

ROLE OF MAGNETIC RESONANCE IMAGING IN DETERMINATION OF SCIATIC NERVE COMPRESSION IN PATIENTS WITH BACKACHE AND SCIATICA

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ABSTRACT

BACKGROUND: Sciatic pain is low backache and pain radiating in the territory of sciatic nerve roots. It causes numbness, tingling, hot, cold sensations and hypersensitivity through the sciatic nerve pathway. There are many causes of sciatica. Aim of the study was to determine the most common cause of sciatic nerve compression using MRI in patients with backache and sciatica. **MATERIAL & METHODS:** Ninety-Eight (98) patients presenting with backache and sciatica that may be unilateral or bilateral. Magnetic Resonance Imaging was the modality of choice to determine the most common cause responsible for sciatic nerve compression. The study design that had been adopted was observational descriptive study. The data was taken from the Radiology Department of Sir Ganga Ram Hospital, Lahore from 1st august 2012 to 31th January 2013. **RESULTS:** The results shown that 97 (99%) patients had disc prolapse out of which 76 (76.8%) patients had disc bulges, 9 (9.1%) had disc protrusions, whereas 12 (12.1%) had disc extrusions whereas it is absent in 1 (1%) patient. Spondylosis was found in 14 (14.1%) patients, spinal stenosis in 27 (27.3%), degenerative disease in 23 (23.2%), thickened ligamentum flavum in 14 (14.1%), osteophytes formation in 13 (13.1%), spinal tumor in 6 (6.1%), infectious spine disease in 1 (1%) and other causes in 10 patients (spondylolisthesis in 5 (5.1%); retrolisthesis in 1 (1%); straightening of lumbar curve in 19 (19.2%); tarlov cyst in 3 (3%); limbus vertebra 1 (1%)). The mean age of female patients were 42.38 ± 12.172 years and male patients were 45.13 ± 13.751 years. **CONCLUSION:** It is concluded that the disc prolapse is the most common pathology responsible for the compression of sciatic nerve compression using MRI where as in disc prolapse disc bulge is the most common pathology than disc protrusion and disc herniation.

Keywords: Sciatica, Intervertebral Disc, Magnetic Resonance Imaging

Introduction

Lower backache is a common clinical problem and pain radiating to a lower leg is considered as the diagnostic hallmark of sciatica. Nerve entrapment and pressure is the sentinel reason for this neurological problem and disc bulge is the most common pathology responsible for sciatica. Since the introduction of magnetic resonance imaging (MRI), studies have shown many people without back

pain have disk bulges or protrusions but not extrusions. Literature is flooded with studies about role of MRI in lumbago from various corner of world; however, contribution from Pakistan is really negligible.¹ The present study was conducted to determine the most common cause of sciatic nerve compression using Magnetic Resonance Imaging in patients with backache and sciatica.

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Material and Methods

3.1 Study Population:

Study comprises the patients having backache and sciatica coming for MRI lumbosacral spine.

3.2 Study Design:

The study design that had been adopted was observational descriptive study. This study design describes the characteristics of existing phenomena. This was an observational study, which does not involve treatment or control group. It simply observes and interprets the phenomenon that is happening.

3.3 Setting:

The study was carried out in FMH College of Medicine & Dentistry, Shadman Lahore.

3.4 Study Duration:

The study duration was 6 months after the approval of synopsis from 1st August 2012 to 31th January 2013.

3.5 Sample size:

A Sample of one hundred (100) patients was initially recruited; Ninety-Eight (98) patients fulfilling the inclusive criteria were included in the study whereas two patients were in exclusive criteria. This number of sample was taken due to the inspiration from the first mention study in literature review that was conducted in Rawalpindi Pakistan with the sample size of one hundred (100) patients. (Fatima Farooq, Kiran, 2006)

3.5.1 Inclusive criteria:

Patients having backache and sciatica coming for MRI lumbosacral spine were included.

3.5.2 Exclusive Criteria:

Patients having backache without sciatica coming for MRI lumbosacral spine were excluded.

3.6 Sampling technique:

A consecutive sampling technique was used to collect data because the basic idea of sampling is the analysis of some of the elements in a population that provide useful information for the whole population.

3.7 Methodology:

Patients visited the setting for the MRI lumbosacral spine with the history of low back pain and sciatica that may be unilateral or bilateral. Toshiba (Excelart Vintage 1.5 T, Japan) MRI machine was used. Patients were screened for any metallic objects. Patients were Positionend supine on the couch with their knees elevated over a foam pad, for comfort and to flatten the lumbar curve so that spine lies near to the coil. Instructions were given to the patients to become immobilize during the scan. Patient was moved inside the gantry and start scan following Pulse sequences was applied:

Fast spin echo sequence with Saggital T1 & T2; Axial T1 & T2

After post processing and filming report was done by radiologist and data was gathered by a pre-designed Performa.

