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TO STUDY THE CONCORDANCE BETWEEN CLINICAL AND MRI FINDINGS IN PATIENTS WITH SCIATICA IN A MILITARY SETTING

Surgery

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ABSTRACT

Introduction: Sciatica, a radiculopathy arises when one or more lumbosacral nerve roots become compressed and can lead to radiating leg pain to lower limbs as well as sensory or motor deficits in some cases. The most common cause of sciatica is intervertebral disc herniation. **Aim:** To evaluate patients with sciatica and assess the concordance between their clinical and MRI findings. Materials and methods: An observational prospective study was conducted from May 2021 to May 2023, with 200 patients with sciatica reporting to a military hospital. The individual data were collected by a proforma and patients were evaluated with a thorough history, physical examination, and radiological findings in of MRI spine. **Results:** A 100% percent correlation between MRI and clinical findings was seen. A statistically significant association was found between range of movement and any of the MRI findings; between side of sciatica and pattern of disc involvement in MRI; and between duration of symptoms and grade of disc bulge on MRI. No statistically significant association was found between clinical findings of the side of sciatica and disc bulging in MRI. There was no significant association between clinical and MRI findings with; gender, height, or weight of the patients. **Conclusion:** Low back pain with sciatica is an extremely common condition. The diagnosis of sciatica is complex and multifactorial. Clinical findings correlate well with MRI findings, but all MRI abnormalities need not have a clinical significance.

KEYWORDS

Sciatica, PIVD, MRI, Military

INTRODUCTION:

Sciatica is shooting pain that radiates down the leg, caused by irritation of the main nerve of the lower limb; the Sciatic nerve. There may be tingling, numbness, and weakness of the lower leg muscles. It is one of the common reasons why patients seek medical attention. The most common cause is PIVD. If a part of the fibrous outer ring of the disc is weak, the softer center composed of the nucleus pulposus may push it through to press against a nerve root to cause symptoms (Pearce, 2007). A rare, but potentially devastating complication is Cauda equina syndrome, causing loss of bladder and bowel control, saddle anaesthesia, and sexual dysfunction, due to the involvement of cauda equina, which has multiple sacral and lumbar nerve roots (Heliövaara et al., 1987). This study focuses on patients with sciatica caused by lumbar disc herniation.

MRI provides a non-invasive modality for viewing various pathological and anatomical changes in the spine. However, the clinical relevance of intervertebral disc bulges in MRI is still controversial. Even though MRI is done as a routine for patients with LBA and sciatica with a suspected PIVD, surgeons are not sure that, which of these MRI findings are clinically and surgically relevant. Loss of disc height or abnormal signal intensity is very highly predictive of symptomatic tears and the presence of a disc bulge or protrusion does not have additional significance (Fardon & Milette, 2001). The presence of disc extrusion and severe nerve root compression at one or multiple sites is strongly associated with distal leg pain (Beattie et al., 2000). However, another study suggested that pain is not a fair predictor of nerve compression on MRI with unsatisfactory correlation (Rankine et al., 1998). It was also found that MRI findings was not very predictive of the development or duration of LBA and that clinical correlation is required (Borenstein et al., 2001). So, there are still many unanswered queries: Is MRI required in all patients with LBA? If an MRI is done, then which findings are clinically significant, and which findings are important from the management point of view? So, in this study we have attempted to draw concordance between clinical findings and MRI findings in patients with sciatica.

AIM:

- To evaluate patients with sciatica and assess the concordance between their clinical and MRI findings

OBJECTIVES:

- To assess the clinical findings in patients with sciatica.
- To study the pattern of MRI findings in patients with sciatica.
- To study the extent of concordance between clinical findings and MRI findings.

MATERIALS AND METHODS:

Type: Observational prospective study.

General Setting: The study was conducted in a military hospital for 24 months (May 2021- May 2023)

Sample Size: A total of 200 patients were evaluated.

Statistical Analysis:

Data collected as per proforma was applied on the master sheet of Microsoft Excel and was analyzed using OpenEpi software.

Inclusion Criteria:

- 200 patients with clinical features of sciatica.

Exclusion criteria:

- All patients with LBA alone, with no sciatica.
- All patients with claudication and no sciatica.
- All patients with a contraindication to undergo MRI.

METHODOLOGY:

A detailed proforma was used to record information after history taking, duration of illness, anthropometric measurements, and thorough physical examination. All patients were then subjected to an MRI LS spine and radiological findings were noted down (Table 1). The concordance between clinical and radiological findings was statistically analyzed.

