

DETECTION OF SPINAL CORD TUMOR BY MRI⁺

Mohammed mizhir radhi^{*}

Dr. Qayss F. Shemal^{**}

Usra Jhed Swelh^{***}

Abstract

The study included a total of 50 patients suffering from spinal cord tumors admitted to the department of neurosurgery ,specialized surgical hospital and Neurosurgery hospital in Baghdad .These cases were were examined by MRI . The examination shows T1- Weighted imaging pictures are iso- or hypo- intense image relative to the cord , enhancement of tumors following gadolinium injection showed a better assessment of these tumors to the spinal cord and hyper intense on T2- weighted imaging . The diagnosis of MRI can only be confirmed by histo- pathological examination .

المستخلص

تضمنت الدراسة ٥٠ مريضاً يعانون من أورام في الحبل الشوكي وهم راقدون في مستشفى الجراحة التخصصية . ومستشفى الجملة العصبية في بغداد. تم إجراء التصوير بالرنين المغناطيسي لجميع الحالات وظهرت النتائج بوضوح الصور عند استخدام طريقة (T2- و (T1-WEIGHTED) , (T2-WEIGHTED) واستخدام صبغة الغادولينيوم حيث تم مقارنة النتائج مع التحليل النسيجي فكانت جميعها متطابقة .

Introduction

The first successful nuclear magnetic resonance (NMR) examination were described by BLOCH and PUREEN indecently 1946 , and for their discovery they were jointly awarded the Nobel prize for physics in 1952 .

Thus paving the way for the development of NMR spectroscopy as powerful analytical tool in chemistry and biology . [1] Damidan (1972) and Lauterbur (1973) indicated the potential NMR to obtain images of the intact human body [2].

Mansfield and Maudsly , Damdian et.al published human in vivo images in 1977 , and Hinshaw et.al., The multiplier facility of MRI was first demonstrated by Hawkes et.al.,In 1980 who also reported the first demonstrated of intracranial pathology .[1]

Magnetic Resonance Imaging (MRI) combines a strong magnetic field and ratio frequency (RF) energy to study the distribution and behavior of hydrogen protons in fat and water [3] .

Hydrogen had been chosen because it is the most abundant of the naturally occurring spinning nuclei in the human body found in water and lipids [4] .

Those unpaired protons possess intrinsic spin . since the nucleus is positively charged it generates a small magnetic field when it spins . The protons also presses i.e

⁺Received on 2002/7/2 , Accepted on 2004/10/28

^{*}ASSISTANT PROF ; COLLEGE OF MEDICAL AND HEALTH TECHNOLOGY \ RADIOLOGY DEPT;- BAGHDAD.

^{**}Specialized Surgical HOSPITAL \ BAGHDAD

^{***}COLLEGE OF MEDICAL AND HEALTH TECHNOLOGY \ RADIOLOGY DEPT. – BAGHDAD.

. The axis of the spinning top circle forming a cone shape . when the patients put into the main magnetic field , we send aradio frequency (RF) pulse at the same frequency as the processing

nuclei [4]. Protons un proteins , DNA and those in solid structures ,such as bone , usually do not contribute to the signal mainly because their relaxation render then undetectable by typical imaging system [5] .

Magnetic Resonance Imaging (MRI) has greater inherent soft tissue contrast in many area compared to the other imaging modalities . The contrast depends on the choice of the imaging sequences which high light the influence of certain tissue characteristics , essentially the T1 and T2 relaxation times [6].

Usually MRI scanning with and with out a contrast agent is the preferred study . the contrast agent is a drug given intravenously which can provide additional detail of the tumor and surrounding nervous system structures . once the MRI is completed , treatment decisions are made . Usually a surgical biopsy or resection is performed.[7]

Patient and Methods

The study included a total number of 50 patients suffering from the spinal cord tumors, they were admitted to the department of Neurosurgery ,in specialized surgical hospital and Neurosurgery hospital in Baghdad .

This study revealed : female ratio 26 : 24 and their age ranged 13 – 85 years .

Results

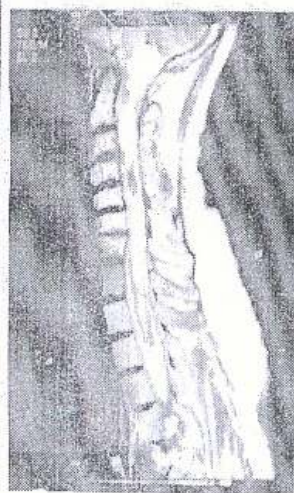
Also this study revealed types of spinal cord according to this table :

Table (1) Distribution of Lesions according to age .