3.8 Operational Definitions of Variables:

Following were some of the operational definitions of variables

3.8.1 Sciatica:

Sciatic pain is low backache and pain radiating in the territory of sciatic nerve roots. It causes numbness, tingling, hot, cold sensations and hypersensitivity through the sciatic nerve pathway. Coughing, sneezing and constipation aggravate sciatica but temporarily alleviated by sitting and resting.

3.8.2 Intervertebral Disc:

It is regarded as semi-elastic discs, which lie between the rigid bodies of adjacent vertebrae. Their physical characteristics permit them to serve as shock absorbers. The anulus fibrosus is composed of fibrocartilage, in which the collagen fibers are arranged in concentric layers or sheets whereas nucleus pulposus in children and adolescents is an ovoid mass of gelatinous material containing a large amount of water, a small number of collagen fibers, and a few cartilage cells.

3.8.3 Magnetic Resonance Imaging:

MRI is a modality of imaging in which we get image by high magnetic fields and radiofrequency pulses. It is widely used for musculoskeletal imaging. Pace-

maker, surgical implants etc are some of its contra-indications.

3.9 Data Collection Instrument:

Pre-designed Performa will be used to gather the data.

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Performa

MR No: _____ Serial No: _____

MRI Date: ___/___/_____

Name: _____ Age: _____ Gender: Male/Female

Hospital: _____ Clinical history: _____

Sr #	MRI FINDINGS	YES	NO	REMARKS
1	Lumber Bulging Disc or Herniated Disc			
2	Lumber Spinal Stenosis			
3	Spondylosis			
4	Osteophytes Formation			
5	Hypertrophied Facet Joints			
6	Thickening Of Ligamentum Flavum			
7	Degenerative Disease			
8	Spinal Tumor			
9	Infectious Spine Disease			
10	Other:			

Causes of Sciatica found: _____

Figure 3.1: Data Collection Instrument

3.10 Data Analysis:

Data was entered and analyzed using SPSS 17.0. (SPSS Inc. Chicago, USA). The continuous variables are expressed in the form of Mean ± SD, whereas categorical variable in the form of frequency and proportion.

Results

Initially One Hundred (100) were planned to recruit but only Ninety eight (98) patients fulfilling the criteria were included in the study. Out of ninety eight patients Fifty two (52) were females and forty six (46) were

males. The mean age of female patients were 42.38 ± 12.172 years and male patients were 45.13 ± 13.751 years shown in (Tab. 4.1).

	Sex of Patient	N	Mean	Std. Deviation
Age of Patients	Female	52	42.38	12.172
	Male	46	45.13	13.751

Table 4.1: Mean age of patients according to the gender

Out of 98 patients 52 (52.5%) patients presented with unilateral sciatica while 46 (46.5%) had bilateral sciatica as shown in (Tab. 4.2) & (Fig. 4.1).

	Frequency	Percent
Unilateral	52	52.5
Bilateral	46	46.5

Table 4.2: Frequency distribution of Sciatica

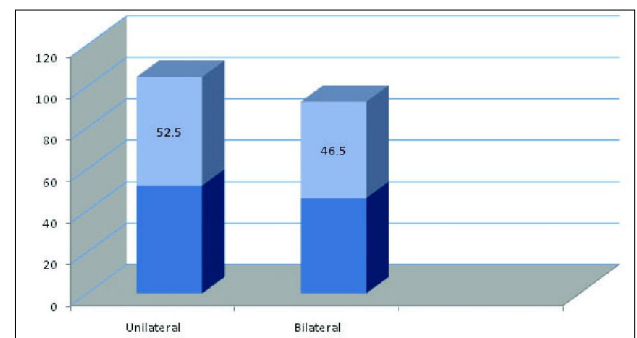


Figure 4.1: Frequency Distribution of Sciatica

The results shown that 97 (99%) patients had disc prolapse out of which 76 (76.8%) patients had disc bulges, 9 (9.1%) patients had disc protrusions whereas 12 (12.1%) patients had disc extrusions whereas it is absent in 1 (1%) patient as shown in (Tab. 4.3) & (Fig. 4.2).

