Inovasi Kesehatan Global
Vol. 1 No. 2 Mei 2024
e-ISSN : 3046-4625, p-ISSN : 3046-4706, Hal 132-143
DOI: https://doi.org/10.62383/ikg.v1i2.249

The Role of MRI in Establishing *The Optic Nerve* in TheOrbita *Literature Review* Study

Novinda Syamantha Djawa
Akademi Teknik Radiodiagnostik Dan Radioterapi Bali, Indonesia

I Made Lana Prasetya
Akademi Teknik Radiodiagnostik Dan Radioterapi Bali, Indonesia

I Wayan Ariec Sugiantara
Akademi Teknik Radiodiagnostik Dan Radioterapi Bali, Indonesia

Corresponding author: syamanthadjawa@gmail.com

Abstract: *Diagnosing optic nerve disorders in the orbit is a clinical challenge that requires sophisticated imaging technology. MRI has become one of the main diagnostic tools in identifying various optic nerve pathologies, such as Optic Neuritis, Multiple Sclerosis, and tumors. However, it is important to understand in more depth how MRI can play an effective role in this diagnosis process. This study aims to explore the role of MRI in diagnosing optic nerve disorders in the orbit, specifically focusing on Optic Neuritis. This research uses a Literature Review Study approach by collecting data from various sources, including Pubmed, Google Scholar, and online repositories. Relevant data was selected based on established inclusion criteria, and then analyzed to understand the contribution of MRI in the process of diagnosing optic nerve disorders. The results of the study show that the use of ADC values has proven effective in diagnosing Multiple Sclerosis of the optic nerve, while the diagnosis of Optic Neuritis can be made without the useof contrast media with high sensitivity. Imaging techniques with diffusion weighting, fat saturation, and phase oversampling have also been proven to improve the quality of Orbital MRI images by reducing artifacts. It is also recommended to use slice thicknesses of 1 mm, 2 mm, and 3 mm to optimally displaysmall anatomy and pathology. The rFOV-EPI imaging technique is recommended because it can provide high spatial resolution. Thus, through the application of the various MRI imaging techniques and parameters mentioned above, a more accurate and detailed diagnosis can be made regarding the pathological condition of the optic nerve in the orbit. This research makes an important contribution to our understanding of the role of MRI in the diagnosis and management of optic nerve disorders, as well as providing practical guidance for medical practitioners in the clinical use of this technology.*

Keywords: *MRI, Optic Neuritis, Optic Nerve Disorders, Diagnosis, Multiple Sclerosis*

INTRODUCTION

Optic Neuritis (ON) is an inflammation that occurs in the optic nerve, resulting from myelination due to nerve inflammation. The optic nerve consists of one million axons from retinal ganglion cells whichare also an extension of the central nervous system or defined as a canal extending from the eye to *the optic chiasm*. *Optic neuritis* can be divided into typical *optic neuritis* and atypical neuritis . Patients with typical *optic neuritis* are unilateral , found in women aged 15-45 years and accompanied by pain in eye movement. Characteristics of *Optic neuritis* is characterized by decreased vision, periorbital pain, decreased visual field and *relative afferent pupillary defect* (RAPD) [1] . Although optic neuritis is often associated with *Multiple Sclerosis* (MS), the cause of optic neuritis is protein. The prognosis and treatment of optic neuritis will vary depending on the etiology, duration and severity of vision loss, previous injuries, and the success of previous treatments. Cases of *optic neuritis* can also be caused by

Received Maret 31, 2024; Accepted April 30,2024; Published Mei 31,2024
* Novinda Syamantha Djawa, syamanthadjawa@gmail.com

infectious, autoimmune or idiopathic processes. Therefore, optimal management of patients with optic neuritis depends on timely recognition, *appropriate* diagnostic testing, and early administration of effective treatment [2]. Annual incidence rate of *optic neuritis cases* in Japan is *1.62* per 100 . 00 people per year, while in Indonesia there is no national epidemiological data *on optic neuritis [3].*

