Original Research Paper

Volume - 12 | Issue - 09 | September - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Radio-Diagnosis

EVALUATION OF DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING AGAINST CONTRAST ENHANCED MAGNETIC RESONANCE IMAGING IN DIAGNOSIS OF INTRACRANIA MENINGIOMA.

Dr Vijay Kumar Yadav* Senior Resident, Dept of Radiodiagnosis, IGIMS, Patna. *Corresponding Author

Dr Munish Kumar Assistant Professor, Dept of Neurology, PMCH Patna.

ABSTRACT **Background:** Intracranial meningioma account for 30% of all primary intracranial tumours. Surgical resection remains the mainstay of the treatment for meningioma. The magnetic resonance of intracranial meningiomas has been largely discussed in many reports of the radiological and neurosurgical literature. To date, a few studies have been attempted to differentiate the tumour characteristics of meningioma based on magnetic resonance imaging (MRI) studies. **Methods:** In this study, MRI scans of 15 suspected cases of intracranial meningiomas visiting the place of study were studied retrospectively. **Results:** Of the 15 cases included in this study, 60 % of cases were female and 40% of cases were males. Majority of cases were seen in 40–70 yrs. age group. Frontal region were more commonly affected than the parietal and occipital regions. The number of patients who had headache, decreased vision and seizure were constituted 70 %, 20% and 22 % respectively. Contrast enhancement was seen in the 100 % cases and restriction of diffusion with correspondingly low ADC value was seen in 100 % cases. **Conclusion:** The CE MRI continues to be the gold standard for imaging diagnosis of intracranial meningioma. However, DWI may emerge as a useful alternative to confirm the diagnosis in patients having deranged renal parameters.

KEYWORDS :

INTRODUCTION:

Intracranial meningioma account for 20–30% of all primary intracranial tumours. They originate from the arachnoid cap cells and occur in middle-aged adults. [1,2]. Women are affected twice as often as men[3,4]. Meningiomas are mostly well-differentiated, benign, and encapsulated lesions that indent the brain as they enlarge. Although most meningiomas are benign, they have a surprisingly broad spectrum of clinical characteristics, and histologically distinct subsets are associated with a high risk of recurrence, even after seemingly complete resection. In rare instances, meningiomas are malignant. Most meningiomas are isointense to the brain on T1- and T2-weighted images [5-8]. A heterogeneous internal texture is found in all but the smallest meningiomas. The mottled pattern is likely due to a combination of flow void from vascularity, focal calcification, small cystic foci, and entrapped cerebrospinal fluid spaces. Hemorrhage is not a common feature [5,9].

MR imaging is currently the modality of choice for the evaluation of intracranial meningioma. The advantages of MR imaging over other modalities include capability of multiplanar imaging, direct evaluation of the brain parenchyma and simultaneous visualization of the neural structures. It shows not only the bony involvement but also soft tissue involvement, with serial scans being used to assess the response to the treatment without the ill-effects of radiation. Presently contrast enhanced MR is the modality of choice for clinching the diagnosis of intracranial meningioma, which shows enhancement of the affected parts of brain. Diffusion weighted imaging (DWI) is a form of MR imaging based upon measuring the random Brownian motion of water molecules within a voxel of tissues .The relationship between histology and diffusion is complex, however generally dense cellular tissues or those with cellular swelling exhibit lower diffusion coefficient and are seen as bright signal on higher b values and corresponding low signal on ADC map. DWI has been used in brain for tumour characterization, cerebral ischemia and brain abscess.

Therefore aim of this study is to compare the sensitivity and specificity of DWI with contrast enhanced MRI in diagnosis of intracranial meningioma. If this sequence has comparable sensitivity and specificity to that of contrast enhanced MR, this will help in diagnosing cases of intracranial meningioma with conviction in cases of deranged renal function where contrast administration is contraindicated. It will also reduce the time taken for the investigation besides reducing the cost.MRI plays an important role in the diagnosis of intracranial meningioma with a high specificity and sensitivity.

MATERIALS AND METHODS:

Aim of this study was diagnostic test evaluation of Diffusion Weighted Imaging (DWI) - MRI against contrast enhanced MR imaging in diagnosis of intracranial meningioma .

This study was done in Department of Radio diagnosis and Imaging of a tertiary care teaching hospital in IGIMS, Patna. MRI scans of all the clinically diagnosed cases of intracranial meningioma were done between July 2021 to December 2021 .All age groups of patients and both sexes were included in the study. The scans were done on 1.5T GE MRI machine. We followed our institutional MR Protocol for brain imaging. The sensitivity and specificity of DWI was compared with that of CE MR to evaluate the utility of this sequence in diagnosis of intracranial meningioma.

RESULTS:

A total of 15 clinically diagnosed/suspected cases of intracranial meningiomas were included in present study. They were subjected to contrast-enhanced MRI of brain after taking informed consent from patients/parents. Various observations and results in respect of clinical and radiological parameters and their significance of association are depicted below:-. All 15 patients were divided into four age groups: ≤ 40 completed years, 41– 60 completed years, 61- 70 completed years and > 70 completed years. The maximum numbers of cases were seen in age group of 41 – 60 years and these cases amounted to total of 09 (60%). The minimum number of patients was seen in >70 years age group and amounted to total of 02 cases (13%). In this study the youngest patient was of age 18 years and the oldest patient was of age 72 years. Out of total 15 patients, 09 (60%) were females and 06(40 %) were males.

