AGREEMENT BETWEEN CLINICAL FEATURES OF SCIATICA AND 3.0 T MAGNETIC RESONANCE IMAGING FINDINGS

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ABSTRACT

Objectives: To determine agreement between clinical features of sciatica and 3.0 T magnetic resonance imaging findings.

Study Design: Descriptive, cross-sectional study.

Place and Duration of Study: Department of Orthopedics, Combined Military Hospital Rawalpindi, from Nov 2017 to May 2018.

Methodology: A total of 90 patients with low back pain radiating to one or both lower limbs and age 25-75 years of either gender were included. Patients with tumors of spine or vertebrae, trauma to spine, Pott's disease and previous spinal surgery were excluded. Patients with clinically diagnosed sciatica were taken for magnetic resonance imaging on a 3.0 T magnetic resonance imaging console and images of lumbosacral spine were obtained by a qualified magnetic resonance imaging technician. The images were transferred to computers on reporting station and findings analyzed on vitrea. Reports were prepared according to the findings of magnetic resonance imaging. Agreement was measured if clinical features were positive (positive straight leg raise test) and magnetic resonance imaging showing any feature of disc herniation, disc prolapse and neural foramen narrowing.

Results: Mean age was 53.11 ± 8.13 years. Out of these 90 patients, 46 (51.11%) were males and 44 (48.89%) were females with ratio of 1.1:1. In my study, numbers of observed agreements were 78 (86.67% of the observations) with Kappa value of 0.717 (95% confidence interval: from 0.568 to 0.865). The strength of agreement between clinical features of sciatica and 3.0 T magnetic resonance imaging findings is considered to be 'good'.

Conclusion: This study concluded that there is a good agreement between clinical features of sciatica and 3.0 T magnetic resonance imaging findings. Careful clinical evaluation will help the clinicians for avoiding unnecessary magnetic resonance imaging in patients with sciatica.

Keywords: Magnetic resonance imaging, Sciatica.

INTRODUCTION

Lumbar disc prolapse is one of the commonest causes of sciatica in the working population. The magnetic resonance imaging (MRI) has provided clinicians with a noninvasive mechanism for viewing lumbar anatomy in great detail. Sciatica is one of the most common problems and herniated lumbar disc is the most commonly diagnosed abnormalities associated with low back ache. Disc herniation of the same size may be asymptomatic in one patient and can lead to significant clinical symptoms in another patient[1].

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Low back pain with or without lower extremity pain is a very common problem among chronic pain disorders with significant economic, social, and health impact. There are various studies conducted to determine the frequency of lumbar disc herniation and its different levels, among patients with sciatica[2]. MRI is the preferred investigation for most spinal diseases and is increasingly requested for people with low back pain. However, determining the cause of back pain is complicated as it is often multifactorial and anatomical abnormalities are common in the spine and may not necessarily translate into clinical symptoms. MRI is a very sensitive test for identifying disc lesions, but it is not specific. Clinical findings

frequently do not correlate clearly with MRI findings, especially when there are central disc bulges and disc protrusions with thecal sac compression. These findings may or may not even be associated with clinical symptoms[3]. MRI is a non invasive, commonly used diagnosing modality and accurate in diagnosing pathology causing low back aches[4]. Herniated lumbar discs are traditionally diagnosed using conventional lumbar axial and sagittal MRI. However, conventional lumbar MRI might not reveal nerve root compression in the extraforaminal area. MRI (3 Tesla Oblique lumbar) can provide clear visualization of the dorsal root ganglion and lumbar nerve root in the foraminal and extraforaminal areas.

Any study that aims to establish an agreement between clinical and MRI findings in sciatica has not been done before in our setups. The rationale of this study was to find out the agreement between clinical features and 3 T MRI findings so that it can be determined which of the 3 T MRI findings are important from clinical as well as management point of view. This clinico-radiological correlation will significantly add to the existing knowledge of radiologists and clinicians.

METHODOLOGY

This descriptive, cross sectional study was conducted in the department of Radiology, Armed Forces Institute of Radiology and Imaging (AFIRI), Rawalpindi, from November 2017 to May 2018. Sample size (n) of 90 patients was calculated by using WHO calculator for estimating a population proportion of disease with specified absolute precision. Confidence interval of 95% and absolute precision of 7% was used with anticipated population proportion size of 87%. Patients were recruited through non-probability, consecutive sampling technique. Patientswith low back pain radiating to one or both lower limbs and age 25-75 years of either gender were included. Patients with tumors of spine or vertebrae, trauma to spine, Pott's disease and previous spinal surgery were excluded. Approval of ethical committee of AFIRI was taken before commencement of the study and informed consent from every patient was taken. Patients with clinically diagnosed sciatica were taken for MRI on a 3.0 T MRI console and images of lumbosacral spine were obtained by a qualified MRI technician. The images were transferred to computers on reporting station and findings analyzed on vitrea. Reports were prepared according to the findings of MRI. Each of the prepared report was validated by consultant radiologist. Descriptive statistics were performed for qualitative and quantitative variables. Mean and standard deviation were calculated for quantitative variable like age. Frequency and percentages were calculated for qualitative variables like gender, clinical features and 3.0 T MRI findings. Kappa coefficient was calculated for determining agreement between clinical features of sciatica and 3.0 T MRI findings. Effect modifiers like age and gender were controlled. Post stratification was done by applying chi-square test. A $p \leq 0.05$ was taken as significant.