OBSERVATIONS AND RESULTS:

To summarise the results:

- More male patients (77.5%) presented with sciatica as compared to (22.5%) females.
- Most patients were in the age group of 30-40 years (37%), followed by 20-30 years (18%),40-50 years (16%),50-60 years (13%) and > 60 years (7.50%).
- Most patients with sciatica were of height 170-180cm (37.50%), followed by 160-170 cm (31.50%),150-160cm (31.5%), <150 cm (3.5%) and >180cm (1.0%).
- 93.5% of patients had a decreased range of movement compared to 6.5 % of patients with a normal range of movement.
- 27.5% of patients with sciatica had a bilateral presentation, 37.5% had right sciatica and 35% had left sciatica.
- 55.5% of patients were suffering from sciatica for > 06 months duration and 44.5 % of patients for <06 months.
- 74.5 % of patients with sciatica had focal and 25.5 % had diffuse disc bulges on MRI evaluation.
- 42% of patients with sciatica had central, 52 % had paracentral and 6 % had lateral disc involvement on MRI.
- 91 patients with sciatica had Grade 1, 70 patients had Grade 2, and 39 patients had Grade 3 compression on MRI.
- 13 % of patients were found to have lumbar canal stenosis on MRI.
- 10.5 % had L3/L4, 40.5% had L4/L5 and 49% had L5/S1 segment of vertebral disc involvement.

- No statistically significant association was found between clinical findings, MRI findings, and the gender, weight, and height of the patients.
- A 100 % correlation between MRI findings and clinical findings was seen in our study, suggestive of the high sensitivity of the imaging modality. (Table 2)
- A statistically significant association was found between the range of movement and any of the MRI findings (P value .0002). (Table 3)
- No statistically significant association was found between the side of sciatica and the side of the disc bulge in MRI (P value .64, z score-0.51). (Table 4)
- A statistically significant association was found between the side of sciatica and the pattern of disc involvement in MRI (P value .0001, Z score 5.2). (Table 5)
- A statistically significant association was found between the duration of symptoms and the grade of disc bulge on MRI(P value .01). (Table 6)

Table 1: Parameters Analysed

Parameter	Number Of Patients	Percent (%)
Gender:		
Male	45	22.5
Female	155	77.5
Age(yr) :		
<20	3	1.5
20-30	36	18
30-40	74	37
40-50	32	16
50-60	26	13
>60	15	7.5
Height(cm):		
<150	07	3.5
15-160	51	25.5
160-170	63	31.5
170-180	75	37.5
>180	02	01
Weight (kg):		
Less than 50	148	74
More than 50	52	26
Range of motion:		
Decreased	187	93.5
Normal	13	6.5
Side of Sciatica:		
Bilateral	55	27.5
Right	75	37.5
Left	70	35
Duration of symptoms:		
Less than 6 months	89	44.5
More than 6 months	111	55.5
Degree of disc bulge in MRI:		
Diffuse (>30%)	51	25.5
Focal (<30%)	149	74.5
The pattern of disc bulge:		
Central	84	42
Paracentral	104	52
Lateral	12	6
Grades of involvement:		
Grade I	91	45.5
Grade II	70	35
Grade III	39	19.5
Lumbar canal stenosis:		
Present	26	13
Absent	174	87
MRI and level of disc involved:		
L3-L4	21	10.5
L4-L5	81	40.5
L5-S1	98	49

Table 2: Correlation Between MRI Findings And Clinical Findings

Findings	Clinical	Percent
MRI	187	100%

Table 3: Correlation Of Sciatica With Clinical Findings (ROM) And MRI Finding

Findings	Clinical findings	MRI findings
Present	187	200
Absent	13	0
Total	200	200
Chi square=17.75	P value	0.0002

Table 4: Correlation Between Side Of Sciatica And Side Of Disc Bulge In MRI

Findings	Clinical findings	MRI findings	Percentage difference
Unilateral (focal)	145	149	2.5%
Bilateral (diffuse)	55	51	2.5%
Total	200	200	
Z score	0.64	P value	0.51

Table 5: Correlation Between Side Of Sciatica And Pattern Of Disc Bulge In MRI

Findings	Clinical findings	MRI findings	Percentage difference
Paracentral and lateral	145	116	14.5%
Central	55	84	14.5%
Total	200	200	
Z score=	5.2		
P value	0.0001		

Table 6: Correlation Between Duration Of Symptoms And Grade Of Bulge Disc On MRI

Duration	Grade1	Grade2	Grade3	Total
<06 months	37	40	12	89
>06 months	54	30	27	111
Total	91	70	39	200
Chi-square	8.05	P value	0.01	

DISCUSSION:

Sciatica is a common illness presenting to general and neurosurgery departments. It has prolonged morbidity, decreased work efficiency, and psychological effects on the patients. The clinical assessment, investigations, and whether to go for a conservative approach or surgical intervention is still a challenge.

In our study, more males presented with sciatica (77.5%) as compared to females (22.5%). The reason for this could be that, our study population includes more serving soldiers. A study done on 2946 women and 2727 men showed neither gender nor body mass influenced the development of sciatica (HELIÖVAARA et al., 1991).

No statistically significant relation was established in this study, with patient's demographic profile (age, sex, and weight) and their clinical vs MRI findings. No significant association was found between the clinical side with quantification of disc bulge(large/small) suggesting that the symptom of a patient does not depend on the size of the disc bulge. Small disc bulges may have severe symptoms and vice versa. It may be due to the dynamic compression which occurs when the patient does some activity; so, the actual compression occurs at the time of activity, whereas MRI measures the static fraction only.

