Original research

Correlation between Clinical Features and Magnetic Resonance Imaging Findings in Lumbar Discopathy

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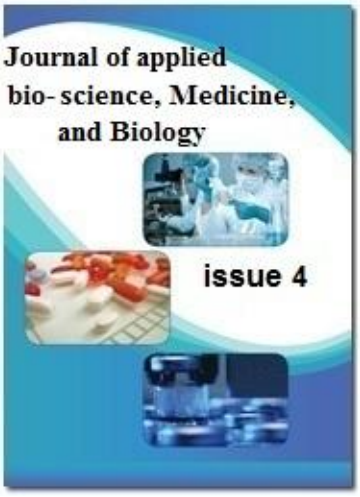

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ABSTRACT

Background: A large number of patients are referred to MRI in order to diagnose discopathy whereas a remarkable percentage of them may not need this method of imaging.

Method: MRI of the patients who were clinically diagnosed with lumbar discopathy was investigated and the observed results were compared to those of before the MRI clinically diagnosis in regard with the level of the agreement between these two stages.

Results: A total of 597 MRI cases were examined during a period of 3.5 months. However, according to the study criteria 462 individuals (77.4%) were included in the study. Examinations were shown that 76 cases have normal pathology, disc herniation was observed in 214 patients and in 172 cases other findings were achieved. From among the patients who were clinically diagnosed with lumbar discopathy and referred to MRI, an average of 16.4% of the MRI results did not include any pathological points. The highest percentage of MRI with normal result belonged to the rheumatology group (19.4%). Normal MRI reports were more among women than men and the highest rate of agreement was related to the age group of 50-70 (87.5%).

Discussion: The results of the study indicated that specialists had not appropriately observed the guidelines of discopathy examination especially in young patients.

Keywords: Lumbar MRI, Low back pain, Discopathy, Clinical diagnosis.

Introduction

Low back pain (LBP) is a common condition in musculoskeletal system, which is observed in both genders and at all ages all over the world. Ligamentous-muscular injuries and age-related degenerative processes in facet joints and intervertebral disk are likely to be the most common causes of LBP [1].

The major diagnostic problem for physicians is to determine a small portion of a large group of patients, who should further be examined due to the possibility of serious issues. Failure to diagnose, which is a factor for increased disability, can result in wrong treatment and getting poor results.

Advent of MRI dramatically revolutionized the diagnosis and consequently the cure of spinal problems. The major problem with MRI is that it may indicate irrelative but alarming results and cause emotional stress and the use of costly methods and unnecessary interventions [2]. Deyo et al., have also observed more surgery of lumbar spine, consumption of more drugs, more epidural injections in areas where more MRI is conducted [3].There are also some studies that have showed a poor relation between MRI results and clinical signs and symptoms [4 & 5] (a lot of imaging results of abnormality with no clinical symptoms).

On the other hand, reports on normal conditions account for a large portion of MRI conductions (acute clinical symptoms with no MRI results). It has been indicated that those who have experienced longer periods of pain do not necessarily have more anatomical abnormalities [6]. Unnecessary conduction of MRI imposes high costs on patients and the healthcare system.

In Iran, MRI has been conducted relatively more than other countries. Although conducting cost of MRI in Iran is much lower, its unnecessary conduction imposes high costs on patients and the national healthcare system. On the other hand, high working pressure on the healthcare personnel leads to fatigue, work-related stress, accuracy reduction, and an increase in mistakes, which could enhance the risk of ignoring the current pathology.

Identifying the relation between MRI results and clinical diagnoses will help better define the indications of its conduction; therefore, the number of unnecessary cases will decrease. By reducing the number of unnecessary cases, there will be a decrease in the risk that the patients who really benefit from the device will be missed. As a result, the life of MRI equipment in our country, where limited financial resources are available for the healthcare system, will increase.