RESULTS

Age range in this study was from 25-75 years with mean age of 53.11 ± 8.13 years. Majority of the patients 57 (63.33%) were

Table-I: Agreement between clinical features of sciatica and 3.0 T MRI findings.

		Magnetic Resonance Imaging		Total
		Yes	No	
Clinical feature	Yes	50	07	57
	No	05	28	33
Total		55	25	

No. of observed agreements: 78 (86.67% of the observations). Kappa=0.717 (95%) confidence interval: from 0.568 to 0.865. The strength of agreement is considered to be 'good'.

Table-II: Stratification of age 25-50 years (n=33).

		Magnetic Resonance Imaging		*p*-value
		Yes	No	
Clinical feature	Yes	20	03	0.0001
	No	01	09	

No. of observed agreements: 29 (87.88% of the observations). Kappa=0.728 (95%) confidence interval: from 0.482 to 0.975. The strength of agreement is considered to be 'good'.

between 51 to 75 years of age. Out of total 90 patients, 46 (51.11%) were males and 44 (48.89%) were females with ratio of 1.1:1. In this study, number of observed agreements were 78 (86.67% of the observations) with Kappa value of 0.717 (95% confidence interval: From 0.568 to 0.865) as shown in table-I. The strength of agreement between clinical features of sciatica and 3.0 T MRI findings is considered to be 'good'. Stratification of age groups and gender is shown in table-II to V respectively.

Table-III: Stratification of age 51-70 years (n=57).

		Magnetic Resonance Imaging		*p*-value
		Yes	No	
Clinical feature	Yes	30	04	0.0001
	No	04	19	

No. of observed agreements: 49 (85.96% of the observations). Kappa= 0.708 (95%) confidence interval: From 0.521 to 0.895. The strength of agreement is considered to be 'good'.

Table-IV: Stratification of male gender (n=46).

		Magnetic Resonance Imaging		*p*-value
		Yes	No	
Clinical feature	Yes	29	02	0.0001
	No	00	15	

No. of observed agreements: 44 (95.65% of the observations) Kappa = 0.904 (95%) confidence interval: From 0.775 to 1.000. The strength of agreement is considered to be 'very good'.

Table-V: Stratification of female gender (n=44).

		Magnetic Resonance Imaging		*p*-value
		Yes	No	
Clinical feature	Yes	21	05	0.0001
	No	05	13	

No. of observed agreements: 34 (77.27% of the observations) Kappa = 0.530 (95%) confidence interval: From 0.275 to 0.785. The strength of agreement is considered to be 'moderate'.

DISCUSSION

Though MRI represents a tool for morphologic and biochemical analysis of disc disease, yet there is only a moderate correlation between the imaging evidence of disc herniation and the presence of symptoms[5]. To jump from identification of an anatomic derangement in MRI to symptom complex must be made with caution. Therefore, correlation between the clinical features of disc collapse and MRI is necessary to determine the clinical importance of anatomical abnormalities identified by MRI technique[6].

In a study carried out by El Barzouhi *et al*, excellent agreement was found on the affected disc level (kappa range 0.81–0.86) and the nerve root that most likely caused the sciatic symptoms (kappa range 0.86–0.89). Inter observer agreement was moderate to substantial for the probability of disc herniation (kappa range 0.57–0.77) and the probability of nerve root compression (kappa range 0.42–0.69). Absolute pair wise agreement among the readers ranged from 90-94% regarding the question whether the probability of disc herniation on MRI was above or below 50%. Generally, moderate agreement was observed regarding the characteristics of the symptomatic disc level and of the herniated disc[7].

Besides herniated discs, the direct evaluation of nerve roots and spinal canal by MRI has been considered an important asset to facilitate decision making in patients with leg and/or back pain[8-10]. Unfortunately, no universally accepted imaging criteria exist to define nerve root compression and lumbar spinal stenosis with MRI. The inter-reader agreement regarding the presence of nerve root compression varies widely between studies. Cihangiroglu and co-authors found fair to substantial agreement (kappa = 0.30–0.63) between two neuro-radiologists for classifying nerve root compression, which was dichotomized as absent or present, in 95 patients with low back or radicular pain. Fair to moderate agreement was found for spinal canal stenosis[11].

Rijn and co-authors found substantial agreement between two neuro-radiologists when evaluating nerve root compression in 59 patients (kappa=0.77). Their kappa is comparable with the agreement between the neuro-radiologists in the present study (kappa=0.80)[12].

