

Role of MRI in the Evaluation of Lumbar Disc Degenerative Disease



Radiology

KEYWORDS: Disc degeneration, MRI, Lower backache, radiation, bulge, protrusion

Sathish Babu

Associate Professor, Department of Radiodiagnosis Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu

Vinod

Assistant Professor, Department of Radiodiagnosis Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu

Anu Priya

Postgraduate Department of Radiodiagnosis Sree Mookambika Institute of Medical Sciences Kulasekharam-629161 Kanyakumari (Dist) Tamil Nadu

ABSTRACT

Background: Lumbar Disc degeneration is the most common cause for lower back ache. It affects middle aged population commonly. Early detection of disc degeneration helps to prevent progression of the disease. MRI is an essential tool in the detection of degenerative diseases. The present study aims to evaluate the role of MRI in the detection of degenerative disc diseases.

Materials and Methods: This study was conducted in the Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu during 2015-2016. A total of 100 patients who fulfilled the inclusion and exclusion criteria of protocol were chosen. All the patients were subjected to MRI study and the images were analyzed.

Results: Among 100 patients, 74 showed degenerative changes. Annular disc bulge was most common finding.

Conclusion: Our study concludes that MRI is the imaging modality of choice to detect disc pathology.

Introduction

Magnetic Resonance Imaging (MRI) is an essential tool for diagnosis of various disc diseases. Dehydration and inflammation that occur in degenerative disc diseases can be easily seen in MRI. Signal intensity in intervertebral disc spaces and spine is used to diagnose disc degenerative disease [1]. Based on the previous studies disc degeneration is more common in adults predominantly in males. Currently three types of MODIC changes have been identified. The Type-I (Bone marrow edema which appears hypointense on T1 and hyperintense on T2), Type-II (Fatty replacement, which appears hyperintense on both T1 and T2) and Type-III (bone sclerosis, which appears hypointense on both T1 and T2). Absence of MODIC changes indicates the normal spine [2]. Studies showed that MODIC changes are associated with the degree of disc degeneration. [3-5]. MRI is able to detect degenerative and other changes in the disc [6]. This study was conducted to evaluate the role of MRI in the detection of lumbar disc degeneration.

Materials and Methods

This study was conducted in the Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences, Kulasekharam for a period of 1 year. The study protocol was approved by Institutional Research Committee and Institutional Human Ethics Committee. R soft ware used to calculate the sample size for this cross sectional study [7].

Inclusion criteria

- Male and female patients of age group 30 years to 70 years.
- Disc problems
- Patients giving consent for study.

Exclusion criteria

- Metallic implants
- Non consenting patients.

A total of 100 patients were selected for the study. The study procedure was explained in detail and informed consent was taken from individual patient. Both genders were included in the study. Demographic changes and other information was recorded in the case record form. The patients who met inclusion criteria were subjected to MRI (Siemens Essenza, 1.5 tesla). These sequences used in our setting are T1 W.I, T2 W.I, STIR, myelogram and T1 FS. For better diagnosis contrast (Magnavist, Bayer, Germany) was used wherever necessary. Images were acquired in axial, coronal and sagittal planes. Slice thickness of 3 mm. The images was stored and used for analysis.

Statistical analysis

The data was expressed in number and percentage. Statistical Package for Social Sciences (SPSS 16.0) version used for analysis. Student t test applied to find the p values. P value less than 0.05 considered statistically significant at 95% confidence interval.

Results

Among 100 cases, 74 showed the disc degeneration, of these 44 were males and 30 were females (Graph-1). Majority of the patients showed annular disc bulge (70) followed by protrusion (45), extrusion (25) and sequestration (10). Thus annular disc bulge was found to be the most common etiology of lower back ache in our study (Table-2, Image-1&2).

Discussion

Imaging plays an important role in the detection of degenerative diseases of spine. Decreased signal intensity of the intervertebral disc image indicates disc dehydration, progression of the degeneration [8-9]. Traumatic, physical, nutritional and genetic factors play a major role in the development of disc degeneration. Early detection is useful in the prevention of progression of disease [10]. Birney et.al study showed the role of MRI in the detection of disc degenerative disease. They observed that L4-L5 degeneration was more common as compared to other levels. Our study also showed similar results [11]. Grenier et.al study found MRI to be accurate in detection of minor degenerative changes in lumbar disc [12]. Our study emphasizes MRI as a specific, sensitive, and accurate imaging modality in detecting the lumbar disc degeneration.

Conclusion

Disc degeneration is the major cause for the low back. MRI is the imaging modality of choice for detection of degenerative disc disease.

Graph-1: Distribution of patients based on the gender

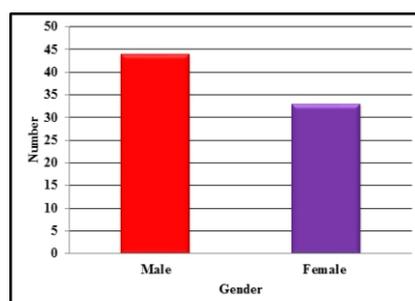


Table-1: Distribution of patients based on disc herniation types

Herniation types	L1- L2	L2-L3	L3-L4	L4-L5	L5-S1	Number
Annular disc bulge	4	10	18	30	8	70
Disc protrusion	2	5	8	20	10	45
Disc extrusion	1	3	4	12	5	25
Disc sequestration	0	1	1	5	3	10
Total	7	19	31	67	26	150

Image-1: T2 weighted axial image at the L4-L5 level intervertebral disc showing right lateral disc bulge indenting the anterior thecal sac

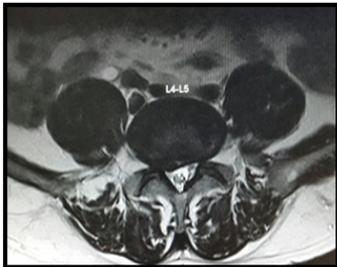


Image-2: T2 weighted sagittal image showing disc dehydration with disc bulge and posterior annular tear at L4-L5 and L5- S1 level intervertebral disc



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