

Conference Paper

The Rule of Magnetic Resonance Angiography (MRA) in the Case of Angiofibroma in the Elbow Joint Region

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Abstract

Background: Using the MRI modality of 1.5 Tesla can alter vascular imaging (angiography) from invasive examination into a non-invasive examination. The Magnetic Resonance Angiography (MRA) can be performed on upper limb organs with and without contrast. One indication of the MRA examination is angiofibroma. Because of the pathology, clinicians want to see the flow of blood from the upper arm to the elbow so that body coil is used as an alternative to genu coil or ankle coil commonly used in this examination. **Objective:** The research intends to know how the technique of MRA elbow management using body coil in the angiofibroma case. **Method:** This research was conducted by observation. The researchers looked directly at the MRA elbow examination procedure using the body coil. **Result:** The result is the MRA elbow image using body coil from different sequences.

Keywords: MRA, Elbow, MRI, Angiofibroma

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1. Objective

The development of computer technology until now widely used in various fields. One of the many fields utilizing computer technology is the field of medicine. Some examples of computer technology applications in the field of medical diagnostic imaging are: ultrasound (ultrasound), computed tomography (CT), magnetic resonance image (MRI), single photo emission computed tomography (SPECT) or gamma camera, and positron emission tomography (PET) (1). MRA (Magnetic Resonance Angiography) is a more sophisticated blood vessel depiction with MRI. Vascular contrast is maximized by increasing signals from moving spins in the bloodstream or signal suppression of stationary spin on the tissues (2). The angiography examination technique (MRA) is not invasive and requires no contrast agent. Blood intrinsic movement distinguishes it from surrounding tissue (3). MRA can be used to check all blood flow in the body,

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such as brain, upper limb, lower limb, renal artery, spinal artery, abdominal artery, etc. MRI depiction technique is relatively complex the resulting picture depends on many parameters. When the selection of parameters is appropriate, MRI image quality can provide a detailed picture of the human body with contrasting differences, so that tissue anatomy and pathology can be carefully evaluated. According to some literatures there are several variations of sequence use on MRA elbow examination techniques.

MRA technique with contrast serves to improve the image of blood vessels in the arms / legs. MRA lower extremity peripherals require the movement of the examining table and the addition of a special RF coil or multiple doses of contrast to improve the signal. (4) Magnetic Resonance Angiography (MRA) elbow is excellent for viewing the flow of blood vessels around the elbow. Angiographic results are needed for doctors to establish clinical diagnosis of patients. There are several abnormalities in the blood vessels that are generally less clearly visible on roentgen examination or CT-scan.

There are many abnormalities in the blood flow of ekstermitas on one of them caused by angiofibroma. Angiofibroma is benign tumor of blood vessels that are benignly histologically benign but clinically malignant, because it has the ability to mendstruksi bone to the surrounding tissue.(5). The number of patients with angiofibroma in Indonesia is not known with certainty. But more experienced by adolescents aged 14-18 years. The incidence of angiofibroma is 1 in 5,000-60,000 cases and mostly attacks the head and neck areas. The etiology of these tumors remains unclear, many types of theories are proposed. Among them are tissue theory of origin and hormonal imbalance factor. This tumor is rich in blood vessels.(6).

2. Material dan metode

The patient is Ms. KA, perempuan, 14 years with complaints of lumps and pain in the elbow and left knee, limited movement since 2 months ago. In addition, the function of the elbow and left knee was also felt weakened. The patient had done a radiographic and x-ray examination before, it was found that there was a firm lump on the elbow and left knee which was thought to be agiofibroma. Patients or their families are asked to fill out informed consent after receiving an explanation of the examination that will take place. The MRI aircraft specifications used in this study were GE Healthcare aircraft. Main Magnet Type: Superconductor. Strength: 1.5 Tesla. The coil used in the elbow MRA examination is the Body Coil, so that the entire flow of blood vessels from the brachiocephalic trunk artery to the elbow artery can be visualized. The console operator is the center of all general system operations such as entering patient data, running

the scanning process, selecting parameters and sequences used, processing data, and making the film printing process. Earplug / Headphone functions to reduce noise and as a medium for communicating between radiographers and patients. Emergency Bell functions as a medium of communication between patients and officers, markers when patients feel uncomfortable when examinations are taking place. Processing unit for processing equipment or film printers using a dry chemical system that is heat processing film (dryview) 5950 lasser carestream imager, so the film used is a film that is sensitive to heat. The type of film used is a film with a size of 35x43 cm / 14x17 inch. Digital Video Disc-R to store data on the results of the MRA elbow examination needed in this study.

The elbow MRA examination technique is that the patient is supine on the examination table with the position of the arm straight beside the body.(7) The examined arm attaches and is in the center of the examination table. The patient's body is arranged symmetrically and straight with the position of the AP patient's hand (antero posterior) like an anatomical position.(8) The coil used is surface coil and wraparound coil.(7)

Next, install a body coil that can cover the shoulder to elbow. Install ear plugs or headphones. Give the patient an emergency bell and explain its function as a medium of communication between the patient and the officer. Patients are fitted with blankets to provide comfort during the examination. The patient begins to be inserted into the gantry with a head first position, by setting CP (central point) in the middle of the elbow. Input patient data in the new examination column. Enter the patient's identity in accordance with the request letter which includes the patient's name, age, sex, weight, sending doctor, radiologist, executive officer, and type of examination.

