



ROLE OF MRI IN EVALUATION OF BRACHIAL PLEXUS PATHOLOGIES

Radio-Diagnosis

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ABSTRACT

MRI is an important noninvasive imaging modality which has a very high sensitivity due to its excellent soft tissue resolution. The objective of the study is to evaluate the traumatic and non-traumatic causes of brachial plexus pathologies of the upper limb like involvement of the roots, trunks, divisions, cords by Pancoast tumor, trauma, radiation plexitis, inflammatory plexitis, thoracic outlet syndrome, metastatic infiltration, lymphoma, nerve sheath tumour exiting nerve root compression and iatrogenic injury, to study the various MRI appearances of the above mentioned causes, to evaluate the extent of the cause and its relationship to adjacent structures, to compare CT findings with pathological findings where ever possible, to study the limitations if any, in the MRI in evaluation of radiating upper limb pain. **Aims & Objectives:** To study the various MRI appearances of traumatic and non-traumatic brachial plexus pathology. **Methodology:** The study included of 30 patients referred to department of radiodiagnosis with traumatic and non-traumatic pathologies of brachial plexus over a period of 18 months. All patients were subjected to MRI using 1.5T philips achieve MRI machine. **Results:** 30 patients who were clinically suspected of brachial plexus pathology were subjected to MRI imaging. Among these 30 patients, in general, patients in the middle age group constituted 62% of the total study group, with an overall slight male predominance 77%. Most common clinical presentation was unilateral upper limb weakness 66%. **Conclusion:** MRI has become increasingly important in the evaluation of brachial plexus pathology, owing to the improved soft tissue resolution with MRI not only can the nerve roots of the brachial plexus be visualized but also the trunks, divisions, cords and also characteristics such as course, caliber, signal intensity, fascicular pattern and size can be better evaluated. Additionally improved size tissue differentiation allows for improved detection of intrinsic and extrinsic pathology. MRI also has the additional benefit for multiplanar imaging.

KEYWORDS

INTRODUCTION

Brachial plexus is the main sensory and motor innervation of the upper limb. Brachial plexus is formed by the ventral rami of C5-C8 and T1 nerve roots. Brachial plexopathies often present with vague symptoms. Clinical examination and electrophysiological studies are useful but may not localize the lesion accurately. MRI has a multiplanar imaging capability and soft tissue contrast resolution and plays an important role in evaluation of abnormal brachial plexus. Plain radiography can depict large lesions affecting the brachial plexus or the presence of fractures in the setting of trauma. However, radiographs are far less sensitive than other studies. CT offers poor soft tissue contrast for direct evaluation of the nerves of the brachial plexus.

Detailed study of the brachial plexus is made possible by the direct multiplanar capability of MR imaging and its superior soft-tissue contrast resolution. Furthermore, the brachial plexus is relatively fixed and thus minimal image degradation, from respiration occurs. (1). MR findings correlate well with findings at surgery and on clinical follow-up (2). MRI can provide useful guidance in the waiting period prior to surgical exploration after brachial plexus injury (3). Appropriate treatment of brachial plexus injury depends on determining whether or not nerve root avulsion has occurred. (4). The multiplanar capability and excellent soft-tissue contrast of MR imaging allow differentiation of nerve tissue from adjacent fat, muscle, blood vessel, and tumor, permitting precise diagnosis of BP disorders. Unlike in computed tomography (CT), intravenous contrast material is not required. Normal nerve roots, trunks, and cords show uniform caliber, have intermediate signal (5)

METHODOLOGY

This study on "ROLE OF MRI IN EVALUATION OF TRAUMATIC AND NON TRAUMATIC PATHOLOGIES OF BRACHIAL PLEXUS" has been carried out in the Department of Radio-diagnosis, Mahadev Appa Rampure Medical College, Kalaburagi. A total number of 30 patients with clinical and laboratory features suggestive of brachial plexus pathologies of all age groups and either sex referred to the Department of Radiodiagnosis over a period of 18 months i.e. between 1st March 2022 to 31st august 2023 were included in this study. The study protocol was approved by the ethical committee. All the patients gave informed consent to participate in the study.

MRI was performed by using Philips Achieva 1.5 Tesla MRI machine.

