

Original Article

Evaluation of history taking status and diagnostic and therapeutic measures before applying spine MRI

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Abstract. According to increasing use of clinical facilities such as MRI to diagnose diseases around the world, it is important to know that to what extent these facilities are used based on the existing indications. Accurate history taking and physical examination are essential and first step in requesting para-clinical measures. It is also very important in interpreting the spine MRI findings in patients with back pain. Therefore, it seems necessary to examine physicians' attention to history taking and physical examination before applying MRI to enact rules for optimal use of existing facilities. A total of 195 outpatients referred to the Imaging Center of Shahid Sadoughi Hospital in Yazd for spine MRI were selected by easily and convenience sampling method. The data were collected using a structured interview. Of 195 patients referred, 17.5% (n = 31) and 8.2% (n = 16) reported that the physician was not aware of the main complaint duration and the exact pain localization, respectively, and 31% of patients had not been examined by the physician. Based on the results of this research, inattention of some physicians to accurate history taking and physical examination is one of the reasons for aberrant spine MRI. Accordingly, lack of attention to the absence of clinical signs consistent with the results of MRI can create a chain of futile diagnostic and therapeutic measures as well as financial and psychological burden on the patients. The results showed that solving the problem of aberrant requests for MRI requires fundamental and comprehensive planning to develop national guidelines, inclusion of these guidelines in educational system of medical students and doctors, encouraging patients to ask physicians about the reason for applying MRI and its impact on diagnostic and therapeutic processes, and finally national legislation and insurance to monitor and reduce requests without indications.

Keywords: Medical history taking, physical examination, magnetic resonance imaging, indications

Introduction

More than 84% of adults experience back pain in their lifetime [1, 2]; the back pain is the second leading cause of referral to the physicians [1]. Fortunately, most back pain is self-limiting, but there are some conditions defined for patients with back pain that a physician accordingly should request specific clinical measures for the patient.

Diagnostic tests without clear indications among the population with low pretest probability lead to a series of other tests to assess false-positive outcomes, unnecessary interventions, anxiety in patients and increased costs.

The results of imaging requests for back pain are usually misleading or have low sensitivity and much lower value than the accurate history taking and physical examination [3]; hence, these imaging are required to be requested appropriately and based on the indications.

Currently, aberrant imaging requests are on the rise around the world. According to a study in America, 30%-40% of diagnostic imaging is aberrant in this country [8].

In a study by Salari et al. in Iran in 2012, 56% of spine

MRI requests were reported aberrant [9].

The number of existing MRI devices has been increasing in Iran since 2005 [10], and this indicates that the annual volume of the costs associated with the health system is spent for aberrant clinical requests.

Numerous programs have been implemented and reviewed to solve this problem in different countries, such as training guidelines to physicians on imaging requests [11]. These guidelines are effective when are used properly.

Therefore, it seems necessary to evaluate history taking status and physical examinations as well as diagnostic and therapeutic measures by physicians before applying MRI for future planning purposes.

Materials and Methods

In this cross sectional study, 195 outpatients referred to Imaging Center of Shahid Sadoughi Hospital in Yazd, Iran for spine MRI were selected by easily and convenience sampling method from October 2014 until the completion of the sample members. The data were collected using a

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TABLE 1
FREQUENCY OF SPECIALISTS REQUESTING MRI

Specialist	Frequency	Percent
Neurosurgeon	66	33.8
Orthopedist	88	45.6
Rhaumatologist	15	7.7
Others	26	12.9
Total	195	100

TABLE 2
FREQUENCY OF PATIENTS IN TERMS OF PAIN LOCALIZATION

Pain location	Frequency	Percent
Back pain	26	13.3
Radicular	28	14.4
Mix	141	72.3
Total	195	100

TABLE 3
RELATIONSHIP BETWEEN DOCTOR SPECIALTIES AND KNOWLEDGE OF THE DURATION OF MAIN COMPLAINTS

Specialist	Knowledge		Total, n (%)
	YES, n (%)	NO, n (%)	
Neurosurgen	40(80/3%)	12(19/7%)	61(100%)
Orthopedist	65(81/3%)	15(18/8%)	80(100%)
Rhaumatologist	13(86.7%)	2(13.3%)	15(100%)
Others	19(90/5%)	2(9.5%)	21(100%)

P-value: 0.708

structured interview. Consequently, information was obtained from patients who had minimal memory and verbal ability to answer questions, and the aim of the study was explained to the patients. Data were recorded on a checklist prepared based on American College of Radiology (ACR) guidelines [12]. The patients were asked for information required in history taking (according to the ACR guidelines) to request spine MRI. The patients were asked about whether or not to bring up these issues with their doctor visit. The examinations performed in different modes easily to remember were asked separately. Data were analyzed using the SPSS 21 software with regard to frequency tables and chi-square test.

Results

Of 195 patients referred for performing spine MRI, 90 cases (46.2%) were male and 105 (53.8%) were female, 1.2% (n=4) below 20 years, 81% (n=158) aged between 20 and 60 years, and 16.9% (n=33) over 60 years.