Specify the protocol on the window site to do the scanning process as follows:

1. Create a localizer which usually consists of 3 planes, namely sagittal, coronal, and axial.
2. Next set the sequence: T1 weighted axial, T2 weighted axial, proton density coronal fat sat, cored T2 weighted, T1 weighted sagittal, proton density sagitta fat sat, T2 weighted sagittal, TRICKS (sagittal), T1 weighted axial fat sat contrast, T1 weighted coronal fat sat contrast.

When making the localizer axial, coronal, and sagittal images will appear. Followed by taking a picture of T1 and T2 for each piece. Then take and set the TRICKS protocol to create the angiographic sequence. Previously, prepare the injector to produce accuracy in the speed and accuracy of Gadolinium contrast injection. The volume of contrast and speed of injection (flow rate) is influenced by the blood vessels to be examined,

blood pressure, suspected pathological abnormalities, the size and caliber of the blood vessels examined. The amount of contrast material used in this examination is 6 ml, and flushing with 30 ml NaCl with 2.0 ml / second flowrate. After the non-contrast sequence is complete and the injector is ready, then run the TRICKS sequence. TRICKS is an image based on the timeliness of shooting and contrast movements. TRICKS are a mainstay sequence that allows high spatial resolution of contrast enhancement MRI. (4)

The sequence used in the MRA technique with contrast media is called the Contrast Enhancement MRA (CE MRA). The shooting technique in this sequence is by retrieving data when contrast media reaches the highest concentration (peak time) in the blood vessels (objects) that are examined. (9) When on the computer console shows the pause time, then press the start button on the injector and allow scanning continue again automatically. Check the sagittal TRICKS image again on the computer console. The results of the description are then seen with the maximum intensity projection (MIP). Projection images are made by looking at three-dimensional data along the selected axis, and taking the maximum intensity obtained. (3) Then proceed with taking the post contrast sequence. Phase contrast imaging is an MRI technique that can be used to visualize moving fluid. (10)

3. Results and Discussion

Figure 1 and Figure 2 are axial pieces that show all elbows in axial slices. The image includes an overview of ulna, radius, tendon, and muscle. Figure 1 shows the results of T1 weighted axial images that are good at showing the anatomical structure and tissue of elbows. Figure 2 shows the results of T2 weighted axial images showing clear pathological features in the elbow region.

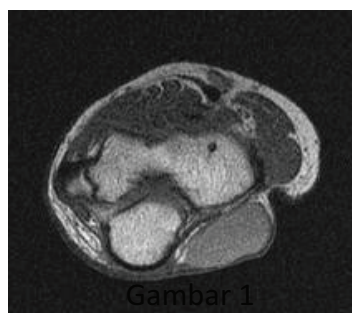


Figure 1

Figure 3 and Figure 4 are the results of a coronal cut which shows all elbows in a coronal slice. The image includes images of the ulna, lateral epicondyle, triceps muscle (lateral head), medial epicondyle, flexor digitorum superficialis muscle, flexor

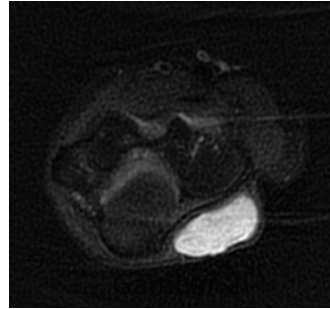


Figure 2

digitorum profundus muscle, muscle supator, extensor digitorum muscle, extensor carpi ulnaris muscle. Figure 3 shows the results of coronal fatsat PD where areas with high proton density will appear hyperintense compared to the surrounding area, and added fatsaturation or pressing fat. In Figure 3 there are bright colored lumps. Whereas in Figure 4 which is a coronal T2 weighted image, hyperintense colored abnormalities appear with a fairly firm boundary.

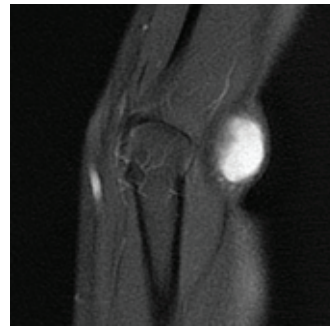


Figure 3



Figure 4

Figures 5, 6, and 7 are the results of a sagittal chunk that shows all elbows in a sagittal slice. The image includes a radial head, muscle supatorator, anconeus muscle, capitellum, triceps muscle (lateral head), extensor carpi radial longus muscle, biceps brachii muscle, brachoradialis muscle. Figure 5 shows the results of the T1 weighted sagittal picture. Figure 6 shows the results of PD sagittal with fatsaturation. Figure

7 shows a T2 weighted sagittal picture. Where in Figures 5, 6, and 7 abnormalities suspected of angiofibrom appear hyperintense compared to muscle and surrounding tissue.