The orbit is a cavity that is schematically depicted as a pyramid that approaches the posterior part. Theorbital cavity has 7 orbital bones, namely the eyeball, nerves, blood vessels, lacrimal glands, extraocular muscles, tendons, fat and connective tissue. Race and gender can also affect eyeball size. The structure of the eyeball is well formed to protect the eye from injury because the eyeball rests on strong bones. In addition to the protection provided by bones, the opening of the eyeball contains a lot of fat and muscle which also functions to protect and move the eyeball. In a room shaped like a four-sided pyramid with a pear-like structure, it is the orbital bone in adult. The orbital entrance has an average height of 35 mm and width of 45 mm . Orbital depth in adults varies from 40 to 45 mm from the orbit to the orbital apex [4].

The protective structure of the eyeball is called the palpebra and is divided into superior and inferior parts, and occupies a small part of the anterior part of the eyeball. The eyelids consist of 9 layers andhave a complex function that can protect the anterior parts of the eyeball such as the cornea andconjunctiva from damage to the lacrimal system. The palpebrae is a part of the orbit that protects the eye from damage and excessive light and provides tears to the lining of the eyeball by releasing tears through the lacrimal duct, however damage to the eye cannot be avoided even though it is protected by the posterior fat pad. Trauma to the orbit can also damage the bones in the face and surrounding soft tissue. Intracranial structures and paranasal sinuses can also be damaged by fractures associated with orbital trauma [4].

Magnetic Resonance Imaging (MRI) has an important role in diagnosing cases of *Optic Neuritis* and ruling out other optic nerve disorders. MRI is a diagnostic imaging modality in the health sector that utilizes an external magnetic field with hydrogen atoms in the human body. MRI examinations can be evaluated from various surfaces both axially, sagittally, coronally *and* obliquely [5]. In clinical *Optic Neuritis*, MRI examination is used to confirm the diagnosis and the possibility of recurrence or recurrence

[3] . 3 T MRI imaging demonstrated superior SNR and spatial resolution for evaluating orbital structures as well as intracranial pathology, compared with 1.5 *T* scanners. Thin-section high-resolution spin-echo T2-weighted images at 3 T depict the optic nerve and orbital anatomy much better than a 1.5 *T* scanner . Thin coronal and axial T1 and short tau inversion recovery (STIR) or T2 fat-saturated sequences, as well as sagittal T2 fat-saturated sequences were obtained for optical nerve evaluation . The slice thickness used is 3-4 mm with

a gap between slices of 0-1 mm. The entire examination takes approximately 30 minutes,and patients are asked to refrain from eye movement during the scan.

According to Westbrook, the protocols used in orbital *Magnetic Resonance Imaging* (MRI) examination include sagittal SE/FSE T1, SE/FSE axial T1 or T2, SE/FSE T2 or coronal Stir and the addition of a coronal or axial T1 SE/FSE protocol [6] .

This literature study aims to thoroughly explore the role played by MRI in the process of establishing adiagnosis regarding optic nerve pathology in the orbit. By limiting the issue to the role of MRI, this studywill investigate various technical and clinical aspects of the use of MRI in detecting and identifying various pathological conditions affecting the optic nerve. The main aim of writing this literature study is to provide an in-depth understanding of how MRI technology plays a role in facilitating accurate and efficient diagnoses regarding optic nerve problems.

In theoretical aspects, this study is expected to make a significant contribution to the scientific literature by presenting an updated and expanded understanding of the role of MRI in the diagnosis of optic nerve pathology. By mining data from various sources and summarizing current findings, this studywill be a valuable source of information for academics and researchers interested in this field. In addition, it is hoped that this study will trigger further in-depth research on this topic, which in turn will increase our understanding of the complexity of optic nerve pathology and the potential role of MRI in its management.

Practically, this research has significant benefits for medical practitioners, radiologists *and* other related experts involved in treating optic nerve cases. By comprehensively understanding how MRI can be used effectively to support diagnosis, healthcare professionals can improve their ability to accurately interpret MRI results and integrate this information into the clinical decision-making process. This could lead to improved quality of care for patients with optic nerve disorders, as well as minimizing the risk of misdiagnosis and delays in treatment. Thus, the results of this literature study will have an immediateand positive impact on daily clinical practice , by providing useful and informative guidance for medical practitioners involved in the diagnosis and management of optic nerve cases .

