequence T2 Weight TSE Sagittal patient 3

e. Sequence T1 TSE Axial

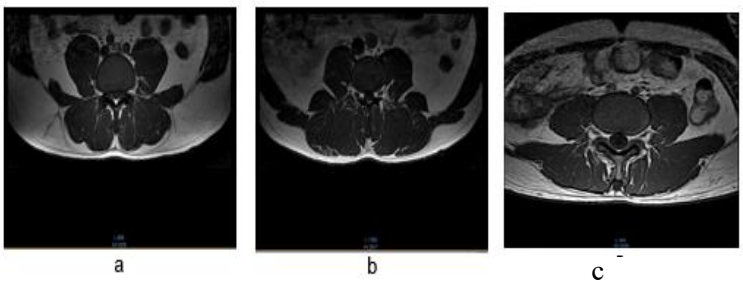

Figure 7 sequence T1 TSE Axial

Description:

a. T1 TSE Axial patient 1
b. T1 TSE Axial patient 2
c. T1 TSE Axial patient 3

f. Sequence T2 TSE coronal

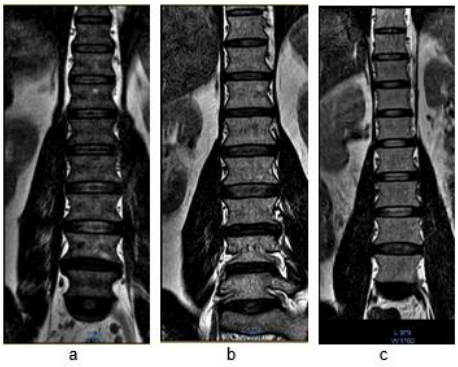

Figure 8 sequence T2 TSE Coronal

Description :

a. T2 TSE coronal patient 1

b. T2 TSE coronal patient 2
c. T2 TSE coronal patient 3

g. Sequence Myelo

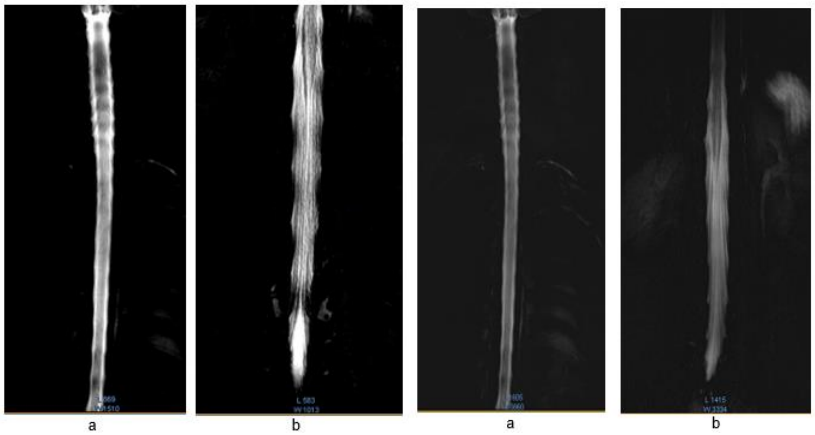

Figure 9 Myelo Radial Sequence Section

Keterangan gambar 9:
a. Radial Myelo sequence section from cervical to thoracic.
b. Radial Myelo sequence section from thoracic to sacrum.

5. The reason for lumbar MRI examination using radial myelo sequence plus whole spine survey with MobiView software in one examination at the Radiology Installation of Mayapada Hospital South Jakarta.

Based on interviews with radiographers, the reason for lumbar examination using radial myelo sequence plus whole spine survey with MobiView software at Mayapada Hospital South Jakarta is conducted if there is an instruction from the referring doctor. According to the neurosurgery specialist at Mayapada Hospital South Jakarta as a respondent who always uses MobiView software. The use of this software is used for initial screening in vertebra examination because it can evaluate the shape of the spine, HNP cases because this examination can show disc protrusion, metastasis cases due to the amount of destruction that is multiple, tumor cases from the corpus.