	Frequency	Percent
Disc Bulge	76	76.8
Protrusion	9	9.1
Extrusion	12	12.1
No	1	1.0

Table 4.3: Frequency distribution of Disc Prolapse

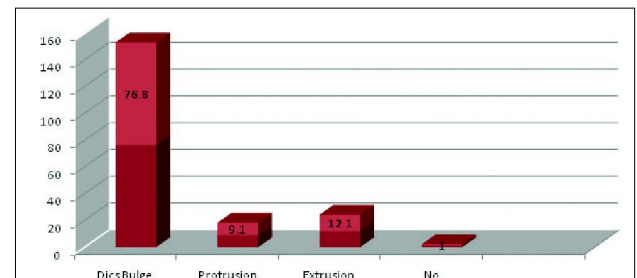


Figure 4.2: Frequency distribution of disc prolapse

It was also noted that there were also some other causes which involved in sciatic nerve compression. Spondylosis was found in 14 (14.1%) patients, spinal stenosis in 27 (27.3%), degenerative disease in 23 (23.2%), thickened ligamentum flavum in 14 (14.1%), osteophytes formation in 13 (13.1), spinal tumor in 6 (6.1%), infectious spine disease in 1 (1%) and other causes in 10 patients (spondylolisthesis in 5 (5.1%); retrolisthesis in 1 (1%); straightening of lumbar curve in 19 (19.2%) ; tarlov cyst in 3 (3%); limbus vertebra 1 (1%)) shown in (Tab. 4.4) & (Fig. 4.3).

Causes	Frequency
Disc Prolapse	97
Spondylosis	14
Spinal Stenosis	27
Degenerative Disease	23
Thickened ligamentum flavum	14
Osteophytes formation	13
Spinal Tumor	6
Infectious Spine Disease	1
Others	10

Table 4.4: Frequency Distribution of Causes found

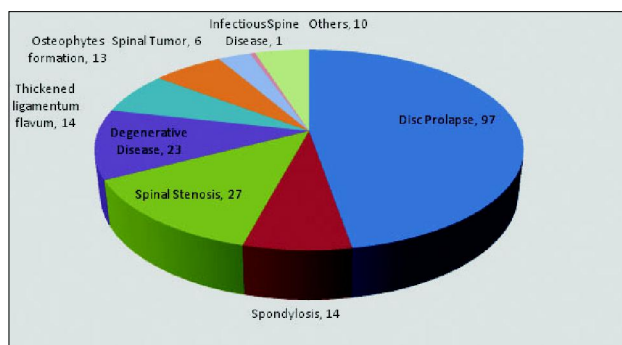


Figure 4.3: Causes of Sciatic nerve compression on MRI in pie chart

Discussion

Sciatic pain is low backache and pain radiating in the territory of sciatic nerve roots. The majority of cases of sciatic pain are due to prolapsed intervertebral disc. It causes numbness, tingling, hot and cold sensations and hypersensitivity through the sciatic nerve pathway. Coughing, sneezing and constipation aggravate sciatica but temporarily alleviated by sitting and resting.² MRI is considered as the imaging modality of choice for diagnosis and follow-up of musculoskeletal disorders including sciatica.³

This study is supported by a previous study from Pakistan¹ to determine the cause of sciatica with the sample size of one hundred (100) patients presenting with unilateral or bilateral sciatica. They considered disc prolapse, hypertrophied facet joints, thickened ligamentum flavum and osteophytes formation as anatomical factors responsible for sciatica and they found prolapsed disc (71%) as the most common cause of sciatic pain, out of these cases disc bulge was found in 50% patients, protrusion and herniation in 37% and extruded disc fragments in 7%. Osteophytes and hypertrophied facet joints were seen in 7% whereas thickened ligamentum flavum were in 22% patients. In that study, maximum numbers of patients (38%) were in their 4th decade of life i.e. 31-40 years of age. 31% belonged to the 41-50 years age bracket. Only one patient presented in the 7th decade of life. Mean age of presentation was 41.45 years with standard deviation of 9.4.⁸ Also the patients were between 20-70 years of age, 67 of them were males while 33 were females. In our study, prolapsed disc was also the most common cause of sciatica 97(99%), out of these cases disc bulge was found in 76 (77%) patients, disc protrusion in 9 (9.1%) and disc extrusion in 12 (12.1%). Whereas some other factors like spondylosis was found in 14 (14.1%) patients, spinal stenosis in 27 (27.3%), degenerative disease in 23 (23.2%), thickened ligamentum flavum in 14 (14.1%), osteophytes formation in 13 (13.1), spinal tumor in 6 (6.1%), infectious spine disease in 1 (1%) and other causes in 10 patients (spondylolisthesis in 5 (5.1%); retrolisthesis in 1 (1%); straightening of lumbar curve in 19 (19.2%) ; tarlov cyst in 3 (3%); limbus vertebra 1 (1%)). The main factors responsible for the differences in the value of causes were the mean ages of the patients and number of male and female patients. Mean ages of this study for males and females were 45.13 ± 13.751 and 42.38 ± 12.172 respectively whereas in this study male patients were 46 and female patients were 52 as shown in (Tab. 4.1).

Conclusion

It is concluded that the disc prolapse is the most common pathology responsible for the compression

of sciatic nerve compression using MRI whereas among disc prolapse; disc bulge is the most common pathology.

References

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