Lesions Ages	Astrocytoma	Ependymoma	Meningioma	Neurofibroma	Haemangioma	Malignant melanoma	Epidermoid cyst	Metastase	Total	Percent
13- 20	2	1	-	-	2	-	1	-	6	12%
21- 28	3	4	-	-	1	1	-	-	9	18%
29- 36	3	3	-	2	-	-	1	1	10	20%
37- 44	1	4	1	-	1	-	-	-	7	14%
45- 52	1	1	1	2	-	-	-	-	5	10%
53- 60	3	1	1	1	-	-	-	-	6	12%
61- 68	-	-	2	-	-	-	-	-	2	4%
69- 76	-	1	3	-	-	-	-	-	4	8%
77-85	-	-	-	1	-	-	-	-	1	2%
Total	13	15	8	6	4	1	2	1	50	100

Table (2) Distribution of Lesions according to sex

Lesions \ Sex	Male	Female	Total	% percent
Astrocytoma	9	4	13	26%
Ependymoma	8	7	15	30%
Meningioma	-	8	8	16%
Neurofibroma	4	2	6	12%
Haemangioma	2	2	4	8%
Malignant Melanoma	-	1	1	2%
Epidermoid cyst	2	-	2	4%
Metastase	1	-	1	2%
Total	26	24	50	100%



(a)



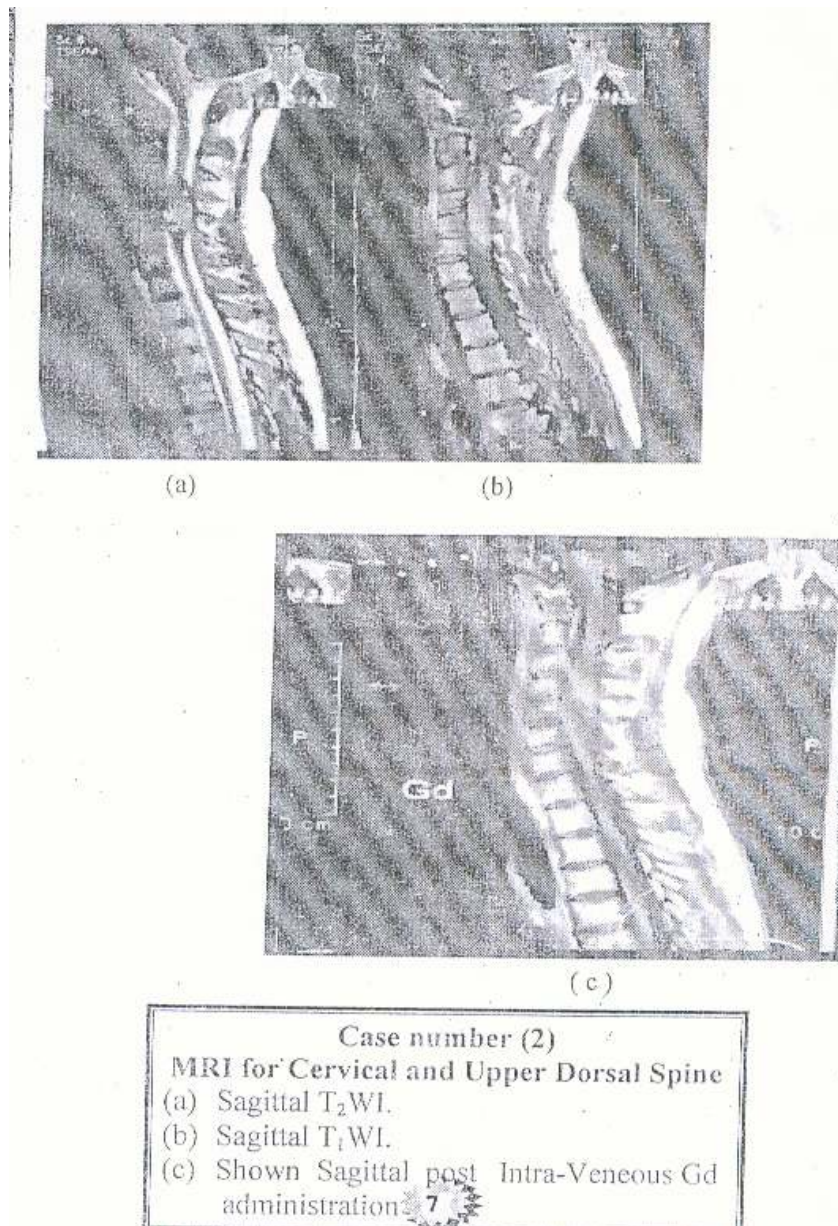
(b)

(c)



(d)

Case number (1)
MRI for Cervical
Spine
(a) Sagittal T2 WI.
(b) and (c) Sagittal
T₁WI.
(d) axial After Gd
administration.



Discussion

It was found that the MRI , depend on three parameters (T1,T2and proton density)these parameters are sensitive to distinguish between tumors and surrounding normal tissue and act as a guide for surgical biopsy . The diagnosis of MRI can only be confirmed by histopathological examination .