Inclusion Criteria:

Patients of all age groups with

- 1) Clinically suspected brachial plexus pathology
- 2) Upper limb peripheral neuropathy
- 3) Radiating upper limb pain
- 4) Traumatic upper limb injury

Exclusion Criteria:

Any contraindication for MRI like non compatible implants, claustrophobia

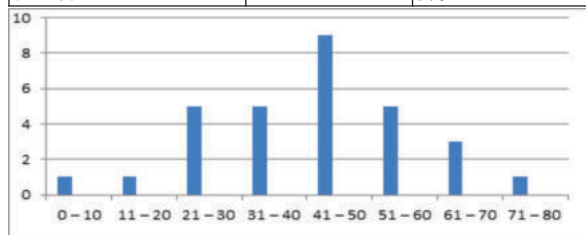
RESULTS:

Of the 30 patients who underwent MRI during the study,

- 15 patients had traumatic brachial plexus injury
- 4 patients had Brachial plexitis
- 3 patients had Cervical rib
- 2 patients had Lymph node mass
- 2 patients had Neurofibroma
- 2 patients had Pancoast tumor
- 2 patients had Schwannoma

Table – 1 : Age Distribution

Age in years	No. of patients	Percentage
0 – 10	1	3%
11 – 20	1	3%
21 – 30	5	16%
31 – 40	5	16%
41 – 50	9	30%
51 – 60	5	16%
61 – 70	3	10%
71 – 80	1	3%



Graph-1 : Age distribution

Age distribution of 30 patients with clinically suspected brachial plexus pathology were divided accordingly. The maximum number of patients in our study were from age group 41 to 50 years.

Table – 2 : Sex Distribution

Sex	No. of patients	Percentage
Male	23	77%
Female	7	23%
Total	30	100%

Of the 30 patients with brachial plexus pathology, 23(77%) were male and 7(23%) were female.

Graph-2 : Sex distribution

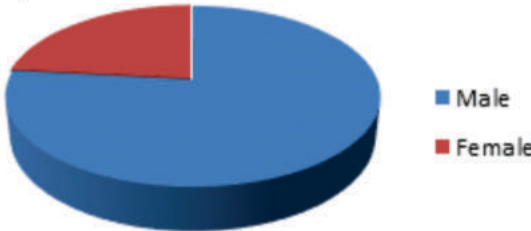


Table – 3 : Distribution Of Patients Based On Clinical Symptoms

Symptoms	No. of patients	Percentage
Unilateral limb weakness	20	66%
Unilateral upper limb radiating pain	6	20%
Bilateral upper limb radiating pain	4	13%

The most frequent clinical presentation was found to be unilateral limb weakness in 20 (66%) patients followed by unilateral limb pain in 6(20%) and 4(13%)cases presented with bilateral limb pain.

Graph-3 : Clinical Symptoms

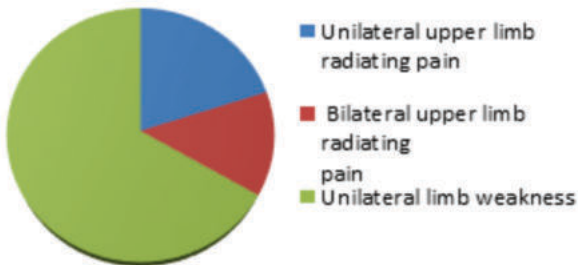


Table – 4 : Distribution Of Causes Of Upper Limb Weakness

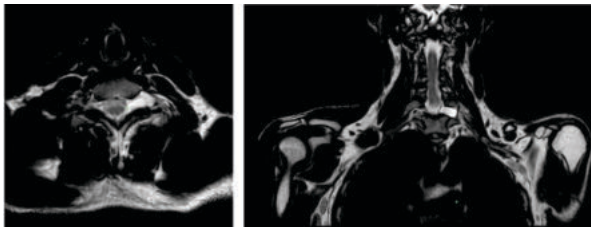
Causes	No. of patients	Percentage
Traumatic brachial plexus Injury	13	43%
Brachial plexitis	2	6%
Cervical rib	1	3%
Lymph node mass	1	3%
Neurofibroma	1	3%
Pancoast tumor	1	3%
Schwannoma	1	3%

Table 5- Distribution Of Causes Of Unilateral And Bilateral Upper Limb Pain

Causes	No.of patients	Percentage
Brachial plexitis	2	6%
Brachial plexus injury	2	6%
Cervical rib	2	6%
Lymph node mass	1	3%
Neurofibroma	1	3%
Pancoast tumor	1	3%
Schwannoma	1	6%

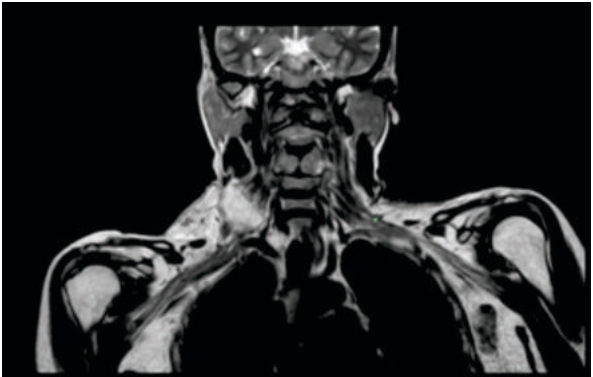
Case Illustrations

Case – 1 :