According to the radiology doctor, the use of MobiView software in whole spine survey examination is recommended with the aim of viewing the vertebrae as a whole and being able to see the condition of the spinal cord in the spine from cervical to sacrum, so that if there are abnormalities in certain areas, they can be clearly identified.

A regular lumbar MRI examination takes about ±20 minutes, and a lumbar MRI examination with the addition of a whole spine survey using MobiView software takes about ±35 minutes. Thus, the MRI examination with the addition of a whole spine survey using MobiView software requires an additional time of ±15 minutes, so conducting the examination takes a long time. n patients who are not cooperative, it is not recommended to use the addition of a whole spine survey because the patient cannot lie down for a long time, causing the images to become blurred. From several image results, if one or more sections experience a shift, then the image results cannot be obtained.

DISCUSSION

1. Lumbar MRI procedure using radial myelo sequencing plus whole spine survey with MobiView software in one examination in HNP

The patient's preparation for lumbar MRI examination includes removing all metallic objects (ferromagnetic), checking the patient with a metal detector, the patient wearing the clothes that have been prepared in the dressing room, giving ear plug/ ear phone, provide an explanation before starting, as well as put the patient's knee pillow for the patient's comfort. [9].

Lumbar MRI examination procedure using sequencing radial myelo with the addition of survey whole spine Using software MobiView at Mayapada Hospital South Jakarta, there is no special preparation. Before the examination begins, the patient is carried out medical history, and screening. Then an explanation was given about informed consent, then the patient is asked to change all clothes with the patient's clothes that have been prepared in the examination room, asking the patient not to bring equipment to the MRI room such as: not bringing Mobile, ATM or credit card, watches, keys, and metal tools, and it is recommended to urinate before the examination begins

According to the authors, the lumbar MRI examination procedure uses a radial myelo sequence with the addition of survey whole spine with software MobiView at the Mayapada Hospital Radiology Installation in South Jakarta with HNP cases in accordance with the theory [10][11] The patient is asked to change clothes with the patient's clothes, and asks not to bring objects made of metal and is encouraged to urinate first before the examination begins.

Patient preparation that needs to be done is instructing the patient to remove metal objects (ferromagnetic), examining the patient with a metal detector, the patient wearing clothes that have been prepared in the dressing room, providing ear plugs/ear phones, giving explanations before the examination begins, and placing pillows on the patient's knees for the patient's comfort. For the patient position, i.e., position the patient to sleep on his back on the examination table, then position the patient so that the vertical collimator light is located at the midline of the body, and the horizontal collimator light passes through the midpoint between the sacrum and the base of the cranium, use Pre gating if necessary [4] [12]

According to (Westbrook, 2019)dan [14] preparation of the tool for lumbar MRI examination using radial myelo sequencing with the addition of survey whole spine body that is Coil/ Multi-coil array spinal coil, pre gating if needed, and ear plugs. Preparation of equipment at the Mayapada Hospital Radiology Installation in South Jakarta, namely the Phillips MRI Aircraft type Achieva 1.5 Tesla, coil vertebra, Emergency Buzzer, Headstack, CCTV monitors, blankets and printers. Use coil vertebra aims as a receiver which includes the cervical organs up to the sacrum. Emergency Buzzer prepared if the patient wants to communicate with the radiographer. Headseat serves to dampen the noise produced by the MRI aircraft. CCTV monitors are used as a means of monitoring the patient's condition in the room during the examination. Blankets are used for patient comfort as warmers because the MRI room is very cold, and the printer as a printing modality for the final results that will be given to the radiologist.