The study sample are classified in to eight lesions as follow :

1. Ependymoma are the largest group , 15 in number , forming 30% and more common in male (21-28) and (37-44) years , and well diagnosis by MRI and biopsy .

2. Astrocytoma are 13 in number, forming 26% and more common in male (21-28),(29-36) and (53-60) years and well diagnosis by MRI and biopsy .
3. Meningioma are 8 in number, forming 16% and more common in female (69-76) years and well diagnosis by MRI and biopsy .
4. Neurofibroma are 6 in number ,forming 12% and more common in male (29-36) and (45-52) years , and well diagnosis by MRI and biopsy .
5. Haemangioma are 4 in number ,forming 8% and common in both male and female ,(13-20)and (29-36) years and well diagnosis by MRI and biopsy .
6. Epidermoid cyst are in number ,forming 4% and common in both male and female (13-20) and (29-36) years and well diagnosis by MRI and biopsy .
7. Malignant melanoma are 1 in number ,forming 2% and found in female patient, (21 -28) years and well diagnosis by MRI and biopsy .
8. Secondary Metastasis was 1 case forming 2% and found in male patient,(29-36) years and also well diagnosis by MRI and biopsy .

In case number (1) represent MRI for cervical spine , shown intramedullary tumor of woman in 56 years old .(a) sagittal T2WI reveals a large intramedullary mass that involving medulla oblongata and cervical spin which contain a large cystic component. (b) and (c) sagittal T1WI which is shown iso and hypo intense on T1 and (d)axial after Gd administration , enhancement is present in apportion of tumor while tumors which demonstrates on MRI as irregular enlargement of the cord which appears hypo intense onT1WI . the tumor is surrounded by a zone of peripheral edema appearing very hyper intense on T2WI .

The soft tissue areas of the tumor become enhancement homogenously following gadolinium injection . The soft tissue tumor component my be associated with non euplastic ,more hypo intense than CSF[8,9and10].

And in case (2) , MRI for cervical and upper dorsal spine , shown intramedullary tumor of young woman in 24 years old with 6 months history of limping , which shown (a) sagittal T2WI ,high signal intensity on T2 . (b) sagittal T1WI shown hypo intense heterogeneous on T2 , while in (c) shown sagittal post intra-venous Gd administration , inhomogeneous , heterogeneous on T1 . the intramedullary tumors appear iso- or hypo intense on T1WI and moderately hyper tense on T2WI . The soft tissue component of the tumor enhancement is usually present , although it may be inhomogeneous [11] following injection of gadolinium , thus differentiating it from processional edema and cyst formation .

Processional edema appears equally hyper intense on T1WI while cyst areas are very hypo intense on T2WI and hyper intense on T1WI (8,9and 10) .

Conclusions

1. MRI provides multiplanar images.
2. MRI provides good image quality .
3. MRI have sensitivity of 100% for diagnosis of spinal cord tumors .
4. Results of biopsy analysis coincided with results of MRI .

Recommendation

It is recommended that the radiologists used MRI preferentially in the diagnosis of spinal cord tumors ,since it can differentiate between tumors and surrounding normal tissue in 100% of cases .

References

1. Bradley WG , Bydder GM and Worrthington BS. *MRI Basic principles* ,in Grainger of Allison Diagnostic Radiology 3rd ed ,New York Churchill Livingston,pp 63-81 . ,1997
2. Sutton D. MRI –Technical Aspects . In : Textbook of radiology and imaging . New York Churchill Livingston pp 1654-90 . ,1987
3. Weir J . and Abraham Ph. MRI . In : A slide , *atlas of imaging of human anatomy* . London , Mosby year Book Europe I td . 1994: .
4. Schild H . MRI made easy ,Berlin Schering AG, 1990 : 5-9 .
5. Bushong S.C; *Physical principles of MRI* . In *Radiologic Science for Technologist* 5th ed . st. Louis ;Mosby;449-464 . , 1993
6. CT- and MRI in oncology . Didier Buthiau, David Khayat . PP7. 1998
7. WW/ Texas Pediatric Surgical Associates (713) 704-5869 .
8. Andrew MC,Goy AMC,Pionto RS, Ragavendra BN, Espstein JF,Kricheff II , Intramedullary spinal cord tumors;MRI ,with emphasis on associated cysts Radiology 161,381-385 (1986) .
9. Baleriaux D ,Parizel P , Segebarth C. Pathologic intra-rachidienne et medullaire , In ; Manelfe Imagerie du Rachis Etdela Moella Vigot , Paris (1989).
10. Dillon WP ,Norman D. Newton TH. Bollak ,Mark A. Intradural Spinal cord lesions ;Gd DTPA enhanced MRI . Radiology 170: 229-237 (1989).
11. Fundamental of neuroimaging , Blaine L. Hart Edward C. Benzel and Corey C.Ford W.B.Saunders company (1997).