Figure 5

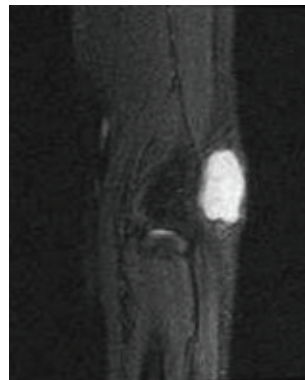


Figure 6



Figure 7

After obtaining a pre contrast image, then proceed with the TRICKS sequence (in sagittal pieces) to make elbow angiography, then still in the TRICKS sequence will be injected with Gadolinium contrast media through automatic injectors, and followed by post contrast shooting.

Figure 8 is an image of the 3D MIP reconstruction from TRICKS which can be rotated to show elbow blood flow from the brachiocephalic trunk to elbow. It can be seen that the flow of blood vessels can be well visualized because it uses a body coil whose coverage of the shooting area can be much wider than using the genu coil or ankle coil. With the use of contrast media and proper shooting sequences, the image visualization of the brachiocephalic trunk artery to elbow is very good. All arterial blood vessels from the brachiocephalic trunk to elbow appear bright and firm, visualizing a picture of the abnormality (lump) but less intense in the area. Also seen is the limit of the lump (abnormality) in the patient's elbow.

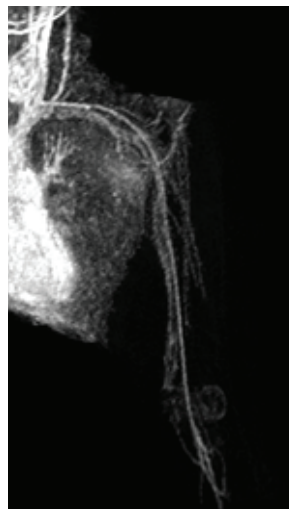


Figure 8

Figure 9 represents an axial picture after the injection of contrast media. Axial pieces that reveal all elbows in axial slices. The image includes a picture of the humerus, ulna, radius, tendon, muscle, and shows the results of T1 weighted axial images with fat saturation which is good at showing the anatomical structure and tissue of elbow, while suppressing tissue containing fat. Abnormalities or lumps on T1 weighted axial post contrast images appear to be slightly hyperintense when compared with surrounding tissue. This abnormality also appears hyperintense in the pre contrast phase on T2 weighted axial.

Figure 10 is the result of a coronal cut which shows all elbows in a coronal slice. The image includes images of the ulna, lateral epicondyle, triceps muscle (lateral head), medial epicondyle, flexor digitorum superficialis muscle, flexor digitorum profundus muscle, muscle supator, extensor digitorum muscle, extensor carpi ulnaris muscle. Figure 6 shows the results of a post contrast T1 coronal image in which the definite boundary of abnormalities or lumps is clearly seen.

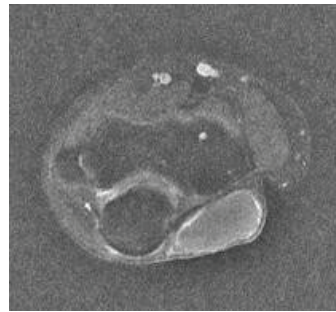


Figure 9



Figure 10

From the description of various sequences that have been done, it can be concluded that the abnormality or lump is a cystic mass with benign characteristics found in the ulna tissue of the elbow region, precisely in the sinistra elbow anconeus muscle. This can be seen from the results of lesions that are slightly hyperintense compared to muscles in the T1 weighted image, and hyperintense on the T2 weighted image and T2 fat sat. And when the contrast media was given, there was a softening of the left edge of the soft elbow muscle anconeus muscle tissue. There is no visible neurovascular bundle infiltration in the region. The position of the bones is still good. The intact bone structure, there is no fracture or destruction. The humeroulnar, humeroradial, and radioulnar joints are still good, not called dislocations or subluxations. There is no visible pathological fluid accumulation in the intra-joint or the bursa.

4. Conclusion

Examination of magnetic resonance angiography elbow is good for seeing abnormalities in the upper extremity (elbow) especially to see soft tissue and blood vessels around the elbow. By injecting Gadolinium contrast media, it can be shown that an abnormality that was originally considered angiofibroma, turned out to be a cystic period of soft tissue due to the absence of arteries that bleeding the abnormal cells. Cystic mass is characterized by the existence of a regular boundary that is firm on the edge of the

abnormality. The cystic mass measuring approximately 1.1 x 2.2 x 2.2 cm is located in the soft tissue of the anconeus region of the left elbow muscle. MRA elbow which is carried out using a body coil produces a good picture and is able to cover a wider area when compared to other coils, the body coil can cover the area of the brachiocephalic trunk artery to elbow. Management of elbow MRA is carried out using T1 and T2 weighting which includes sagittal, coronal, axial cuts with the addition of fat saturation in the post contrast phase, PD fat sat on coronal and sagittal pre contrast pieces, and TRICKS to see blood vessel flow.

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