Original research article

MAGNETIC RESONANCE IMAGING EVALUATION OF SPINAL TUMOURS AND ITS PATHOLOGICAL CORRELATION IN ROHILKHAND REGION

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Abstract

Introduction: Spinal tumours of the spine constitute around 15-20% of CNS tumours. It can be localized into three compartments- extradural, intradural extramedullary and intramedullary. Once the lesion is localized, a differential diagnosis can be established based on the tumours that commonly occur in that compartment. These lesions have characteristic magnetic resonance imaging features for a definitive diagnosis. The present study aims to evaluate spectrum of spinal tumours and correlate MRI imaging with pathological findings.

Material and Methods: The present study included 48 patients and was conducted on 3 Tesla MRI. The patients who had back pain and neurological symptoms & were diagnosed as spinal tumours on FNAC/ Biopsy were included. The routine MRI protocols included T1WI & T2WI sagittal and axial, STIR coronal and sagittal images; slice thickness was 3.0 mm; field of view (FOV) was 28 - 32 cm and contrast enhanced axial, sagittal and coronal T1W fat sat images. The images were assessed for location, shape, extent, component characteristics, signal intensities on different MRI sequences and enhancement patterns of the lesions. The lesions were correlated with cytohistopathological findings.

Results: Male predominance (2.7:1) with common age group 41-50 years with mean age of 43 years was seen. The male: female ratio in malignant and benign was 1:1.8 and 1:6 respectively. Most common location of tumours was intradural extramedullary (54.16%), followed by Extradural (37.5%) and intramedullary spinal cord tumour (6.25%). Most common location was dorsal (52.08%). The most common spinal tumour was metastasis followed by nerve sheath tumours. On correlation of MRI finding with cytohistopathology sensitivity and specificity for malignant lesion was 85.71% and 96.29 % respectively, while for benign lesion was 96.29 % and 85.71% respectively.

Conclusion: Magnetic resonance imaging is useful in effectively defining the size, shape and position of tumour along with accurate localization of particular compartment of tumour and correlation with cytohistopathology.

Keywords: Spinal Tumours, pathological correlation, magnetic resonance imaging

INTRODUCTION

Tumors of the spine constitute approximately 15-20% of CNS tumors.[1] They primarily occur in young adults & are less common in children and the elderly. Only 1% of primary spinal tumors involve multiple separate levels.[2]

Tumors in the spine can be localized into one of three compartments: extradural, intradural extramedullary, and intramedullary. Lesions in each of these compartments have common characteristic appearances that help to identify the compartment in which the tumor is located. Once the lesion is localized, a differential diagnosis can be developed based on the tumors that commonly occur in that compartment. Some lesions have characteristic magnetic resonance imaging or radiographic features that may allow for a definitive diagnosis based on imaging studies alone.[3]

Extradural tumors are the tumors located external to the dural layer and cause impingement on the thecal sac. With progressive increase in size of the mass. The subarachnoid space is at the interface of the mass & the cord gets obliterated with extrinsic cord compression. The common extradural benign tumors are haemangioma, osteoblastoma, osteoid osteoma, osteochondroma, giant cell tumor, aneurysmal bone cyst, eosinophilic granuloma, chordoma, sacrococcygeal teratoma while common extradural malignant tumors are multiplemyeloma, plasmacytoma, ewings sarcoma & osteosarcoma,

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Intradural extramedullary tumors are the tumors located in the subarachnoid space between the dura and spinal cord. They will be seen as intradural filling defect outlined by sharp meniscus of CSF with enlarged ipsilateral subarachnoid space up to mass and cause deviation of the spinal cord away from the mass.[3] In adults, nearly two-thirds of all intradural tumors are extramedullary and are typically nerve sheath tumors, meningiomas, or ependymomas.[4]

Intradural intramedullary tumors are the tumors located within the spinal cord and cause cord expansion. The one third of intradural tumors are intramedullary, with the most common histologies being astrocytoma and ependymoma, followed by hemangioblastoma and other tumor types.[4]

In this present study, we aim to study distribution spectrum of spinal tumors by MRI imaging and pathological correlation.

