

Original Research Article

Frequency of lumbar magnetic resonance imaging findings in patients with low back pain

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ABSTRACT

Background: Back pain is one of the main causes of disability and has been the most common cause of disability in the last decade. MRI imaging is able to identify soft tissues, including the intervertebral disc, nerves, and muscles, that are potential sources of back pain; it should be noted, however, that in some cases MRI is not able to identify the source of low back pain.

Methods: This cross-sectional study was done on 256 patients who referred to the imaging ward of Ardabil city hospital for lumbar MRI from September 2020 and September 2021. These patients in terms of gender, age, type of insurance, disc dehydration, disc protrusion, disc extrusion, disc sequestration, disc dehydration, spondylolisthesis, retrolysis, presence of Taylor cyst, hemangioma, vertebral fracture, spinal abnormality, spinal abnormality Bone marrow SG, spinal canal stenosis, furaminal stenosis, modic changes and the presence of scoliosis were evaluated.

Results: The mean age of patients was 45.10 with a standard deviation of 14.28 years. 152 patients (59.4%) were male. 240 patients (93.7%) had health insurance. 55 patients (21.5%) had normal MRI. The most common MRI findings in the present study were: extrusion (67.6%), intervertebral disc dehydration (59.4%), protrusion (40.2%), spinal canal stenosis (29.7%) furaminal stenosis (24.2%), retrolysis (19.5%), lumbar scoliosis (14.7%), modic changes in the lumbar vertebrae (14.5%), scoliosis (13.7%), hemangioma (10.5%), spondylolisthesis (9.4%), sequestration (3.1%), spinal abnormalities (2%) and bone marrow SG (1.6%).

Conclusions: Based on the results, the most common abnormal findings in MRI of patients with low back pain were: extrusion, protrusion and dehydration of the intervertebral disc. Also, most of these changes were in the lower levels of the lumbar vertebrae.

Keywords: Disc protrusion, MRI, Back pain

INTRODUCTION

Back pain is one of the main causes of disability and has been the most common cause of disability in the last decade.¹ A population-based study in Japan estimated the prevalence of low back pain to be more than 80% of a lifetime.² MRI imaging is able to identify soft tissues, including the intervertebral disc, nerves, and muscles, that are potential sources of back pain; however, it should be noted that in some cases MRI is not able to identify the source of back pain. According to some studies,

intervertebral disc degeneration has been associated with low back pain, but other studies in this field have not proven such a relationship.³⁻⁶ It has been suggested that the symptoms of low back pain fluctuate over time and that low back pain is often associated with patterns of improvement and exacerbation.⁷ It is to be expected that if the physician has sufficient information about the relationship between the MRI findings and the patient's low back pain, he or she can better guide patients on how to prevent low back pain. In a recent study, disc degeneration, bulging discs, and the high-signal area were

associated with a history of low back pain, and individuals with these MRI findings were more likely to develop severe low back pain in the future.⁸ Therefore, according to what has been said, lumbar MRI findings in patients with low back pain are of great importance for examining the patient's clinical relationship and imaging. The aim of this study was to evaluate the findings of lumbar MRI in patients with low back pain referred to the imaging ward of Ardabil city hospital between September 2020 and September 2021.

METHODS

Study design

The present study was performed as a cross-sectional descriptive study from September 2020 to September 2021 in Alavi Hospital of Ardabil in the Department of Radiology of Ardabil University of Medical Sciences. All patients with low back pain who referred to the imaging ward of Ardabil city hospital for lumbar MRI were included in the study.

Patients in terms of gender, age, type of insurance, disc dehydration, disc protrusion, disc extrusion, disc sequestration, disc dehydration, spondylolisthesis, retrolisthesis, tarlov cyst, hemangioma, vertebral fracture, spinal cord abnormality, soft tissue abnormality, Signal change Spinal canal stenosis, foraminal stenosis, modic changes and the presence of scoliosis were evaluated.

Data collection and analysis

The data were collected in a checklist and analyzed in SPSS software version 26 using tables and graphs. Data were analyzed using descriptive statistics such as frequency indices, frequency percentage, mean, median, standard deviation, and confidence interval.

Ethical approval

This study was conducted after approval in the ethics committee of Ardabil University of Medical Sciences.

RESULTS

In this study, 256 patients with low back pain referred to the imaging ward of Alavi Hospital in Ardabil were included in the study and underwent MRI. The mean age of patients was 45.10 with a standard deviation of 14.28 years. 152 patients (59.4%) were male and the rest were female. 240 patients (93.7%) had health insurance. 55 patients (21.5%) had normal MRI.

Frequency distribution of lumbar MRI findings in the studied patients 103 patients (40.2%) had protrusion, 173 patients (67.6%) had extrusion and 152 patients (59.4%) had lumbar disc dehydration (Figure 1).

The most common vertebrae involved in protrusion are related to L4-L3 and L5-L4 each with 48.5% and in extrusion related to L5-L4 and S1-L5 each with 75.1% and in dehydration and foraminal stenosis with 93.4% and 77.4%, respectively; and 93.4% were related to L5-L4.

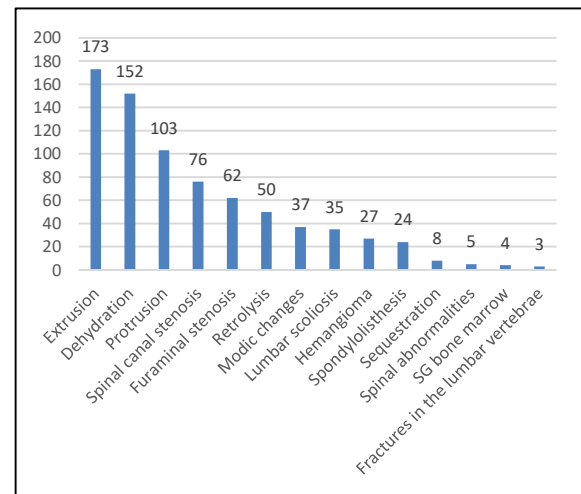


Figure 1: Frequency of MRI finding in studied patients.