Diagnostic evaluation

Since accurate anatomical diagnosis of discomfort cause is not a simple process, diagnosis evaluation is tiring for both the physician and the patient. In most cases; however, by recording the patient's history and conducting an appropriate physical examination, the cause of the LBP can be distinguished and even radiographic imaging is not needed in most patients with severe LBP [7]. Especially, in cases where the patient has conducted lumbar radiography in last 2 months or CT scanning or MRI in last 6 months, it is not necessary to repeat them [8]. Guidelines and standardization for management of back pain and indications of MRI conduction have been

proposed [2 & 8]; however, the level of the physicians' adherence to these guidelines is not clear. As was mentioned, failure to adhere to the guidelines of diagnosing and treating LBP leads to unnecessary conduction of MRI, an increase in normal cases, and emergence of negative results (an increase in cost-benefit ratio).

Different studies have indicated that early imaging (compared to conservative treatment without imaging) in patients without risky symptoms (signs and evidence of serious problems) does not have any influence on the patient's final results [2, 7 & 9].

Material and methods

Since discopathy is among the most common differential diagnosis of LBP, the aim of the present study was to determine the level of the relation between discopathy diagnoses before and after conducting MRI and to specify the difference between specialists and the effects of age and gender according to this relation. In so doing, a cross-sectional study was conducted in order to determine the level of observing the guidelines of diagnosing spinal diseases by the specialists.

Different specialists refer patients diagnosed with discopathy to MRI. However, a preliminary estimate has indicated that orthopedic specialists, neurosurgeons, neurologists, and rheumatologist refer the most patients to MRI. Therefore, the present study was conducted on the patients who were referred by these groups of specialist.

In order to conduct the investigation, the lumbar spine specialists (orthopedic surgeon, neurosurgeons, neurologists, and rheumatologist) who were faculty members of the university were talked to and asked to attach their differential diagnosis to the documentations of the patients who were referred to MRI. However, they were not aware of the investigation and its probable results. Therefore, they conducted their medical practices usual and in accordance to the guidelines presented in their specialized department.

Therefore, all of the patients who were referred to the imaging department of the hospital with a request of MRI during a period of 3.5 months were included in the study. In this period, 597 MRI cases were examined.

The exclusion criteria were: cases that the physician had not attached his/her clinical diagnosis to the request sheet, cases where the clinical diagnosis was other than discopathy, patient's history of lumbar spine surgery, and Cases where MRI was associated with contrast injection.

Taking the abovementioned procedures, 462 individuals (77.4% of all of the referring patients) were included in the study. The minimum size of the sample had previously been determined by a statistics expert through standard computational formulas, and the sample size was bigger than the minimum required.

According to the routine sequences of the imaging department and using an MRI device with a 1.5 Tesla magnet, MRI images were taken from the patients' lumbar spine sections including sagittal sections T1 and T2 and axial section T2 within the distance of the end plate of two adjacent vertebrae.

The retrieved images were examined by an experienced radiologist who was a faculty member and was familiar with lumbar MRI but was unaware of the patients' clinical diagnosis. The results of his examinations were reported in written form in accordance with Fardon's definitions [10]. Afterwards, in order to facilitate the examining process, the results of those reports were revised by another radiologist in three groups of patients: those with disk morphological abnormalities (Disk Herniation), those with positive results but without Disk Herniation, and those without positive results (Normal). Then, normal reports were revised again.

In MRI reports, cases in which only minor disk dehydration or slight degenerative change had been announced were considered normal cases and the changes were attributed to natural aging. Cases where the related specialist reported irrelevant issues were recorded for comparison but were not included in calculating the final results.

In all of the reports, disk morphology was modified in accordance with recommendations of "Combined Task Forces of the North American Spine Society" and "American Society of Spine Radiology". However, while the data were inserted in the tables, the whole disk morphological abnormality (Disc Herniation) was recorded.

Results

As our study showed 177 patients (25.3%) were referred by orthopedists, 237 (51.3%) by neurosurgeons, 22 (4.8%) by neurologists, 67 (14.5%) by rheumatologists, and 19 (4.1%) by other specialists. The proportion of male to female patients was equal (231 men and 231 women). Frequency distribution of the patients' age is presented in Table 1. According to this table, the age group of 30-50 accounted for most of the patients (49.1%). Their mean age was 42±14.25 (the youngest patient was 13 and the oldest one was 87). Median age amongst men and women was respectively 40 and 43 years.