MATERIAL AND METHODS

The present study was conducted in the department of Radiodiagnosis at Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly from November 2015 to December 2016. It included 48 patients and was conducted on 3 Tesla MRI (Siemens Magnetom Verio)

Inclusion Criteria: The patients who were found to have spinal tumors on undergoing MRI of spine in department of the Radiodiagnosis for the evaluation of back pain and neurological symptoms and patients who were already diagnosed spinal tumors by FNAC / biopsy and had not undergone surgery were included.

Exclusion Criteria: All cases of spinal tumors who were not subjected to FNAC / biopsy.

Methods of data collection: The routine MRI protocols included T1W & T2W sagittal and axial, STIR coronal and sagittal images; slice thickness was 3.0 mm; field of view (FOV) was 28 - 32 cm and contrast enhanced axial, sagittal and coronal T1W fat sat images.

Following optional sequences were obtained:

- Sagittal diffusion weighted MRI (single shot echo planar sequence) wherever required
- Gradient sequences-Sagittal or axial images

The images were assessed for location, shape, extent, component characteristics, signal intensities on different MRI sequences and enhancement patterns of the lesions. The lesions were classified into extradural, intradural extramedullary & intradural intramedullary and correlated with cytohistopathological findings. Written consent of all the patients was taken.

RESULTS

A total of 48 cases with spinal tumours were evaluated. It showed male predominance with male : female ratio in our study 2.7 : 1. Spinal lesions were most commonly noted in the age group 41-50 years

Table-1: Distribution of spinal tumors

Distribution	n (%)
Cervical	2 (4)
Dorsal	25 (52)
Lumbar	13 (27)
Cervico-dorsal	1 (2)
Dorso-lumbar	5 (11)
Lumbo-sacral	2 (4)

Table-2: Histological spectrum of spinal tumors

Spectrum of Disease	n (%)
Metastasis	14 (29.16)
Nerve sheath tumor	13 (27.08)
Meningioma	7 (14.58)
Epidermoid	4 (8.33)
Teratoma	1 (2.08)
Liposarcoma	1 (2.08)
Giant cell tumor	1 (2.08)
Ependymoma	1 (2.08)
Plasmacytoma	1 (2.08)
Hemangioblastoma	1 (2.08)
Dermoid cyst	1 (2.08)
Arachnoid cyst	1 (2.08)
Lipoma	1 (2.08)
Acute myeloid leukemia	1 (2.08)

Table-3: Spectrum of multiple spinal tumors in the present study

Spectrum of disease		n	Age Range (Years) (Mean)	M:F	Compartment	MRI Findings*							
						T1WI			T2WI			Post Contrast	
						Hyper SI	Hypo SI	Iso SI	Hyper SI	Hypo SI	Iso SI	Homo	Hetro
Meningioma		7	18-64;36	0.4:1	ID-EM	-	2	5	4	2	1	7	-
Epidermoid		4	1-53;25.5	01:01	ID-EM	-	3	1	4	-	-	-	4
NST	Schwannoma	12	34-77;57.54	05:01	ID-EM	-	3	9	11	1	-	-	12
	Neurofibroma	1	23	M	ID-ED	-	1	-	1	-	-	-	1
Metastasis		14	14-84;62	06:01	ED	-	13	1	13	-	1	11	3

NST- Nerve Sheath Tumors; Compartment- Extradural (ED), Intradural-extramedullar (ID-EM), Intradural-intramedullary (ID-IM), Both extra and intradural (ED-ID), M- male, F-female, *Fig. 1-5

