Original article

MRI Pattern of Lumbosacral Degeneration in Tribhuvan University Teaching Hospital, Nepal

Ansari MA, Subedi K, Panta OB, Suwal S

Department of Radiology and Imaging, Tribhuvan University Teaching Hospital, Kathmandu, Nepal

Correspondence: Dr. Mukhtar Alam Ansari

Email: dr.mukhtaransari@gmail.com

Abstract

Introduction: The economical and social burden of degenerative disc disease remains unclear in Nepal due to lack of systematic data. However, considering the large volumes of spinal magnetic resonance imaging (MRI) performed for low back pain and/or radiculopathy, this has become the prime problems in all spinal care facilities in Nepal. Spinal MRIs constitute approximately sixty percent of the MRI performed in the Tribhuvan University Teaching Hospital (TUTH). This study is being conducted to review the pattern of degeneration of lumbosacral spine in patients referred for MRI at TUTH.

Methods: A retrospective study was conducted at TUTH. Patients with low back pain and or radiculopathy undergoing MRI in the previous 5 months were included in the study. Patients with trauma and or conditions other than degenerative processes were excluded in the study. The findings were recorded and analyzed using SPSS.

Results: A total of 301 patients were included in the study. Age ranged from 16 to 83 years, mean age being 42 years. Highest number of patients were in the 30-40 years age group (26.2%).

Male to female ratio was 1.22. Disc bulge was the most common finding, seen in 77.7% followed by protrusion (58.5%), extrusion (3.9%) and sequestration (0.3%). Foraminal stenosis (68.4%) was the most common complication followed by central canal stenosis (51.8%) and nerve root compression (37.8%). Disc protrusion was the most significant ($p<0.05$) predictor of complications (nerve root compression, foraminal stenosis and central canal stenosis).

Conclusion: The study shows that degenerative disc diseases remain the cause of morbidity in the most productive years of life (30-40 years of age). Large volumes of MRIs performed for this condition represent significant economic and healthcare burden in a developing country like Nepal as well.

Keywords: disc degeneration, lumbosacral spine, MRI

Introduction

Degenerative diseases of the spine remain a significant cause of morbidity in the western world. The mechanical stress to the vertebra and intervening discs from age related wear and tear remain the prime cause of the degenerative process, apart from the acute stress to the spine in some instances. The 2010 Global Burden of Disease Study estimated that low back pain is among the top 10 diseases and injuries that account for the highest number of Disability Adjusted Life Years (DALYs) worldwide.[1] The economical and social burden of this disease remains unclear in our country due to lack of systematic data. However, considering the increasing number of spinal MRIs performed for low back pain and/or radiculopathy, it is not hard to surmise that these diseases have become the prime problems in all spinal care facilities. The manual labourwith tendency to lift heavy weights in the back is probably aggravator of degenerative process in Nepalese population.

Spinal MRIs constitute approximately sixty percent of the MRIs performed in the T U Teaching Hospital. MRI remains the imaging modality of choice in these cases due

to its inherent ability to depict the intervertebral disc and its various forms of herniation; and the resultant effect in the nerve roots, thecal sac and spinal cord. Furthermore, it detects the other mimics of the disc pathology. However, considering the cost and availability, MRI still is an expensive and less available modality.

Though MRI suggests the cause of patients' symptoms, it is still unclear whether the MRI findings are actually the cause of patient symptoms. So it remains difficult to justify the use of MRI in every case of low back pain. Regardless of this justification, the trends of MRI evaluation of the spine are in rise. We have reviewed the pattern of degeneration of lumbosacral spine in patients with low back pain and/or radiculopathy referred for MRI at TUTH. This review will help to identify the patterns of degeneration specific to Nepalese population and compare the findings with the existing literature from the west.

Methods

This was a retrospective hospital based study performed in TUTH, a tertiary care referral center in Kathmandu, Nepal. The study population consisted of all patients who underwent MRI of lumbosacral spine for evaluation of low back pain during the period of May 2012 to October 2012. All MRIs available in the hospital record during the study period were analyzed.

MRI was performed with Hitachi Airis Vento 0.3 Tesla MRI machine. T1W, T2W (FSE) images in axial and sagittal plane were available.

A total of 301 MRIs were analyzed. Data were recorded in a predesigned proforma and were analysed using SPSS software.

Results

A total of 301 MRI of lumbosacral spine were reviewed. The mean age of the sample was 41.84±13.99 years. The highest frequency of MRI exams for low back pain was in the age group of 30-40 yrs (26.2%) and 51.8% of patients were below 40years of age. There was a slight male predominance with a male to female ratio of 1.25:1.(Table 1)

Low back pain was the most common presenting symptom(n=260; 86.4%). Radiculopathy was present in 146 (48.5%) patients with low back pain. Six (2%) patients underwent MRI with the suspicion of degenerative central spinal canal stenosis.