Based on the five journals reviewed, the role of MRI in *Optic Nerve cases was found* from each journal, so the author is interested in further research regarding ***"The Role of MRI in Establishing The Optic Nerve in The Orbita Literature Review Study".***

METHOD

This study adopted a descriptive qualitative approach through a *Literature Review Study* to thoroughly explore the role of MRI in establishing *the Optic Nerve* in the orbit. The research was carried out intensively for two months, starting from September to October 2023. The data collection method consists of a series of careful steps, starting with searching for relevant library materials from various databases such as Pubmed , E-books, Google Scholar , and Research Gate. This data search process was carried out using keywords related to the role of MRI in the diagnosis *of Optic Nerve* in the orbit, namely *"* the role of MRI *"* and *"Optic Nerve"*, and limiting the publication year range between 2016 to 2023. The next step is the selection of relevant data based on predetermined inclusion criteria, including the existence of the abstract and complete contents of the journal, focus on relevant topics such as *Magnetic Resonance* and *Optic Nerve,* as well as completeness of information regarding the publisher and bibliography. Data that meets these criteria is then compiled and organized systematically to become the basis for research.

The subsequent research process involves in-depth analysis of the literature that has been collected, with steps such as organizing, unifying, and identifying controversial issues that may arise in that literature. This aims to gain a holistic understanding of the role of MRI in diagnosing optic nerve problems in the orbit . Data analysis was carried out through theoretical studies from related journals, with the aim of understanding more deeply how MRI contributes to diagnosing optic nerve problems. The discussion process is then carried out by analyzing the findings from the literature that has been reviewed, explaining the implications of these findings, and formulating questions that require further research. Through a series of comprehensive methodological steps, it is hoped that this research can provide an in-depth and comprehensive understanding of the role of MRI in diagnosing optic nerve problems in the orbit.

Results and DiscussionResearch result

Based on the results by searching for related sources or library materials, there are 5 journals whose authors discuss the role of MRI in establishing *Optic Nerve* in the orbit, then carry out an *organizing process*, namely by organizing the sources to be reviewed and then grouping several journals into several divisions starting from the title, author, year of research, background, research subject, research methods, results and conclusions of the research.

Table 1. Research Related to the Role of MRI in Establishing *the Optic Nerve* in the Orbita

No	Writer	Year	Title	Method	Technique	Results
1	Mehmet Hamdi Şahan,Mikail İnal, Neşe Asal, Nesrin Buyuktortop , Gökçınar	2019	Apparent Diffusion Coefficient Variabilities ofthe *OpticNerve* in *Multiple Sclerosis*: Intraorbital Segment and Brain	Literature study researchwith data collection from January 2014 to April 2018	Data collection was carried out using a 1.5Tesla MRI *with* a Philips Achieva device.	The resultsshowed increased sensitivity indetecting optic neuritisin patientswith *MultipleSclerosis* using ADC values without contrast .
2	Sebastian Berg, Iris Kaschka, Kathrin *S.* Utz, KonstantinHuhn, Alexandra Lämmer,	2015	*Optic Nerve* Provides Limited Predictive Information on	Retrospective study usingVEP and MRI clinical data from December 2010 to	Use of 1,5 Tor 3 T MRI with Siemens MAGNETOM Aera or Trio TIM devices.	Information from clinical and MRI datashows limited predictabilityregarding short-term recovery after