Sixty-two patients (24.2%) had foraminal stenosis at the lumbar spine, of which 11 (17.8%) were on the right, 1 (1.6%) on the left, and 50 (80.6%) were bilateral.

76 patients (29.7%) had lumbar spinal canal stenosis, the most common vertebrae involved with 75% L5-L4.

37 patients (14.5%) had modic changes in the lumbar vertebrae, the most common vertebrae involved with 75% were S1-L5 and 33 patients out of 37 patients (89.2%) were grade 2.

Regarding spinal abnormalities, 3 cases (1.2%) of Kurdish tetrad, 1 case (0.4%) of nerve sheath masses and 1 case (0.4%) of myelopathy were reported, which was a total of 5 cases (2%).

Lumbar scoliosis was present in 35 patients (13.7%) with 13 cases (5.1%) convexity to the right, 18 cases (7%) convexity to the left and 4 cases (1.6%) S convection.

DISCUSSION

According to a study by Widman et al on 115 people in Canada, the most important MRI findings in patients with low back pain are anular tears and loss disc height, which were associated with the severity and frequency of low back pain in patients over the past year.⁹ In a study of 412 people in Denmark, Jar et al reported the most common findings on MRI in people with low back pain, seen in more than 50%, as reduced disc dehydration, and noted that most changes in the area. The lower back was seen, which in our study also showed changes mainly in the lower levels. On the other hand, Jar stated that findings

such as abnormal disc signal, rupture of the envelope, disc protrusion and foramen stenosis are seen in 25 to 50% of people, although in our study, only extrusion was more prevalent. Also, findings such as central canal stenosis are seen in only less than 25% of patients with low back pain, which was also true in our study.¹⁰ In a study of 53 patients with low back pain in Switzerland, Klein-Stock et al reported MRI findings and their frequency as follows: severe disc degeneration in 89% of cases and disc bulging in 74% of people. In addition, 11% of patients had no MRI findings.¹¹

In this study, the frequency of disc protrusion at L3-L4 and L4-L5 levels was higher than other disk surfaces, and the frequency of disc extrusion at L4-L5 and L5-S1 levels was higher than other levels.

This result was similar to previous studies, so that in the Crock study, the frequency of disc protrusions (including Protrusion and Extrusion) was higher at the L4-L5 and L5-S1 levels than at other disc surfaces.¹² The reason for the greater frequency of disc protrusions on these surfaces was the presence of more mechanical stresses.

In this study, the frequency of spondylolisthesis was higher at the L5-S1 level than at other levels, while in the Crock study, the most common level of involvement was L4-L5 (12). The reason for the higher prevalence of spondylolisthesis in the lower lumbar spine was probably due to the fact that the fast joints in these surfaces were more vertical than the higher disc surfaces, so they were more prone to slipping the upper vertebra on the lower vertebra.

In the present study, men were a higher percentage of patients with low back pain, while in Hadizadeh Kharazi's study of 110 patients with degenerative back pain, women were a higher percentage of patients with low back pain.¹³ It seemed that women were probably more prone to degenerative phenomena due to different types of physical work at home and farm and gender backgrounds. In our study, most patients were over 40 years old and most often between 40 and 59 years old. While in Kharazi's study, most patients with degenerative back pain were a decade younger and the age of 31 to 50 years was the most common time for degenerative low back pain.¹³

It can be seen that the process of degeneration in the spine begins from the third decade of life. Numerous studies have shown that degenerative change begins with a decrease in the height of the intervertebral disc and leads to bulging, annulus, and stenosis of the intervertebral discs. This change increased the pressure on the fast joints and their osteoarthritis, thickening of the flow ligament and growth of osteophytes.^{14,15} It also caused changes in the anterior-posterior dimensions and cross-sectional area of the spinal canal.¹⁶ In the Videman et al study it was shown that signal reduction secondary to dryness and disc bulging are findings that begin at age 35 and increase with age.¹⁷ In the present study, spinal canal stenosis was more

common at several levels. In the Videman et al study stenosis at several levels was more common than stenosis at one level.¹⁷ In general, because degenerative phenomena usually involved the joints of the body in general, it seemed that all levels were affected to different degrees of degenerative phenomena.

In our study, the most affected level was L4-L5. This finding was consistent with other studies.^{18,19} It can be concluded that the lower levels of the lumbar spine were the least defense mechanism against the forces and pressures that ultimately led to degenerative phenomena and spinal stenosis.

In this study, the second level involved after L4-L5 was the L3-L4 area. In the Videman et al and Osti et al study the L3-L4 level was the second highest level after L4-L5.^{17,19} In Kharazi et al study the prevalence of degeneration in this disk was relatively high.¹³ In our study, the third most common site of canal stenosis was L5-S1 level, while in Kharazi et al study the second level was involved and in Videman et al study it was the fourth level.^{12,17} Lack of comparison of abnormal MRI findings over time was one of the limitations of the present study.

CONCLUSION

According to the results, the most common abnormal findings on MRI of patients with low back pain were: extrusion, protrusion and dehydration of the intervertebral disc. Also, most of these changes occurred in the lower levels of the lumbar vertebrae. It is also suggested that a similar study with a larger sample size be performed to investigate the effect of aging on degenerative changes in the lumbar vertebrae. It is also recommended to conduct more clinical trials in the future with a larger study population, to study the effect of education on the process of lumbar vertebral changes and to study the effect of job on degenerative changes of the lumbar vertebrae.

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