In terms of education, 37.4% (n = 73) were uneducated, 25.6% (n = 50) were under diploma, 21.5% (n=42) had high school graduate, and 15.4% (n = 30) had university education.

In terms of occupation, 47.2% (n = 92) of patients were housekeeper, 6.7% (n = 13) of patients mentioned that their job requires lifting heavy objects and physical activity is high, 23.1% (n = 45) had a job that requires prolonged sitting on chair, and 23.1% (n = 45) had varied and light job;

Among them, 96.4% (n=188) were insured patients and only 3.6% (n = 7) were uninsured, 88.7% (n=173) were living in urban areas, and 11.3% (n=22)in rural areas. Frequency of physicians requesting MRI in terms of specialization is shown in Table 1.

Other specialists included neurologists, internists, physical medicine specialists, general surgeons and pain specialists. Of the physicians requesting MRI, 22.1% (n = 43) were faculty members at the University of Medical Sciences.

Of patients, 30.3% (n=59) had duration of complaint less than six weeks and 69.7% (n=136) had duration of complaint over 6 weeks.

Among the patients with history of main complaint over 6 weeks, 22.1% (n = 43) reported that their pain has intensified over the past six weeks.

Of patients, 82.5% (n=146) mentioned that the physician was informed during the main complaint, 17.5% (n=31) noted that the doctor did not ask about the duration of complaints and the patient did not also raise this issue, and 9.2% (n=18) did not remember about whether or not to record these issues in history.

The frequency of patients according to pain localization is listed in Table 2.

Of the patients, 836% (163) reported that the physician was informed on the exact location of the pain, 8.2% (16) stated that the physician did not ask about the exact location of pain and the patient did not also raise this issue, and 8.2% (16) did not remember about whether or not to record these issues in history.

Six patients (3.07%) had requested from their doctors to prescribe MRI. Chi-square test was used to examine the relationship between doctor specialties and knowledge of the duration of main complaints (Table 3).

According to the results presented in Table 3, there was no significant difference in knowledge of the duration of main complaints among different specialists.

Chi-square test was recruited to study the relationship between doctor specialties and knowledge of the pain localization (Table 3). Based on the results shown in Table 4, there was no significant difference in knowledge of the pain localization among different specialists.

The frequency of therapeutic measures of the patients before applying MRI is listed in Table 5.

Medication therapy mentioned by patients included the arbitrary or prescribed use of painkillers.

Of patients, 23.6% (n = 46) mentioned that there were paper or electronic records for them in the visit resulted in request for MRI.

Among the patients, 68.2% (n=133) were undergone MRI for the first time, 12.8% (n=25) had once MRI earlier because of the same problem and between the two MRIs were just under conservative therapy.

Ten patients (4.2%) had the MRI between two and four

TABLE 4
RELATIONSHIP BETWEEN DOCTOR SPECIALTIES AND
KNOWLEDGE OF THE PAIN LOCALIZATION

Specialist	Knowledge		
	YES, n (%)	NO, n (%)	Total, n (%)
Neurosurgeon	56(90/3%)	6(9/7%)	62(100%)
Orthopedist	73(90/1%)	9/9(8%)	81(100%)
Rheumatologist	14(93.3%)	1(6.7%)	15(100%)
Others	20(95.2%)	1(4.8%)	21(100%)

P-value: 0.879

TABLE 5
FREQUENCY OF PREVIOUS THERAPEUTIC MEASURES

Treatment	Frequency	Percent
Surgical	7	3.6
Medical	165	84.6
Physiotherapy	12	6.2
Epidural injection	1	0.5
Supplemental med	1	0.5
No therapy	9	4.6
Total	195	100

TABLE 6
FREQUENCY OF IMPORTANT INFORMATION MISSING
IN THE HISTORY AND PHYSICAL EXAMINATION

Missed information	n (%)
Urinary incontinence	2 (1.02%)
Loss of sensation and motion progressive	5 (2.5%)
Weakened immune system	1 (0.51%)
Started traumatic pain	2 (1.02%)
Overnight exacerbated pain	1 (0.51%)
Total	11 (5.06%)

TABLE 7
FREQUENCY OF PATIENTS WITH ANY OF THE COMPONENTS
OF THE PHYSICAL EXAMINATION PERFORMED FOR THEM

Physical examination	Non-performed n (%)	Total n (%)
Walking	181 (97.8%)	185 (100%)
Evaluation of muscle strength, or walk on the heel and toe	127 (69.4%)	183 (100%)
Bending from side to side, forward and backward	146 (80.2%)	182 (100%)
Sitting down and up	163 (88.1%)	185 (100%)
Examination in supine position	81 (43.8%)	185 (100%)
Examination in prone position	141 (76.2%)	185 (100%)
Examination in sitting position on chair	160 (87%)	184 (100%)
Sensory examination	178 (96.2%)	185 (100%)
Examination of reflexes	142 (77.6%)	183 (100%)

times, and 27 patients (13.8%) had the MRI because of same chronic pain several years ago.