	et al.		Short-Term Recovery after Acute *Optic Neuritis*	September 2012		acuteoptic neuritisof the optic nerve.
3	Foram Gala	2020	*Magnetic Resonance Imaging* of *Optic Nerve*	*Literature Review* research to evaluate MRI imaging protocols of the optic nerve.	Use of 3 T MRIfrom PhilipsMedical Systems Achieva or GEHealthcare HD.xt TwinSpeed.	MRI imagingprotocols are recommende d to obtain an accurate diagnosis ofvarious pathologies of the optic nerve.
4	Fanglu Zhou,Qing Li,Xiaohui Zhang, Hongli Ma,Ge Zhang, Silin Du,Lijun Zhang, et al.	2022	Reproducibility and Feasibility of *Optic Nerve* Diffusion MRITechniques	Retrospective study fromDecember 2019 to April 2020 involving 33 healthy volunteers forMRI scans of the optic nerve.	Use of 3 T MRIfrom SiemensHealthcare MAGNETOM Skyra.	Ther FOV-EPI DWI imaging technique provides better resultsin evaluating diffusion restriction inthe intraorbital segment of the optic nerve.
5	Siti Listia Ningsih, Arinawati, Emi Murniati	2019	Differences inSlice Thickness Variations on Anatomical Image Information on MRI	Experimental quantitative research on Orbital MRI examination with slicethickness variations.	Use of MRI in the orbit with varying slicethickness from1 mm to 4 mm.	Varying slicethickness at 1 mm, 2 mm,and 3 mm provides optimal anatomical image information on variousstructures in the orbit.

Based on Table 1, it can be concluded that there are a number of striking similarities and differences between the studies conducted in the five journals that have been presented . These similarities include several methodological aspects, where a retrospective approach was used in studies conducted in the second , third , and fourth journals. However, this approach is different from the approach taken in the first journal, where the research was based on the Declaration of Helsinki as the basis for obtaining official approval and permission before carrying out research. In addition, the fifth journal adopted a quantitative method with an experimental approach, showing a variety of approaches in data collection and analysis.

Furthermore, significant differences were seen in the participation of study subjects. The Orbital MRIexamination involved volunteer participation in the fourth and fifth journals, but with differences in the parameters used between the two journals. In addition, there are differences in research focus between the third and fifth journals, where both journals emphasize the importance of varying slice thickness in obtaining optimal anatomical image information . However, imaging protocol details are not presented in detail in some journals, resulting in a lack of information that is important for the validity and reliability of the results.

In the context of the use of slice thickness in MRI examinations for diagnosis, there is consistency between the first and fifth journals, where both indicate that a slice thickness of 3mm is used. However, there was a lack of information about patient data collection and analysis in the second journal, as well as a lack of emphasis on imaging technologies other than MRI in the third journal.

Furthermore, in terms of the advantages and disadvantages of each study, the journal first highlighted the use of sensitive ADC values in diagnosing *Multiple Sclerosis* and optic neuritis, but with a lack of detailed imaging protocols. The second journal showed a good association between optic nerve MRI and short-term visual outcomes in optic neuritis , but with a lack of information about patient data collection and analysis. A third journal provides a comprehensive overview of the use of MRI in diagnosing orbital pathology, but with less emphasis on other imaging technologies. The fourth journal suggests that the imaging technique provides better images in evaluating diffusion restrictions in the optic nerve, but with limitations in evaluating only the intraorbital segment of the optic nerve. Finally, a fifth journal highlights the use of certain techniques in Orbital MRI to improve image quality , but with the drawback that the lack of a comparison group may limit the generalizability of the findings. Thus, each journal demonstrated strengths and weaknesses in their research context, highlighting the importance of gaining aholistic understanding of the topic from a variety of sources.

DISCUSSION

Based on previous studies, it was found that the role of MRI in establishing *Optic Neuritis* in the orbit, this can be seen in the discussion below and the attached journal.