Sorensen *et al*, found substantial agreement among two radiologists for classifying disc morphology of herniation (kappa=0.68) in 50 low-field MRI scans[13].

Straight leg raising test is positive in most of the cases (70.7%) but is not helpful in diagnosing

the radiological level of disc involvement. In Cochrane database systemic review, van der Windt *et al*, has noted that SLR is a highly sensitive and variably specific test in localizing the Lumbar disc disease. But when femoral stretch test is considered, it is not positive in all cases of lumbar disc disease but when femoral stretch test is positive it has a very high correlation for a possibility of a higher level lumbar disc involvement (*p*-0.000). When all the clinical findings noted in a patient were combined and analyzed in this study, clinical evidence of nerve root involvement (radiculopathy) correlates very well with the MRI level of disc involvement (*p*-0.000)[14].

CONCLUSION

This study concluded that there is a good agreement between clinical features of sciatica and 3.0 T MRI findings. So, we recommend that MRI should not be compulsory in every patient of sciatica and careful clinical evaluation will help the clinicians for avoiding unnecessary MRI in patients with sciatica.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Selvaraj R, Narayana GS, Ranganathan J, Anandan H. Clinical Correlation of Magnetic Resonance Imaging with Symptom Complex in Prolapsed Intervertebral Disc Disease: A Cross-sectional Study. Inter J Scien Study 2017; 5(5): 261-65.
2. Yang H, Liu H, Li Z, Zhang K, Wang J, Wang H, Zheng Z. Low back pain associated with lumbar disc herniation: role of moderately degenerative disc and annulus fibrous tears. Inter J Clin Exper Med 2015; 8(2): 1634-39.
3. Gopalakrishnan N, Nadhamu K, Karthikeyan T. Categorization of pathology causing low back pain using magnetic resonance imaging (MRI). J Clin Diagn Res 2015; 9(1): TC17–TC20.
4. El Barzouhi A, Vleggeert-Lankamp CL, Nijeholt GJ, Van der Kallen BF, Van den Hout WB, Verwoerd AJ, et al. The Hague Spine Intervention Prognostic Study Group. Magnetic resonance imaging interpretation in patients with sciatica who are potential candidates for lumbar disc surgery. Plos one 2013; 8(7): e68411-7-15.
5. Brinjikji W, Diehn FE, Jarvik JG, Carr CM, Kallmes DF, Murad MH, et al. MRI findings of disc degeneration are more prevalent in adults with low back pain than in asymptomatic controls: a systematic review and meta-analysis. Amer J Neur 2015; 36(12): 2394-99.
6. Verwoerd AJ, Peul WC, Willemsen SP, Koes BW, Vleggeert-Lankamp CL, el Barzouhi A, et al. Diagnostic accuracy of history taking to assess lumbosacral nerve root compression. Spine J 2014; 14(9): 2028-37.
7. Barzouhi AE, Carmen LAM. Lankamp V, Geert J, Nijeholt L, Bas F, et al. Magnetic Resonance Imaging Interpretation in Patients with Sciatica Who Are Potential Candidates for Lumbar Disc Surgery. PLos One 2013; 8(7): e68411-15.
8. Suri P, Boyko EJ, Goldberg J, Forsberg CW, Jarvik JG. Longitudinal associations between incident lumbar spine MRI findings and chronic low back pain or radicular symptoms: retrospective analysis of data from the longitudinal assessment of imaging and disability of the back (LAIDBACK). BMC Mus Disor 2014; 15(1): 152-60.
9. Tawa N, Rhoda A, Diener I. Accuracy of magnetic resonance imaging in detecting lumbo-sacral nerve root compromise: a systematic literature review. BMC Mus Disor 2016; 17(1): 386-90.
10. Li Y, Fredrickson V, Resnick DK. How should we grade lumbar disc herniation and nerve root compression? A systematic review. Clin Ortho Rela Res. 2015; 473(6): 1896-02.
11. Cihangiroglu M, Yildirim H, Bozgeyik Z, Senol U, Ozdemir H. Observer variability based on the strength of MR scanners in the assessment of lumbar degenerative disc disease. Eur J Radiol 2004; 51(1): 202–08.
12. van Rijn JC, Klemetso N, Reitsma JB, Majoie CB, Hulsmans FJ. Observer variation in MRI evaluation of patients suspected of lumbar disk herniation. AJR Am J Roentgenol 2005; 184(1): 299–03.
13. Solgaard Sorensen J, Kjaer P, Jensen ST, Andersen P. Low-field magnetic resonance imaging of the lumbar spine: reliability of qualitative evaluation of disc and muscle parameters. Acta Radiol 2006; 47(1): 947–53.
14. van der Windt DA, Simons E, Riphagen II, Ammendolia C, Verhagen AP, Laslett M. Physical examination for lumbar radiculopathy due to disc herniation in patients with low-back pain. Coch Datab Sys Rev 2010; 17(2): CD007431-35.