In terms of other diagnostic measures of the patients before applying MRI, plain radiography of the spine had been requested for 7.2% (n=14), for 3.1% (n=6) of laboratory tests, for 2% (n=4) of NCV. More than a laboratory test had been requested for 2% (n=4) and no other diagnostic measures of the patients before applying MRI had been performed for 85.1% (n=166).

Of patients, 5.6% (n=11) had more diagnostic measures based on the history that had not been raised doctor visits and had not been examined (Table 6).

The frequency of patients with any of the components of the physical examination performed for them by asking the patients are listed in Table 7. Maximum 6.6% (13) did not remember well examinations conducted for them, which were not included in the result.

In total, 31% of patients had not been examined at all.

Overall, the mean duration of history taking status resulted in the request for MRI was 4.05 minutes for each patient and the mean duration of clinical examination was 2.20 minutes (with STD deviation of 3.9 and 2.5, respectively).

Discussion

The results of this research showed that 31% of patients had not been examined at all by doctor prior to applying MRI. The main complaint duration and the exact pain localization are two fundamental questions in any history that 15.9% and 8.2% of patients had not been asked respectively according to results of this research. However, these figures do not show presence or absence of the indication for MRI, but certainly indicate the underlying gap of aberrant requests for MRI. Although the history and physical examination alone sometimes have shortcomings that do not lead to the correct diagnosis [12, 13], but the significance of the history and physical examination to determine disease is no secret [15-17].

In addition, the lack of history taking and clinical examination may cause the loss of important information, which may affect the prognosis of patients so that 11% of the patients in this study had main complaints that had not raised them with the physician.

Another challenge ahead is how to deal with MRI incidental findings that can also be seen in healthy subjects. Judging solely based on these findings without matching with history leads to a chain of other futile diagnostic and therapeutic measures.

Another reason for excessive requests to MRI is its successive repetitions in people who suffer from chronic low back pain and no specific effective treatments is performed on most of them as well as are only treated with painkillers; so that 12.8% of the patients in this study were in this group. MRI was the first steps in diagnosis in 85.1% of patients; and this statistic has become thinkable due to its higher cost compared to other methods.

Of the patients, 3.07% had requested from their doctors to prescribe MRI. This rate was 9% in a similar study that was conducted in Shiraz, Iran [9]. Given the high cost of MRI, these requests are causing great financial burden on

insurance companies. It seems necessary to remedy the cultural dimension of undue interference of patients to request for diagnostic and therapeutic measures.

The number of existing MRI devices has been increasing in Iran since 2005 [10]. Many of these devices are unnecessary; the question that arises is that whether the large number of facilities encourages physicians to increase request for MRI, or vice versa, the large number of requests for MRI makes false sense of need for these devices.

According to the survey results, the most specialists requesting MRI were orthopedists and neurosurgeon. In a similar study, the most requests were from neurosurgeons and orthopedic neurosurgeons [18].

In this study, there were no significant differences among the various specialists in the knowledge of the pain localization and the duration of main complaints. In a similar study, the results were different in the relationship between doctor specialties and the rate of aberrant requests for MRI, so that the highest timely request was by the rheumatologists in the research conducted by Salari et al. in Shiraz [9]. In another study by Emery et al., the MRIs requested by neurosurgeons had the most indications [19]. It seems that further researches are needed to determine the role of specialization in aberrant requests. The mean duration of history taking was 3.9 minutes and the mean duration of clinical examination was 2.5 minutes. However, this rate was recorded approximately through the patients; this rate seems to be much less than the standard duration of history taking and physical examination. Numerous programs have been implemented and reviewed to solve this problem in different countries, such as training guidelines to physicians on imaging requests by Jayak et al. in 2005, which had no effect in reducing aberrant requests [11]. The other strategy was the refusal of insurance companies to pay for aberrant imaging requests, which had no effect in reducing aberrant requests in other performed studies [20]. At present, the most effective considered method is the use of imaging clinical decision support system that is one of new decisions in the field of healthcare in some countries. Many studies have been conducted to evaluate this method, such as a study by Black more et al. in 2011 who reported significant reduction in aberrant requests [21].

Given that these requests are higher in Iran than in other countries, practical and appropriate strategy is more essential to solve this problem.

Conclusion

The results of this study suggest that the large percentage of the spine MRI are requested without complete history taking and physical examination, causing enhanced aberrant requests as well as increased financial and emotional burden on health systems, insurance companies and patients. Fixing this problem requires a set of actions, including developing national guidelines, inclusion of these guidelines in educational system of medical students and doctors, informing amongst the general public that aberrant requests for para-clinical measures can also be harmful as much as no request,

encouraging patients to ask physicians about the impact of these measures on diagnostic and therapeutic processes and finally national legislation and insurance to monitor of reducing requests without indications.

Conflict of Interest

The authors declare no conflicts of interest.

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