1. First Journal

   In the first journal it was explained that Optic neuritis is an inflammatory condition caused by the body's immune system response to the optic nerve, and this is often associated with inflammatory demyelination that occurs in patients with *Multiple Sclerosis* (MS). Optic neuritis can cause sudden loss of vision due to acute demyelination of the optic nerve. In the course of MS, about half of patients at some point experience acute vision loss. Although this vision loss often recovers significantly once the inflammation subsides, residual visual deficits may sometimes still occur *this* study also found higher ADC values in the optic nerve in MS patients, whether they had a history of optic neuritis or not. Moreover, in our study involving patients with optic neuritis, there were no residual visual defects. It is important to note that studies involving patients with residual visual defects will have different characteristics and findings. The results of studies in patients with residual visual defects will likely provide additional insight into the impact of optic neuritis on long-term vision and the changes that occur in diffusion values as well as other parameters in such cases. The observed increase in ADC values in MS patients in the absence of optic neuritis could possibly be related to the presence of subclinical optic neuritis. These findings indicate that ADC values measured in the optic nerve head and intraorbital segments using ocular DWI may provide great opportunities in supporting the diagnosis and monitoring of MS patients in the future. This technique deserves additional validation at different stages of the disease and warrants further research to predict patients at risk for optic neuritis. This can help doctors provide earlier and more effective treatment to patients who need it and increase our understanding of the role of optic neuritis in the development of *Multiple Sclerosis.*

According to the theory of Mesut, et al (2022) in this journal also states that research with these findings shows that measuring ADC values in the optic nerve head and intraorbital segments using ocular DWI has great potential to be used to support the diagnosis and monitoring of patients with *Multiple Sclerosis* (MS) in the future. Ocular DWI can provide useful information about the condition of the optic nerve in MS patients, including detection of subclinical optic neuritis or MS-related structural changes. The use of ocular DWI can be a useful tool for physicians in identifying and better understanding the progression of MS disease as well as enabling earlier and more targeted action in treating MS patients.

In the author's opinion, this research is appropriate because using DWI and measuring ADC values can provide a diagnosis in detecting the optic nerve and diseases related to *Multiple Sclerosis.* Therefore, this method has the potential to improve MS treatment and disease management in the future.

2. Second Journal

In the second journal it is explained that the use of DWI (Diffusion Weighted Imaging) has proven to be very important in the detection and identification of optic nerve disorders, such as optic neuritis (ON). Previous studies have reported that DWI and measurement of Apparent Diffusion Coefficient (ADC) values are very useful in evaluating ON, both acute and chronic. Both imaging method, namely rs-EPI DWI (readout-segmented echo-planar imaging) and rFOV- EPI DWI (reduced field of view echo-planar imaging), allow high-quality imaging on DWI of the intraorbital segment of the optic nerve. Both techniques are suitable options for evaluating diffusion restrictions and provide much better image quality compared with the ss-EPI DWI(single-shot echo-planar imaging) method . In terms of equal acquisition times, rFOV DWI has been shown to be superior to ss-EPI DWI , with the ability to produce significantly better images . However, rs-EPI DWI is the best choice in terms of image quality, although it requires longer acquisition time, about 47% longer compared to ss-EPI DWI. Thus, both rs-EPI DWI and rFOV- EPI DWI provide better alternatives in optic nerve imaging, especially if high image quality is a top priority. In situations where acquisition time is not a constraint , rs-EPI DWI can be an excellent choice to obtain optimal results. However, rFOV DWI remains a faster and more efficient alternative with adequate image quality.

According to Mehmet Hamdi Şahan, et al (2019), DWI (Diffusion Weighted Imaging) is a method developed based on the movement of water molecules that occur randomly in tissue. Because the movement of these water molecules can be influenced by tissue structure, DWI is used to examine the structural properties of the tissue . By observing how water molecules diffuse within it, DWI provides useful information about the structure and texture of the tissue. The apparent diffusion coefficient value (ADC - Apparent Diffusion Coefficient) is one of the parameters obtained from the DWI results.

This ADC value provides important and significant data related to the texture and structure of the tissue observed in the MRI examination. Thus , DWI and ADC values become important tools in describing the structural and textural properties of tissue, as well as assisting in the diagnosis and monitoring of various medical conditions.

In the author's opinion it is appropriate because with the use of the DWI diffusion technique it can prove to be very important in the detection and identification of optic nerve disorders, such as optic neuritis and DWI and ADC values become an important tool in describing the structural and textural properties of tissue, as well as assisting in the diagnosis and monitoring of various conditions medical.

