ROLE OF DOUBLE INVERSION RECOVERY IN DETECTING LESIONS OF OPTIC NERVE IN DEMYELINATING DISEASES

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Introduction

Demyelinating diseases are those that lead to a loss of my elin, the sheaths of fatty tissue that surround and protect nerves so that they can send signals efficiently. A loss of myelin can cause neurological deficits, such as vision changes, weakness, altered sensation, and behavioral or cognitive (thinking) problems.

When there is a deficiency or a sudden decrease in myelin, the nerves may become damaged and have difficulty sending signals, resulting in symptoms.

Optic nerve affection in multiple sclerosis results in optic neuritis characterized clinically by some temporary loss of vision in the affected eye, usually lasting for days to weeks, color blindess, eye pain, which is usually worse when moving the eye, and flashes of light when moving the eye.

Radiologically, MRI is the modality of choice for visualizing the optic nerve by detecting hyperintense signal in optic nerve. Functional MRI or multifocal visual evoked potentials have also been shown to allow early diagnosis.

Aim of the work

The aim of this study is to assess the role of DIR- MRI in detecting optic nerve lesions in demyelinating diseases.

Patients and Methods

This study will be carried out on forty patients who are clinically and radiologically diagnosed of de-myelinating diseases presenting with or without optic neuritis that attended neurology clinic of Alexandria main university hospital and referred to MRI unit, radio-diagnosis and intervention radiology department- Alexandria main university hospital.

Non contrast -MRI including the following sequences:

- Axial and coronal views of: T1 weighted sequence. T2 weighted sequence. 3D Double inversion recovery. 3D FLAIR. T2 coronal fat sat to the orbit.(whenever possible). DIR hyperintense signal lesion detected on the optic nerve are considered positive results and those will be included in the analysis of the present study.

Results

Among the 61 patients that were clinically proved positive, 60 patients showed positive DIR studies and one of them was negative as patient has already started therapy. While 22 remaining patients that were clinically negative for optic neuritis showed negative DIR sequence studies which proves how sensitive the 3D DIR in detecting optic nerve lesions.

DIR sequence showed 98 %sensitivity based on our study and 100% specificity and 98.8% accuracy. the positive predictive value is 100% and negative predictive value 95.6%.

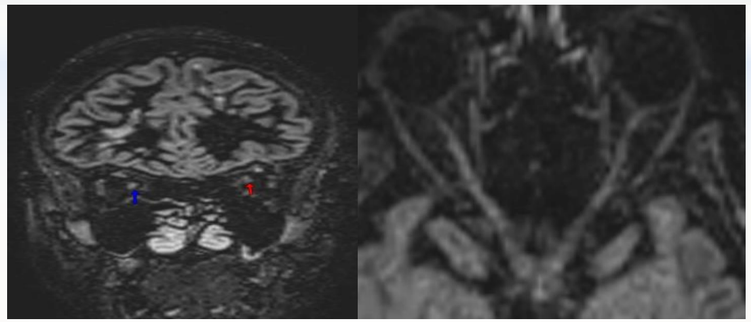

Figure (1):23 years old female complaining of bilateral blurring of vision diagnosed by MS.the image on the left shows 3D DIR showing bilateral signal hyperintenisties in optic nerve. The image on the right shows 3D DIR axial showing bilateral optic nerve affection.

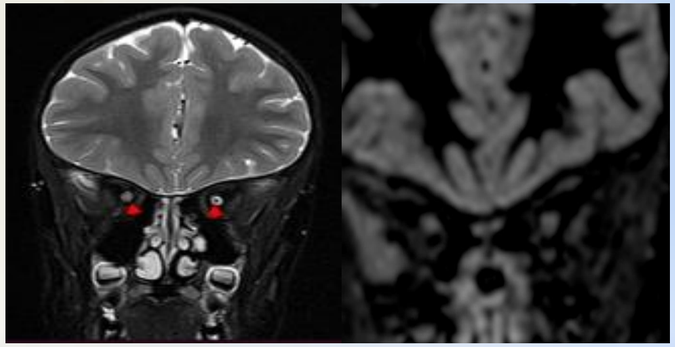

Figure (2): 8 years old male complaining of bilateral upper and lower limb weakness and parasthesi,diagnosed as seropositive NMO. Bilateral hyperintense signal is only diagnosed by 3D DIR confirmed by bilateral visual field defect.image on left shows coronal T2 fat sat showing normal bilateral optic nerve, image on the right shows coronal DIR showing bilateral signal intenisties on both optic nerves.

Conclusion

3D DIR helps in early diagnosis of optic nerve lesions even in asymptomatic cases which were proved positive by retrospective assessment.

3D FLAIR was done in parallel to 3D DIR to improve its spatial resolution yet we found that few patients showed negative results despite of being positive in 3D DIR. 3D DIR was superior in detecting optic nerve lesions than T2 coronal fat sat which is the modality of choice and than T1 post contrast.