Examining the patients' MRI indicated that there was no pathological evidence in 76 cases (normal report). Disc Herniation was observed in 214 patients. In addition to this finding, in 147 cases other findings were achieved. There was no evidence of Disc Herniation in 25 cases; however, they were reported to have other issues. Frequency distribution of MRI findings in patients with discopathy is presented in Table 2.

Among the specialists, the orthopedists had the highest level of agreement between their clinical diagnosis and MRI results (81.2%). In rheumatology group; however, only 71.6% of clinical diagnosis were affirmed. And in 28.4% of the cases, there was no result in favor of Disc Herniation. In specialized groups of neurosurgeons and neurologists, the level of agreement was 78.1% and 77.4%, respectively. The highest percentage of MRI with normal result belonged to the rheumatology group (19.4%) (Table 1).

In terms of age, the highest rate of agreement was related to the age group of 50-70 (87.5%) and the lowest rate belonged to 30-50 years group, and the highest percentage of normal reports was observed in the under-30 age group (23.9%) (Table 2).

There was a minor difference between male and female patients in regard with agreement between clinical diagnosis and MRI results. This agreement among men was slightly higher than women, which were respectively 79.2% and 77.1%. Normal MRI reports were more among women than men (17.7% and 15.2%, respectively) (Table 3).

Table 1. Characteristic of the patients referred to the study.

Variable	Frequency (n=462)	Percent
Age group		
<30	109	23.6
31-50	227	49.1
51-70	104	22.5
>71	22	4.8
Gender		
Male	231	50.0
Female	231	50.0

Table 2. Frequency of MRI results in patients with discopathy.

MRI findings	Frequency (n=462)	Percent
Normal	76	16.4
Disk herniation	214	78.1
Remaining (n=172)		
Spinal Stenosis	82	47.7
Listhesis	38	22.1
Vertebral fractures	21	12.2
Other findings	31	18.0

Table 3. MRI results according to the patient's gender, age and referring specialist.

Variable	Without Disc Herniation		With Disc Herniation*	Total
	Normal	Other Findings		
Specialist				
Orthopedist	19(16.2)	3(2.6)	95(81.2)	117
Neurosurgeon	38(16.0)	14(3.9)	185(78.1)	237
Neurologist	4(18.2)	1(4.4)	17(77.4)	22
Rheumatologist	13(19.4)	6(9.0)	48(71.6)	67
Gender				
Male	26(23.9)	1(0.9)	183(79.2)	231
Female	41(18.1)	16(7.0)	178(77.1)	231
Age				
<30	26(23.9)	1(0.9)	82(75.2)	109
31-50	41(18.1)	16(7.0)	170(74.9)	227
51-70	7(6.7)	6(5.8)	91(87.5)	104
>71	2(9.1)	2(9.1)	18(81.8)	22

*alone or with other findings.

Discussion

The present study was aimed at investigating the level of agreement between MRI results and clinical diagnosis of discopathy and the effect of the referrer's specialty, patients' age and gender on this agreement.

Our investigation indicated that there was agreement between MRI results and clinical diagnosis in 78.1% of the patients who were diagnosed with discopathy and referred to MRI. In 16.4% of the cases; however, the MRI results were normal. And the results in the rest cases (5.5%) indicated other findings like vertebral fractures, spinal stenosis, Spondylolisthesis, neoplasic masses, and other rare issues without any Disc Herniation cases. In a study conducted by Jensen [11], 64% of the patients with no clinical symptoms were reported to have disk abnormality in their MRI and 36% of the whole spine disks were normal. Prevalence of disc bulging increases with age; however, it is not affected by gender. Aging was also effective in the number of disks but did not influence increase in protrusion cases. In Paajanen's study [12] conducted on young patients with back pain, spine morphological abnormality was observed in 57% of the cases. This finding for the control group that had no symptoms was 35%. Therefore, it seems that disc morphological abnormalities are highly prevalent and do not have a clear relation with clinical symptoms. Maus has also stated that there is a poor relation between MRI results and clinical diagnoses [4]. Glenn also considered disk degeneration and vertebral end-plate as the common result of aging [13].