3. Third Journal

In the third journal it is explained that there are various pathologies that affect the optic nerve, both isolated and associated with intracranial abnormalities. A clear understanding of the MRI imaging protocol with slice thicknesses of 3 mm and 4 mm but 0-1 mm slices are better to use, the main anatomical structures, the appearance of symptoms, as well as knowledge of various pathologies is very important for a radiologist to obtain a correct diagnosis. accurate and guides doctors who treat patients .

According to Kim, Jae Hyoung, et al (2022) for imaging cranial nerves in the cavernous sinus, high resolution post-contrast T1 imaging with a slice thickness of ≤ 1 mm is recommended to understand the anatomy. This sequence allows the passage of cranial nerves in the cavernosa.

In the author's opinion, using a slice thickness of 1 mm is in accordance with the journal Kim Jae Hyoung, et al (2022) because a slice thickness of 1 mm can detect subtle anatomy in the cranialnerves. Additionally better lesion detection can be achieved with higher spatial resolution.

4. Fourth Journal

In the fourth journal, it is explained that DWI has proven to be an important technology in detecting and identifying disorders and lesions of the optic nerve . For example, the use of DWI along with calculation of ADC values has been reported as an effective tool for evaluating optic neuritis (ON). However, the use of DWI on the optic nerve in the clinical setting is often difficult due to the nerve's very small dimensions, uncontrolled eye movements, and high signal origin from the cerebrospinal fluid or fat around the orbital region. The DWI ss-EPI (single-shot echo- planar imaging) method tends to produce artifacts caused by magnetic susceptibility, chemical shift, and low-quality images . The results of this study show that the rFOV DWI (reduced field of view echo-planar imaging) method outperforms the ss-EPI DWI method in all evaluated aspects, including reducing blur effects, overcoming image distortion, reducing artifacts, increasing lesionconsistency, and improving image quality. overall. Both rs-EPI DWI (readout-segmented echo- planar imaging) and rFOV-EPI DWI (reduced field of view echo-planar imaging) allow high-quality imaging of the intraorbital segment of the optic nerve. Both techniques are suitable for evaluating diffusion restrictions and provide much better image quality compared to ss-EPI DWI (single-shot echo-planar imaging) . In situations where acquisition times are equal, rFOV DWI has been shown to be superior to ss-EPI DWI , with the ability to produce significantly better images . However , rs-EPI DWI remains the best choice in terms of image quality , even though it requires a longer acquisition time , which is around 47% longer compared to ss-EPI DWI. Both rs-EPI DWI and rFOV-EPI DWI offer better alternatives in optic nerve imaging , especially if high image quality is a top priority . In cases where acquisition time is not a major constraint , rs-EPI DWI can be an excellent choice to obtain optimal results . Meanwhile, rFOV DWI remains a fast and efficient option with adequate image quality .

According to the theory of Achim Seeger, et al (2018) that the imaging technique uses rFOV- EPI because the spatial resolution is higher and the image quality is significantly higher so that it can confirm the diagnosis in the intraorbital segment.

In the author's opinion, using the rFOV-EPI imaging technique is suitable because of its high spatial resolution and ability to produce significantly better images so that it can be an excellent choice for obtaining optimal results.