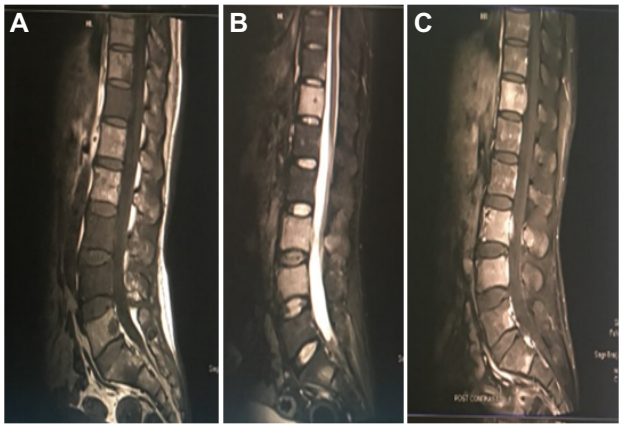

Fig.-1: Metastasis. (A) diffuse and patchy low marrow signal intensity on T1WI (B) displaying hyper signal intensity on T2WI (C) post contrast images shows enhancement.

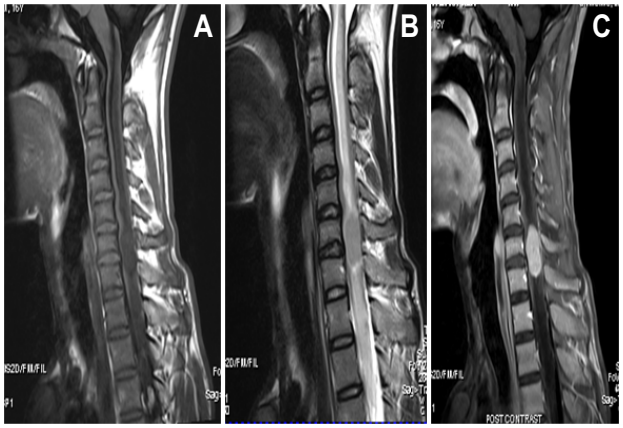

Fig.-2: Meningioma. (A) Sagittal T2WI shows hyperintense lesion at C6-C7 level with surrounding edema (B) lesion appears isointense on T1WI (C) post contrast imaging shows intense homogeneous enhancement.

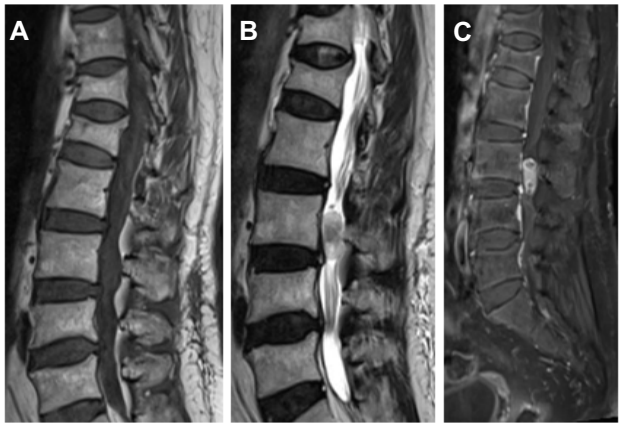

Fig.-3: Schwannoma. A) An oval shaped lesion appearing isointense on t1wi. (b) Slightly hyperintense on T2WI (c) T1 post contrast fat-sat image shows heterogeneous enhancement.

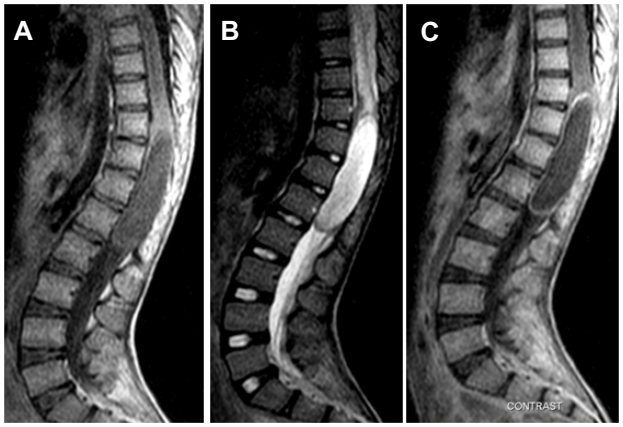

Fig.-4: Epidermoid cyst. (A) sagittal t1wi shows a well defined oblong shaped lesion at level of D10-L1 vertebral level (B) Lesion appears hyperintese on T2WI (C) post contrast images show peripheral enhancement.