Disc Bulge was the commonest type of disc herniation which accounted for 77.7% of study population followed by disc protrusion 58.5%. Disc extrusion was seen in 3.98% while disc sequestration was seen in only 1 patient (0. 3%). Disc bulge was seen to be present in multiple levels in upto 53.2 % of patient while disc protrusion were common in single level(49.5%) (Figure 1).

Disc desiccation was the commonest change in the disc accounting for 92.3% of study population. Annular tear was relatively uncommon accounting for 13.0% of population. Disc herniation commonly involved L4-L5 level accounting for 79.8% of all disc bulge and 67.8% of all disc protrusions (Figure 2).

Other degenerative changes studied were ligamentum-flavum hypertrophy which was seen in 8.0% of cases; facet joint arthropathy in 28.6% of cases and facet joint hypertrophy in only one case.

Neural foraminal stenosis was the commonest complication of degenerative changes seen in 68.4% of the population. However nerve root compression was seen in only 37.8% of the population. Central spinal canal stenosis was seen in 51.8% of population (Table 2). Disc bulge was significantly associated with central spinal canal stenosis (OR- 2.3;p-0.003) and neural foramina stenosis (OR-2.6; p-0.001) but did not show significant association with nerve root compression (Table 3). Disc protrusion was significantly associated with neural foraminal stenosis(OR- 4.2;p<0.001), central spinal canal stenosis (OR-5.5;p<0.001) and nerve root compression (OR-16.24; p<0.001) (Table 4).

Table 1 Demographic characteristics of the population.

Characterstics	Number (%) N=301
Age:	
Mean ± Sd	41.84± 13.99
Median (inter quartile range)	40(50-30)
Range(Max-Min)	67(83-16)
Age Group:	
<20	9(3.0)
21-30	68(22.6)
31-40	79(26.2)
41-50	72(23.9)
51-60	40(13.3)
61-70	24(8.0)
>70	9(3.0)
Sex:	
MALE	166(55.1)
FEMALE	135(44.9)

Table 2 Complications of degenerative spine diseases.

Complications	Number (%) N= 301
Nerve root Compression	114(37.87)
Foraminal Narrowing	206(68.4)
Mild	128(42.5)
Moderate	61(20.3)
Severe	17(5.6)
Central canal stenosis	156(51.8)
Mild	82(27.2)
Moderate	51(16.9)
Severe	23(7.6)

Table 3 Associations of complications of degenerative spine disease with Disc Bulge

Complications	Disc Bulge present (%) (n=234)	Disc Bulge absent (%) (n=67)	p-value
Nerve root compression	93(39.7)	21(31.3)	0.21
Central canal stenosis	132(56.4)	24(35.8)	0.003(OR-2.3)
Foraminal Narrowing	171(73.1)	34(50.7)	0.001(OR-2.6)

Table 4 Associations of complications of degenerative spine disease with Disc Protusion

Complications	Disc Protusion present (%) (n=177)	Disc protusion absent (%) (n=124)	p-value
Nerve root compression	104(58.8)	10(8.1)	<0.001(OR-16.24)
Central canal stenosis	121(68.4)	35(28.2)	<0.001(OR-5.5)
Foraminal Narrowing	143(80.8)	62(50.0)	<0.001(OR-4.2)