5. Fifth Journal

In the fifth journal, it is explained that researchers made different variations in slice thickness and the optimal slice thickness value used in Orbital MRI examinations using 10 samples on volunteers with healthy eyes and scanned 4 times using 4 different variations including 1mm , 2mm, 3mm , and 4mm. Orbital MRI examinations are carried out using a pulse sequence for routine MRI brain examinations first, then supplemented with a pulse sequence for orbital MRI examinations . Pulse sequences used in Orbital MRI include T2 TSE fat sat Coronal, T1 TSE fat sat Coronal, T2 TSE fat sat Transverse or Axial, T1 TSE fat sat Transversal . The aim of using theTSE fat sat sequence is to produce fast scan times and to suppress fat signals. The slice thickness used in pulse sequences for Orbital MRI examination is 3 mm. The optic nerve will be easily visible on T1 WI and T2 WI FSE . The optic nerve produces intensities equivalent to CSF (gray) at T1 and T2; Under normal conditions, *the optic nerve* will not produce images with increased intensity with the addition of contrast material . In axial section, the optic nerve lies in the mid- orbital plane . There is no difference in changes in the thickness of the slices used to produce image information on the optic nerve , because the images obtained give the same results, namely clear and well defined , the optic nerve is a large area so it can be easily seen in all slices. In this study, differences in changes in slice thickness during T2 orbital MRI examinations, T2 TSE fat saturation, significance value was <0.05, *which* means there was a difference in slice thickness used. Based on the results of the Wilcoxon test , not all variations in slice thickness used produce different images; Varying slice thicknesses of 1mm , 2mm , and 3mm will produce the same image quality compared to varying slice thickness of 4mm which produces different images . The differences in imaging results are caused by the use of different voxels even though the matrix usedis the same, so that different anatomical ranges and spatial resolution are obtained but produce the same SNR. Variation in slice thickness is said to be optimal if it can produce information about theanatomy of the parts of the orbit. A slice thickness variation of 1 mm is optimal for producing orbital anatomical imaging information about the choroid, retina, vitreous, extraocular muscles, orbital fat, optic nerve, and lacrimal gland. A cut thickness variation of 2 mm is optimal for the anatomy of the orbital, lens, optic nerve, and lacrimal gland. A section thickness variation of 3 mm is optimal for visualization of the sclera, choroid, and lacrimal gland. However, a change in slice thickness of 4 mm cannot produce optimal visual information about the anatomy of a particular part of the orbit.

According to the theory of Eunike Rivena , et al (2018), a slice thickness of 1mm, 2mm, 3mm is still optimal because it can provide optimal diagnostic information and the thinner the slice thickness, the better it is for displaying small anatomy and pathology .

In the author's opinion, using slice thicknesses of 1mm, 2mm and 3mm is appropriate because it can display small anatomy and pathology and can provide diagnostic information so that it is more optimal in helping to confirm the patient's diagnosis .

According to (Siti Listia Ningsih, 2019), her journal explains that the use of pulse sequencesin Orbital MRI examinations is includes T2 TSE fat sat Coronal, T1 TSE fat sat Coronal, T2 TSE fat sat Transversal or Axial, T1 TSE fat sat Transversal. The aim of using the TSE fat sat sequenceis to produce fast scan times and to suppress fat signals. The slice thickness used in pulse sequences for Orbital MRI examination is 3 mm. The optic nerve will be easily visible on T1 WI and T2 WI FSE . This is in accordance with the existing theory according to (Westbrook & Willey Blackwell) pulse sequences used in orbital MRI examinations, namely Sagittal SE T1, Sagittal FSE T1, Axial T1 T2, Oblique SE T1 T2, Oblique FSE T1T2, Coronal SE/FSE T2, Coronal STIR, Coronal SE/FSE T1Fat Suppression.

CONCLUSION

Based on literature studies regarding the role of MRI in establishing *Optic Neuritis* in the orbit, the researchers can draw the conclusion that the use of ADC values is able to establish a diagnosis indicating *Multiple Sclerosis* of the optic nerve and without the use of contrast media it is also able to diagnose optic neuritis with higher sensitivity. The use of MRI can be used to delineate the precise area and detect possible involvement of the orbital apex and associated intracranial abnormalities and can predict axonal and visual outcomes in patients with acute optic neuritis. To show clearer and more accurate clinical images of medical conditions such as pediatric optic pathway glioma or spinal cord, diffusion-weighted imaging techniques , as well as the use of fat saturation and phase oversampling in Mri Orbita patients, areconsidered to improve image quality by reducing artifacts and increasing SNR and CNR.

When using slice thickness to establish *the Optic Nerve* in the orbit, it is recommended to use a slice thickness of 1 mm, 2 mm*, and 3 mm because it can display* small anatomy and pathology in the structureof the optic nerve and its surroundings. To produce optimal imaging results, it is recommended to use the rFOV-EPI imaging technique, because of its high spatial resolution.

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