ORIGINAL ARTICLE

Magnetic Resonance Imaging (MRI) Diagnostic Accuracy in Acute Spinal Column Injuries

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ABSTRACT

Background: Road side accidents, fall from high altitude and gun shots etc. can lead to the severe, life threat alarming spinal cord damages. Magnetic Resonance Imaging plays an important role in the assessment of spinal injuries. The spinal cord injuries can be detected by MRI technique.
Aim: To establish diagnostic accuracy of MRI in acute spinal column injuries so that neurosurgical professionals could be provided with a non-invasive valuable tool for preoperative diagnosis and planning of different spinal cord injuries.
Methods: A total of 38 patients of acute spinal injury and age 20-40 years of either gender were included in the study. Patients with h/o degenerative or metastatic spinal injury were excluded. All the patients were then underwent MRI of the spinal column. The MRI findings were recorded as positive and negative for any spinal injury. Magnetic resonance imaging findings were correlated with operative findings which were performed in neurosurgery ward.
Results: Mean age was 28.35±7.67 years. Out of these 38 patients, 81.58% were male and 18.42% were females with ratio of 4.4:1 MRI supported the diagnosis of acute spinal column injury in 29 patients, out of which, 28 (True Positive) had spinal column injury and 01 (False Positive) had no spinal column injury on operation. The sensitivity, specificity, predictive values, and diagnostic accuracy of MRI in acute spinal column injury was 96.55%, 88.89%, 96.55%, and 94.74% respectively.
Conclusion: This study concludes that magnetic resonance imaging (MRI) is a highly sensitive and accurate non-invasive modality, and has dramatically improved our ability of diagnosing acute spinal column injuries.
Keywords: CST-Corticospinal Tract , MRI- Magnetic Resonance Image, SCI- Spinal Cord injury,

INTRODUCTION

Road side accidents, fall from high altitude and gun shots etc. can lead to the severe, life threat alarming spinal cord damages. Magnetic Resonance Imaging plays an important role in the assessment of spinal injuries. The spinal cord injuries can be detected by magnetic resonance imaging technique. This study was conducted to establish diagnostic accuracy of MRI in acute spinal column injuries so that neurosurgical professionals could be provided with a non-invasive valuable tool for preoperative diagnosis and planning of different spinal cord injuries. The spinal cord is a long, having a bundle of neurons ,that originates from the brain .It is about 18 in male and about 17 in long in female. The spinal cord has a varying width, ranging from ½ inch thick in the cervical and lumbar regions to ¼ inch thick in the thoracic area[1,2,3]. A total of 38 patients of acute spinal injury and age 20-40 years of either gender were included in the study. Patients with h/o degenerative or metastatic spinal injury were excluded. All the patients were then underwent MRI of the spinal column. The MRI findings were recorded as positive and negative for any spinal injury. Magnetic resonance imaging findings were correlated with operative findings which were performed in neurosurgery ward.

The objective of the study was to establish the diagnostic accuracy of magnetic resonance imaging (MRI) in acute spinal column damages taking operative findings as gold standard.

MATERIAL & METHODS

This study is descriptive and Cross-sectional conducted in the Department of Diagnostic Radiology, Nishtar Hospital, Multan from 15th October 2015 to 14th April 2016. Sample size was 38 cases with 95% confidence level, expected prevalence of spinal column injury as 71% with sensitivity of 93%, specificity 98% of magnetic resonance imaging in diagnosing acute spinal column injury. Non-probability, consecutive sampling was used.

RESULTS

Age range in this study was from 20-40 years with mean age of 28.35±7.67 years. Majority of the

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patients 55.26% were between 21 to 30 years of age as shown in Table I. Out of these 38 patients, 31(81.58%) were male and 7(18.42%) were females with ratio of 4.4:1. The mean duration of injury was 4.98±3.84 days (Table II).

All the patients were subjected to magnetic resonance imaging of the affected site of spine. Majority of the patients i.e., 42.11%, presented with lumbar spine injury followed by cervical injury. MRI supported the diagnosis of acute spinal column injury in 29 (76.32%) patients. Operative findings confirmed acute spinal injury in 29(76.32%) cases where as 9(23.68%) patients revealed no spinal column injury. In MRI positive patients, 28(73.68%) (True Positive) had spinal column injury and 1(2.63%) (False Positive) had no spinal column injury on operation. Among, 09 MRI negative patients, 01 (False Negative) had spinal column injury on operation where as 08 (True Negative) had no spinal column injury on operation (p=1.000) as shown in Table III.

The sensitivity, specificity, predictive value, and diagnostic accuracy of MRI in acute spinal column injury was 96.55%, 88.89%, 96.55% and 94.74% respectively.

Table-I: %age of patients according to Age distribution.

Age (years)	n	%age
20-25	07	18.42
26-30	14	36.84
31-35	11	28.95
36-40	06	15.79

Mean ± SD = 28.35 ± 7.67 years

Table-II: %age according to duration of injury (n=38).

Duration of injury (days)	Frequency	%age
0 - < 7 days	27	71.05
>7 - <14 days	11	28.95

Mean ± SD = 4.98 ± 3.84 days

Table-III: Summary of Results.

	+ve result on MRI	-ve result on MRI
Positive on operation	28 (TP)*	01 (FN)***
Negative on operation	01 (FP)**	08 (TN)****

-TP=True positive **-FP=False positive *-FN=False negative ****-TN=True negative*

DISCUSSION

All the patients were subjected to magnetic resonance imaging of the affected site of spine. Majority of the patients i.e., 42.11%, presented with lumbar spine injury followed by cervical injury. MRI supported the diagnosis of acute spinal column injury in 29(76.32%) patients. Operative findings confirmed acute spinal injury in 29(76.32%) cases where as 09 (23.68%) patients revealed no spinal column injury. In MRI positive patients, 28(73.68%) (True Positive) had spinal column injury and 1(2.63%) (False Positive) had no spinal column injury on operation. Among, 9 MRI negative patients, 1 (False Negative) had spinal column injury on operation whereas 8 (True Negative) had no spinal column injury on operation (p=1.000).The sensitivity, specificity, predictive value, and diagnostic accuracy of MRI in acute spinal column injury was 96.55%, 88.89%, 96.55% and 94.74% respectively. Age range in this study was from 20-40 years with mean age of 28.35±7.67 years. Majority of the patients 55.26% were between 21 to 30 years of age, Out of these 38 patients, 31(81.58%) were male and 7(18.42%) were females with ratio of 4.4:1. The mean duration of injury was 4.98±3.84 days. Approximately 40,000 injuries to the spinal column occur in the United States each year[4, 5,6]**.** Early detection often leads to prompt and accurate diagnosis, expeditious management, and avoidance of unnecessary procedures[7,8,9,10].

CONCLUSION

This study concludes that magnetic resonance imaging (MRI) is a highly sensitive and accurate non-invasive modern technique, and has dramatically enriched our capability of diagnosing acute spinal column injuries Preoperative MRI must be advised in every patient with suspicion of spinal column injury for proper pre-operative diagnosis and planning.

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