Based on history and clinical details, we divided the patients into three groups like headache, decreased vision and seizure. The number of patients who had headache, decreased vision and seizure were constituted 70 %, 20% and 22 % respectively. All patients underwent multiplanar T1WI, T2WI/FLAIR, DWI (Diffusion weighed imaging) with ADC map and contrast enhanced MRI of brain. T1 hypointensity,T2, and Flair hyper intensities were seen in 06(40%), 12(80%) and 12(80%) patients. There was restriction of diffusion with corresponding low ADC values in 15(100%) patients. Contrast enhancement was seen in 15(100%) patients.

Case 1. A 60 years/female presented with complain of headache and decreased vision.

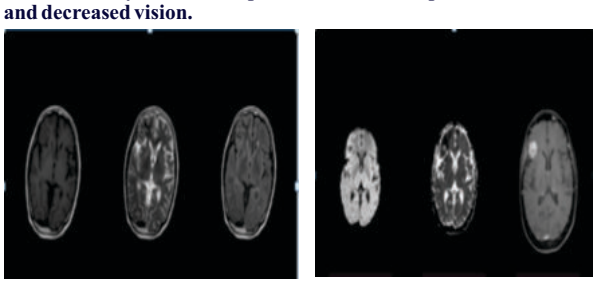

Fig:1- (A to F) shows features suggestive of Meningioma involving

right frontal convexity in the form is isointense on T1WI and T2/FLAIR images, showing post contrast enhancement, patchy restriction of diffusion and correspondingly low ADC values.

Case 2. A 64 years/ male presented with complain of headache and seizure.

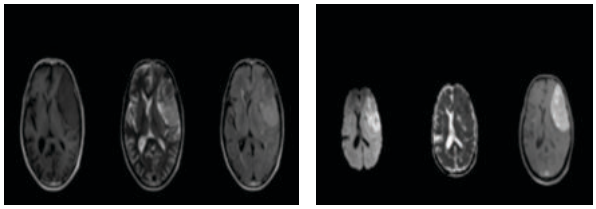

Fig:2- (A to F) shows features suggestive of meningioma involving the left frontal convexity in the form of hypointense on T1WI and hyperintense on T2/STIR images, showing post contrast enhancement, restriction of diffusion and correspondingly low ADC values.

CONCLUSION:

The present study was an attempt to establish the role of DWI in intracranial meningioma and compare it with contrast enhanced imaging. CE MRI already has an established role in diagnostic work-up of intracranial meningioma. However, it suffers from certain disadvantages in form of longer imaging times and risk of complications in patients suffering from renal diseases. DWI is a relatively newer modality of MRI with ever-increasing applications in different parts of body. We evaluated 15 patients of meningioma in our study. We collected their clinical data and performed MRI including CE MRI and DWI. Finally, statistical analysis was performed to compare the findings on DWI to findings on CE MRI.

Our study showed similar age distribution when compared to previous studies with variation in gender distribution. Clinical presentation was similar to previous studies. Our MRI findings were similar to previous studies with a high incidence of T1 hypointensity, T2/ FLAIR hyperintensity and contrast enhancement.We acknowledge the drawbacks in our study which include lack of histopathological analysis and lack of blinding. On statistical analysis we found a statistically significant correlation between patients presenting with headache and positive MRI findings. Similar correlation was also present between raised seizure and positive MRI findings. No correlation was found between age/ gender/ other clinical symptoms and MRI findings.

On comparing DW MRI with CE MRI we found it to be highly specific for intracranial meningioma but suffering from high sensitivity.

Thus, the CE MRI continues to be the gold standard for imaging diagnosis of intracranial meningioma. However, DWI may be good alternative to confirm the diagnosis in deranged renal parameters.

REFERENCES:

1. Claus EB, Bondy ML, Schildkraut JM, Wiemels JL, Wrensch M, Black PM. Epidemiology of intracranial meningioma. Neurosurgery 2005;57:1088-95.
2. Dolecek TA, Propp JM, Stroup NE, Kruchko C. CBTRUS statistical report: Primary brain and central nervous system tumors diagnosed in the United States in 2005-2009. Neuro Oncol 2012;14 Suppl 5:v1-49
3. Jääskeläinen J, Haltia M, Servo A. Atypical and anaplastic meningiomas: Radiology, surgery, radiotherapy, and outcome. Surg Neurol 1986;25:233-42.
4. Central Brain Tumor Registry of the United States. Statistical report: Primary brain tumors in the United States, 1998-2002. Hinsdale, Illinois: Central Brain Tumor Registry of the United States; 2005.
5. Sheporaitis LA, Osborn AG, Smirniotopoulos JG, Clunie DA, Howieson J, D'Agostino AN. Intracranial meningioma. AJNR Am J Neuroradiol 1992;13:29-37.
6. Julià-Sapé M, Acosta D, Majós C, Moreno-Torres A, Wesseling P, Acebes JJ, et al. Comparison between neuroimaging classifications and histopathological diagnoses using an international multicenter brain tumor magnetic resonance imaging database. J Neurosurg 2006;105:6-14.
7. Kasuya H, Kubo O, Tanaka M, Amano K, Kato K, Hori T. Clinical and radiological features related to the growth potential of meningioma. Neurosurg Rev 2006;29:293-6.
8. Yrjänä SK, Tuominen H, Karttunen A, Lähdesluoma N, Heikkinen E, Koivukangas J. Low-field MR imaging of meningiomas including dynamic contrast enhancement study: Evaluation of surgical and histopathologic characteristics. AJNR Am J Neuroradiol 2006;27:2128-34.
9. Tropine A, Dellani PD, Glaser M, Bohl J, Plöner T, Vucurevic G, et al. Differentiation of fibroblastic meningiomas from other benign subtypes using diffusion tensor imaging. J Magn Reson Imaging 2007;25:703-8.