According to the authors, the lumbar MRI examination uses radial myelo sequencing and survey whole spine at the Radiology Installation of Mayapada Hospital South Jakarta in the case of HNP is in accordance with the theory [13][15]. The patient's position at the lumbar MRI examination conducted at the patient's Mayapada Hospital Installation in South Jakarta supine on the inspection table that has been installed Coil vertebrae with position head first. Install headphone and ear plug in the patient's ear with the aim of reducing noise during the process scanning last. Give emergency buzzer to the patient and explained that its use is only for emergencies when the examination process is ongoing. Positioning the patient so that Mid Sagital Point (MSP) aligned with indicator light lOngitudinal and central point in line with sympisis menti Then install it fixing belt for fixation so that the patient does not move. Then give a blanket to the patient so that it does not get cold and explain that during the examination the patient should not move. The patient's position is broadly in accordance with Westbrook's theory (2014). However, the patient should be given fixation in the form of a cushion on the knee for the patient's comfort during the examination process.

According to [4] The sequences used are sagittal SE/FSE T1 pieces, sagittal SE/FSE T2 GRE T2*, axial SE/FSE T1/T2 GRE T2*, coronal SE/FSE T1, axial FSE T2 and STIR. According to the author, the sequence used already includes sequences that are in theory, it's just that there is an increase in Myelo sequences.

Before the examination, first carry out the process of entering patient data and then choose the protocol survey whole spine and lumbar protocols on computers. Furthermore, the examination process was carried out by making a survey of the localizer of 2 planes, namely the coronal and sagittal pieces, the coronal iocalizer was used for the sagittal cut and the sagittal piece localizer was used for the coronal and axial pieces. Then make MobiView sagital TSE T2W sequence, coronal T2W TSE sequence, sagittal T2W TSE sequence, sagittal TSE T1W sequence, sagittal TSE STIR sequence, T2W TSE axial sequence, T1W TSE axial sequence, and MYELO_Radial sequence. According to the author, it is agreed with adding Myelo sequences because it can help radiology doctors diagnose abnormalities that occur in the vertebrae such as the presence of HNP, protrusion, erection or the presence of a narrative.

According to [10] *MobiView is a software on the Philips-branded MRI modality used to combine 4 images Stacks in an aligned sequence. Stacks is a data set where data is placed on top of other data, for example the combination of cervical MRI images with thoracal MRI in one parallel part. Initial data collection on MobiView in the form of a sagittal survey. Use MobiView can make a coronal survey picture into a sagittal survey that is combined into an aligned picture. Application software MobiView used on MRI imaging whole body, including whole spine examination.* [16] Say that multiple data stacks can be stacked to create a full-body image, or just two areas for a smaller area with the surrounding area. [9] One of the protocols used in myelographic MRI examinations is Radial Myelo. Radial Myelo contains about Radial SSFSE (Single-Short Fast Spin Echo) or also called HASTE (Half-Fourier Acqusition Single-Shot Turbo Spin Echo) is a technique in very fast MRI. The advantage of SSFSE is that the MRI acquisition time is very fast and reduces artifacts due to movement and is good for applications that require long TE times such as myelography MRI, urography MRI, and MRCP.

Usage process software MobiView on lumbar MRI examination with the addition of survey whole spine at Mayapada Hospital South Jakarta which is the result of scanning MobiView at survey coronal MobiView ,survey sagital MobiView and T2W TSE sagittal sequences MobiView in the survey resulted in 3 Stack Scanning images are cervico thoracal, thoraco lumbal, lumbo sacral become a unit using software MobiView. On the process part of the sequence Myelo Radial MobiView uniting 2 stacks, namely the cervico thoracal and lumbar thoraco pieces into one unit using software MobiView.

According to the author, the lumbar MRI examination at the Mayapada Hospital Radiology Installation in South Jakarta in the case of HNP was in accordance with the theory [16] yang ada tetapi ada penambahan pemeriksaan yaitu *survey whole spine* yang digunakan untuk melihat kondisi tulang belakang dengan keseluruhan dan *myelo* atau cairan CSF dari *cervical* sampai *sacrum*. Dan menurut existing but there are additional inspections, namely survey whole spine which is used to see the condition of the spine with the whole and Myelo or CSF liquid from cervical. And according to [17]The addition of radial myelo to lumbar examination is used for myelography to obtain a 3D image of the spinal canalis, along with the spinal cord and nerve radicals in it and to see metastases from the cervical to the sacrum.