However, in our study that was conducted on patients with clinical diagnosis of discopathy, there was an acceptable level of agreement between MRI results and clinical diagnosis and MRI results were in line with clinical diagnoses in 78.1% of the cases. Janardhana also reported an acceptable level of agreement between the clinical diagnosis and MRI results in patients with disc Herniation [14]. In this study, MRI was introduced as a highly sensitive test but nonspecific for disk lesions. It was also concluded that clinical symptoms can be observed in Disc Herniation cases that affect nerve root or foramina and in this regard the morphologic type of disc Herniation is not much important.

In our investigation, it was concluded there was difference between different specialists in terms of the level of agreement. The highest level of agreement was observed in the orthopedic group (81.2%) and the lowest was related to the rheumatology group (71.6%). The level of agreement in the neurosurgery and neurology groups was 78.1% and 77.4% respectively. This difference; however, was not significant (P Value=0.52). Moreover, it was observed that the rheumatologists in 28.4% of the cases (the highest percentage) and the orthopedic specialists in 18.8 of the cases (the lowest level) had failed in diagnosing the patient's pain cause.

The level of agreement in MRI results and discopathy diagnosis was higher in the male patients compared to the women (79.2% and 77.1% respectively). However, this difference was not significant (P Value=0.65). On the other hand, since the number of the men and women was equal and due to lower median age in the male patients, it can be concluded that discopathy occurs in men at younger ages. In a study conducted by Traulli [15], it was concluded that discopathy occurs in men 10 years earlier than women.

Although more evidence of Disc Herniation in MRI results was observed, this relation was not significant (P Value=0.059). In addition to that, with age increase other findings (rather than disc Herniation) were reported (P Value=0.006). Other findings with high frequency included stenosis (50%), vertebral fractures (36.4%), and Spondylolisthesis (31.8%) in patients who were over 70 years old. However, the agreement between clinical diagnosis and MRI results in this group was lower than that of the age group of 50-70 (81.8% vs. 87.5%). Therefore, it is likely that the mentioned pathoanatomical changes crated similar clinical symptoms to discopathy and caused the clinicians to make a mistake.

In our study, about 24% normal cases were reported in MRI results of the patients under 30 years old, which inclined as age increased (P Value=0.006) and in over-50 individuals reached 7%. In other words, no MRI was needed at younger ages (without difference in opposite genders), which could have reduced if diagnostic guidelines were observed.

No standard for "normal" report was observed in reviewing the literature. Similar studies have referred to "inappropriate" conduction of spine MRI, which does not necessarily mean "normal" result. In a study conducted by Oikarinen [16], 7-43% of cases of inappropriate conduction were reported. Emery also reported 28.5% cases of inappropriate conduction of MRI [17] and stated that there was a remarkable difference between family medicine specialists and other specialists in terms of MRI request. In our study, an average of 16.4% of normal cases were observed, which was slightly more in women than men (17.7% vs. 15.2%) (P Value=0.74). Among the specialists, the fewest and the most normal cases were respectively observed in patients who were referred by the orthopedists and the neurosurgeons (16%) and the rheumatologists and the neurologists ((19.4%, 18.2% respectively).

Conclusion

According to the results of the present study, discopathy diagnosis at young ages and in female patients is overestimated by lumbar spine specialists (more by rheumatologists, neurologists, and neurosurgeons and less in orthopedists). The level of normal MRI reports in spine specialist groups (rheumatologists and neurologists) was more than the spine surgeons. Other pathoanatomical changes (other than Disc Herniation) due to similar clinical symptoms are likely to cause overestimation in discopathy diagnosis.

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