In this study, most patients with sciatica were of height 170-180 cm (37.50%), followed by 160-170cm (31.50%), 150-160(31.5%), <150(3.5%), >180 (1.0%). So, height has a direct correlation with symptoms, possibly due to effective overload on the spine of these patients. In a similar study it was found that there was an increasing risk for sciatica in taller individuals. They also reported that the peak age for acute sciatica was 45-64 years (Koes et al., 2007). But in our study, the maximum patients with sciatica were of 30-40 years (37%), followed by 20-30 years (18%), 40-50 years (16%), 50-60 years (13%) and > 60 years (7.50%). This could be biased due to the work culture in the military, where more young soldiers are involved in heavy-duty jobs and lifting heavy weights whereas the seniors do light-duty jobs. A case-control study found that the highest risk for the prolapsed lumbar disc was associated with jobs involving lifting objects of more than 11.3 kg with the body usually twisted and the knees not bent (Kelsey et al., 1984).

In our study 27.5% of patients with sciatica have a bilateral presentation, 37.5% have right sciatica and 35% have left sciatica. Overall, the unilateral presentation is more common which again confirms that wrong posturing and weight bearing on a twisted spine

results in sciatica. The findings are consistent with current available data (*Sciatica | NEJM*, n.d.).

In our study, it was observed that 45.5% of patients had sciatica of >06 months duration and 54.5% had < 06 months duration and there was significant association between the duration of symptoms and the grade of disc bulge on MRI. This suggests that patients presenting with prolonged symptoms are more likely to have findings on MRI.

A study of Diagnosis and Treatment of Acute Low Back Pain explains why imaging is not warranted for most patients with acute low back pain. Without significant signs and symptoms indicating a serious underlying condition, imaging does not improve clinical outcomes in these patients. Even with a few weaker red flags, four to six weeks of treatment is appropriate before consideration of imaging studies (Casazza, 2012).

In this study, a significant association was found between the range of movement clinically and MRI findings (P value-0.0002). The specificity of MRI increases as the grade of restriction keeps on increasing. Andrade studied the potential role of sciatic nerve stiffness in the limitation of maximal ankle range of motion and disproves the long-held belief that maximal joint range of motion (ROM) is restricted by muscle tension (Andrade et al., 2018). A similar trend was observed in our study, where 93.5% of patients had a decreased range of movement as compared to 6.5 % having a normal range of movement.

In this study, 74.5 % of patients with sciatica had focal and 25.5 % had diffuse disc bulges on MRI. 42% patients of with sciatica had central, 52% had paracentral and 6% had lateral disc involvement on MRI. 93% of patients with sciatica had grade 1, 83% had grade 2 and 12% had grade 3 compression on MRI. 13 % patient of sciatica had lumbar canal stenosis on MRI. In a study by A el Barzouhi et al (Influence of Low Back Pain and Prognostic Value of MRI in Sciatica Patients in Relation to Back Pain | PLOS ONE, n.d.), of the 379 included sciatica patients, 42% had disabling back pain. Of the patients with both sciatica and disabling back pain, only 68% revealed a herniated disc with nerve root compression on MRI, whereas in patients with predominant complaints of sciatica,88% had corroborative findings on MRI (P<0.001). In another study, correlation between clinical features and MRI findings in lumbar disc prolapse was studied on 119 clinically diagnosed patients with lumbar disc prolapse. The presence of centrolateral protrusion or extrusion with gross neural foramen compromise correlated with clinical signs and symptoms very well, while central bulges and disc protrusions correlated poorly with clinical signs and symptoms (Janardhana et al., 2010). In our study, we found that almost all patients with clinical findings had corroborative MRI findings. A significant association was found between history and clinical findings, with the side of the disc bulge in MRI. It means that if any patient complains of unilateral radicular symptoms there are more chances that the same side will show disc bulge and compression on MRI. Specificity also increases with unilateral findings.

CONCLUSION:

Low back pain with sciatica is an extremely common condition. The diagnosis of sciatica is complex and multifactorial. Most cases of sciatica can be managed conservatively for 6-8 weeks. If there is no improvement or the patient has red flag signs of neural compression then, evaluate further with MRI. Confirmation of the diagnosis is done with MRI, which is a very sensitive modality; but all MRI findings may not have a clinical significance. The chances of significant PIVD are high when; there are clinical findings of reduced motion; long duration of symptoms (>6months); side of sciatica correlates with pattern of disc bulge; and neural foramen compromise on MRI. This correlation between clinical findings and MRI findings is even more important in a military setting, to avoid malingering by the soldiers to avoid hard duties and get sheltered appointments.

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Author contributions: Both authors contributed equally.

Abbreviations:

PIVD- Prolapsed intervertebral disc, MRI- Magnetic Resonance Imaging, LBA- low backache

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