2. The reason for the lumbar MRI examination with HNP cases using radial myelo plus a whole spine survey with MobiView software at the Mayapada Hospital Radiology Installation, South Jakarta

Based on the interview with the radiographer, the reason for the lumbar MRI examination with the addition of survey whole spine by using MobiView at Mayapada Hospital, South Jakarta, action is taken if there is an instruction request from the sending doctor from the neurosurgery specialist installation. Reasons according to respondents 4 use software MobiView used for screening early in the examination of the vertebral bones, namely because it can evaluate the shape of the spine, HNP cases because this examination can show disc protrusion, metastatic cases because of the amount of destruction that is multiple, a case of tumors of the corpus. Aim to see the vertebrae as a whole and be able to see the condition Medula spinalis on the spine starting from cervical to cocygeus, so that if there are abnormalities in certain areas it can be clearly known.

According to the radiographer technically software MobiView makes a means of examining vertebral MRI because it has the advantage of helping radiographers to perform examinations, namely being able to see whole spine Starting from the cervical to the cocygeus, this is related to screening An examination that allows the radiographer to detect abnormalities in organs other than the object or organ at the doctor's request.

Use software MobiView on MRI examination whole spine has several shortcomings, namely shortcomings in diagnosing with HNP cases, this is because in evaluating the patient's pathology the scope is too broad, namely the entire vertebral bone so that it is not focused or not concentrated on the organ being examined.

According to the radiographer, as the implementer, a normal lumbar MRI examination takes ±20 minutes and a lumbar MRl examination with the addition of survey whole spine Using software MobiView It takes ±35 minutes. Thus, MRl examination using software MobiView requires additional time ±15 this causes the examination process to take a long time. In patients who do not cooperative The patient cannot lie on his back for a long time, interfering with the image results. From several drawings, if one or more pieces are distorted, the results of the drawings cannot be put together or Fusion, so that the results of the examination cannot be resumed and must be repeated.

According to [10] *software MobiView function to produce an image of the entire body using coil body that has been integrated.* This software (union software) is capable of writing multiple slices for example, eleven sagittal slices of the upper and lower spine can be arranged to create composer Images of eleven sagittal slices of the entire spine [16].

According to the authors, lumbar MRI examination uses radial myelo coupled with survey whole spine Using software MobiView at Mayapada Hospital South Jakarta can help doctors in enforcing the diagnosis because software This has many advantages that are to evaluate Medula spinalis and nerve radicals in it, used to see the spine as a whole as a unit of the cervical vertebrae, thoracalis vertebrae and cocygeus, because judging from the results of the radiology doctor's readings in two out of three patients with HNP pathology in the lumbar region, it is known that there are other abnormalities in the lumbar, namely with iscalgia pathology.

CONCLUSION

Based on the discussion of the lumbar MRI examination procedure in the case of Hernia Nucleus Pulposus (HNP) at Mayapada Hospital South Jakarta, the author draws the following conclusions:

1. The procedure for the Lumbar MRI examination in the case of hernia nucleus pulposus (HNP) at Mayapada Hospital, South Jakarta has no special preparation, the patient changes the patient's clothes and removes the metal objects used, the position of the supine patient on the examination table that has been installed with a vertebral coil with the head first position. The sequences used are Coronal Survey, Sagittal Survey, Sagittal T2W_TSE_MT, Survey, Ref_Spine, Coronal T2W_TSE_, Sagittal T2W_TSE_, T1W_TSE_ Sagittal, STIR_TSE_ Sagittal, T2W_TSE_ Axial, T1W_TSE_ Axial, and Myelo_radial.

2. The reason for the lumbar MRI examination using radial myelo coupled with the whole spine survey using MobiView software in one examination is to evaluate the spinal cord and nerve radix in it, used to see the spine as a whole as a unit of the cervical vertebrae, thoracalis vertebrae and sacrum.

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