Fig.-5: Dumbbell shaped Neurofibroma. An oval shaped lesion hyperintense on T2WI.

with mean age of 43 years. Out of 48 patients, 30 patients (19 males and 11 females) were found to have benign lesions while 18 (16 males and 02 females) were found to have malignant lesion. The male: female ratio in malignant and benign was 1:1.8 and 1:6 respectively. Most common location of tumours was intradural extramedullary (54.16%), followed by Extradural (37.5%), intramedullary spinal cord tumor(IMSCT) (6.25%). The lesion occupying both intradural and extradural space accounted for 2.08%. Most common location was dorsal (52.08%) (Table-1). The most common spinal tumor was metastasis followed by nerve sheath tumors (Table-2). The primary malignancy leading to metastasis to spine were lung cancer (48.5%), hepatocellular cancer (28.57%), breast cancer (14.28%) and prostate cancer (14.28%).

MRI findings of Spinal Tumors

Teratoma: A Heterogeneous signal intensity (fatty component appears hyper intense on T1WI and cystic component appears hyper intense on T2WI) lesion displaying solid cystic component located from L2 to L5 vertebrae level causing scalloping of posterior margin of L3

Table-4: Spectrum of single spinal tumors in the present study

Spinal tumors	Age	Sex	Vertebral Location	Compartment
Teratoma	27	M	Lumbar	ID-EM
Liposarcoma	13	M	Lumbar	ED
Giant cell tumor	16	F	Dorsal	ED
Ependymoma	28	M	Dorso-Lumbar	ID-IM
Plasmacytoma	65	M	Dorso-Lumbar	ED
Hemangioblastoma	18	M	Dorsal	ID-IM
Dermoid cyst	35	M	Lumbar	ID-EM
Arachnoid cyst	38	F	Dorsal	ID-EM
Lipoma	15	M	Dorsal	ID-IM
AML	16	M	Lumbo-Sacral	ED

Compartment- Extradural (ED), Intradural-intramedullary (ID-EM), Intradural-intramedullary (ID-IM), Both extra and intradural (ED-ID), AML- Acute Myeloid Leukemia, M- male, F-female

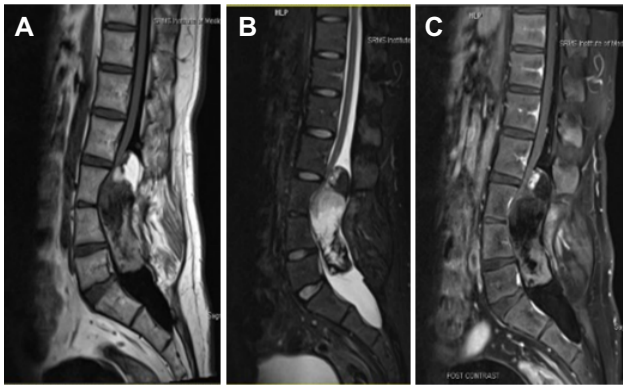

Fig.-6 (Teratoma) : (A & B) show heterogeneous signal intensity lesion located from L2-L5 (fatty component appears hyper intense on T1WI and cystic component appears hyper intense on T2WI .Lesion is causing scalloping of posterior margin of L3 & L4 (C) Post contrast images show focal enhancement.

and L4. Post contrast show focal part of enhancement of the lesion close to the fatty component (Fig.-6).