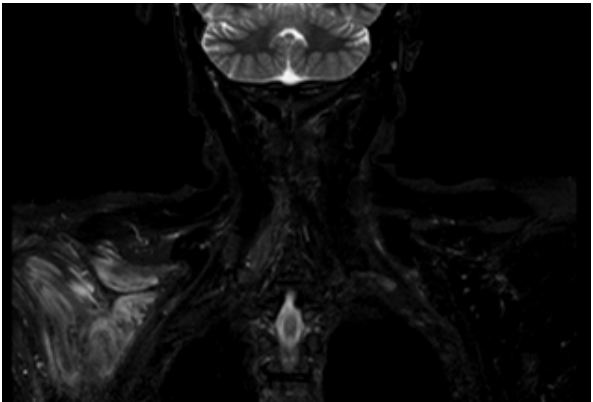
T2 Axial And Coronal: Showing Pseudomenigocele Formation At C7-t1 Intervertebral Disc Level.

Case 2:



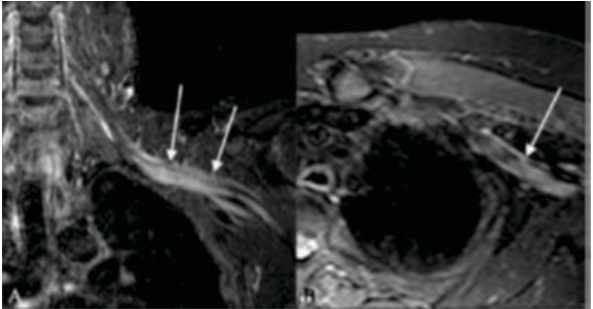
T2 coronal section showing complete laceration of post ganglionic nerve roots and trunks

Case 3



STIR coronal image shows edema involving left supraspinatus, infraspinatus and subscapularis suggesting subacute denervation in a case of right brachial plexus injury

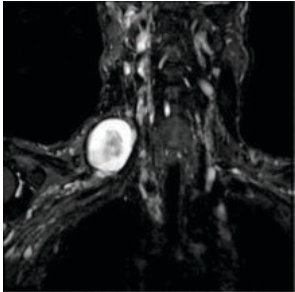
Case: 4



MRI Brachial plexus neuritis

STIR coronal and coronal oblique images of the same patient shows hyperintensity noted in the cords of brachial plexus on left side – Brachial plexus neuritis.

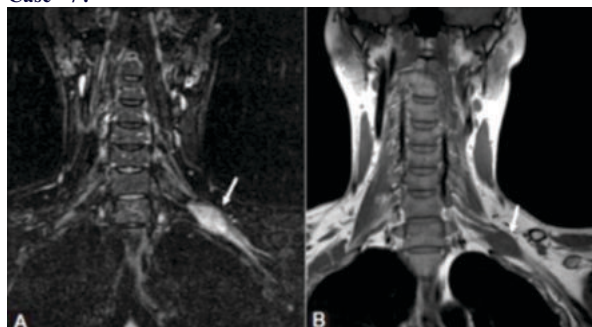
Case – 5 :



STIR Coronal Neurofibroma

Case – 6 :**STIR coronal STIR sagittal**

STIR coronal image of the same patient shows altered signal intensity mass lesion in the right upper lobe involving the cords of brachial plexus on right side – Pancoast tumor. STIR sagittal image of the same patient shows hypointense mass lesion in the right upper lobe involving the cords of brachial plexus on right side – Pancoast tumor.

Case – 7 :

STIR coronal image – of the same patient shows hyperintense lesion involving the cords of left brachial plexus & T1 coronal image of the same patient shows isointense lesion involving the cords of left brachial plexus - Schwannoma.

DISCUSSION

diagnosing brachial plexus pathology can be clinically challenging, often necessitating further evaluation with MRI. Owing to its vague symptomatology, uncommon nature, and complex anatomy, the brachial plexus presents a diagnostic dilemma to clinicians and radiologists alike and has been the subject of many prior reviews offering various perspectives on its imaging and pathology. Magnetic resonance imaging (MRI) of the brachial plexus is the imaging modality of first choice for depicting anatomy and pathology of the brachial plexus. The anatomy of the roots, trunks, divisions and cords is very well depicted due to the inherent contrast differences between the nerves and the surrounding fat.

CONCLUSION

MRI helps to differentiate the traumatic and non-traumatic causes of brachial plexus pathologies and can point towards the site and segment of involvement. MR evaluation of traumatic brachial plexus injury helps differentiate preganglionic from post ganglionic injury and therefore guide management. MRI helps us to study the various appearances, evaluates the extent of the cause and its relationship to adjacent structures. Hence MRI is the modality of choice in the evaluation of traumatic and nontraumatic pathologies of brachial plexus.

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