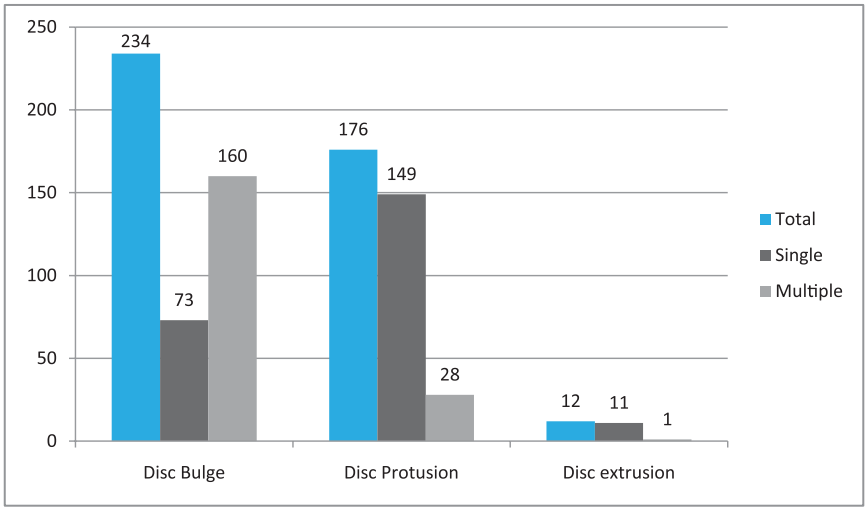

Figure 1 Disc herniation detected on MRI

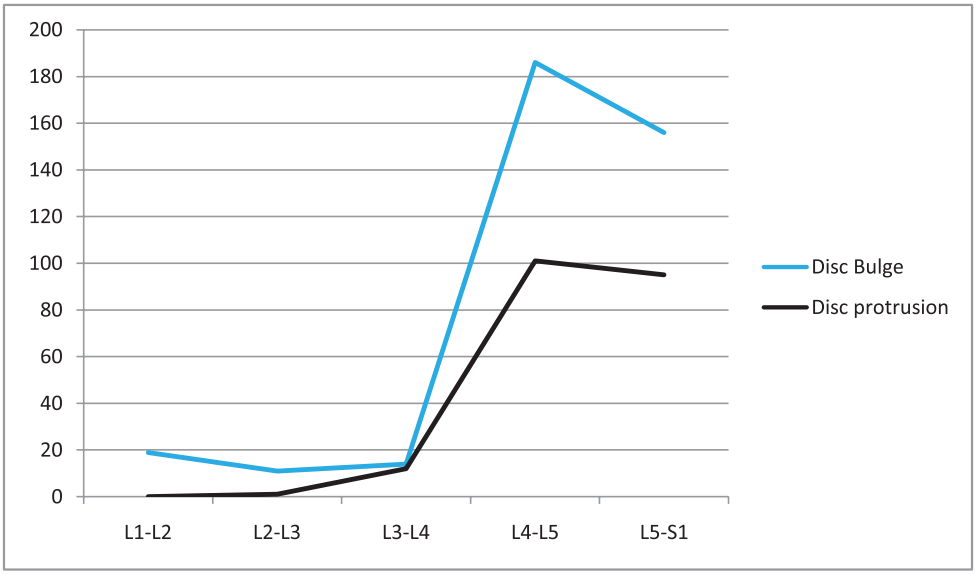

Figure 2 Inter vertebral disc levels of affected by disc herniation.

Discussion

Low back pain is a common cause of disability and absence from work. It affects people of all ages and is a common cause of medical consultation. The lifetime prevalence of non-specific (common) low back pain is estimated at 60% to 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year). The prevalence rate for children and adolescents is lower than that seen in adults but is rising.[2,3] Prevalence increases and peaks between the ages of 35 and 55.[4]

Several studies have been performed in the West to evaluate the social and economic impact of low back pain. In the United States, an estimated 149 million work days are lost every year because of low back pain,[5] with total costs estimated to be US$ 100 to 200 billion a year (of which two-thirds is due to lost wages and lower productivity). [6,7] Due to lack of systematic data, we are unable to predict the losses due to low back pain and its socioeconomic impact in Nepal.

In this hospital based retrospective review, primarily performed for the evaluation of low back pain, degenerative changes in lumbosacral spine were noted in 92.3% of study population. Among the degenerative changes, disc dessicationwas seen in all patients, followed by disc bulge (77.7%), and disc protrusion (49.5%). Similar pattern of degenerative changes were noted in a study conducted by Jensen et al.[8] However, Biluts H et al[9] found disk prolapse (70.1%) commoner than disk bulge (18.5%). Weishaupt D et al[10] also found similar findings with disc prolapse slightly more common than disk protrusion, the latter increased with increasing age.

Prevalence of disc degeneration progressively increases with lower levels of spine with commonest changes being seen at L4-L5 and L5-S1 levels. Similar results are noted in this study, with commonest level of disc bulge (79.8%) and disk protrusion (67.8%) being at L4-L5 level. These findings are consistent with the studies conducted by Weishaupt D et al[10], S Verma et al[11], W West et al12 and Biluts H et al[9]. In these studiesas well, disc degeneration was commonest at L4-L5 level followed by L5-S1 level.

Disc degeneration may involve multiple levels of lumbosacral spine as seen in our study. Disc bulge at multiple levels was seen in 53.2%, however, disk protrusion and extrusion were seen commonly at single level (49.5% and 91.7% respectively). These findings are in agreement with the study conducted by Weishaupt D et al[10], S Verma et al[11] and W West et al[12].

Although most of the patients in this study complained of low back pain, radiculopathy was present only in 48.5% patients, which is due to nerve root compression. Disk bulge may not cause nerve root compression as seen in this study, however disk protrusion, predominantly paramedian and foraminal, may compromise the neural foramina resulting in the nerve root compression. A disc protrusion was significantly associated with neural foraminal stenosis. These findings are similar to the studies done by S Vermaet al[11] and Weishaupt D et al[10].

Although the study was done in symptomatic patients, asymptomatic individuals may also have degenerative

changes in lumbosacral spine as reported by Jensen et al and Boos et al in their study. Again, more specific symptoms of degenerative changes in lumbosacral spine like radiating pain are relatively less common even in the symptomatic patients. Thus, it may be the subject of debate regarding role of imaging, particularly MRI, of lumbosacral spine. Non specific symptoms like low back pain can also be caused by non-discogenic degenerative changes in lumbosacral spine like facet arthropathy and hypertrophy which were relatively less common compared to discogenic degenerative changes in this study.

Conclusion

Degenerative disc diseases remain significant cause of morbidity and absence from work in the most productive years of life (30-40 years of age). Large volumes of MRIs performed for this condition represent significant economic and healthcare burden in a developing country like Nepal as well.

Conflict of interests: None declared.

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