Liposarcoma: A well defined lesion is seen in posterior paraspinal region displaying hyper signal intensity on T1/

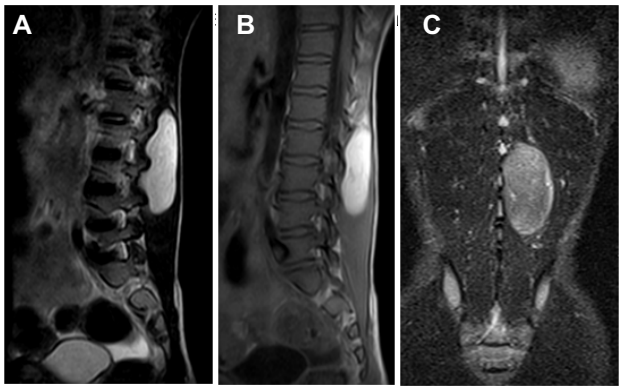

Fig.-7 (Liposarcoma): Oblong shaped lesion is noted in Left paraspinal region, displaying hyper signal intensity on T2WI (A) & T1WI (B). Stir coronal images show partial fat suppression (C).

Giant Cell Tumor: An expansile lesion involving D8 vertebral body with bone destruction with small paravertebral soft tissue displaying iso – hypo signal intensity on T1WI and heterogeneously hyperintense on T2WI with curvilinear low signal intensity areas. Post contrast study showed moderate heterogeneous enhancement (Fig.-8).

Fig.-8 (Giant Cell Tumor): CT guided Biopsy from expansile lesion involving D8 vertebral body with bone destruction and small paravertebral soft tissue.

Ependymoma: A heterogeneously hyper signal intensity mass on T2WI in the thecal sac extending superiorly from cord /conus level at D12/L1 level to inferiorly up to the lower margin of L3 vertebra. T2 signal intensity is seen the lower dorsal cord/ conus against D11/D12 level. Post contrast study shows asymmetrical patchy heterogeneous enhancement of the mass. No obvious extension to neural foramina is seen (Fig.-9).

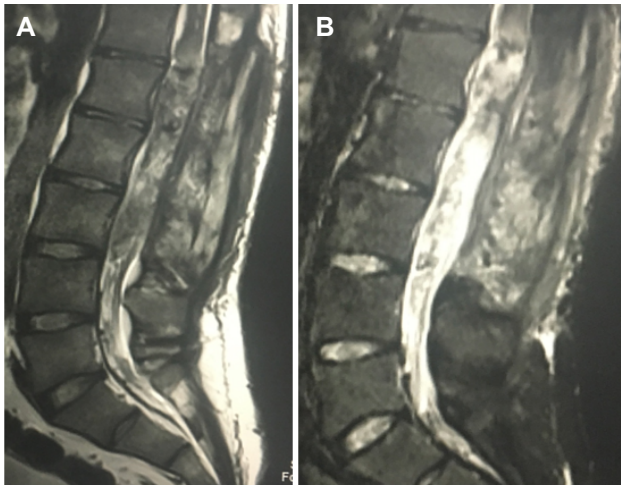

Fig.-9 (Ependymoma): It is appearing iso – hypointense on T1WI (A) and hyperintense on T2WI (B).

Plasmacytoma: A hypo signal intensity expansile lesion on T1WI and hyper signal intensity on T2WI. Post contrast study shows moderate enhancement (Fig.-10).

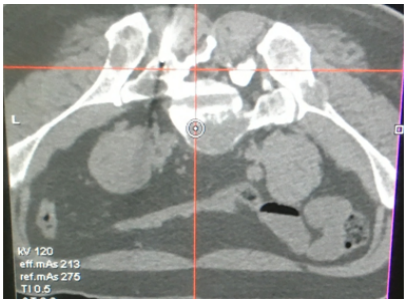

Fig.-10 (Plasmacytoma): CT guided Biopsy from vertebral body.

Hemangioblastoma: A lesion isointense on T1WI, hyperintense on T2WI image with extensive edema and flow void. Post contrast study shows intense heterogeneous enhancement (Fig.-11).

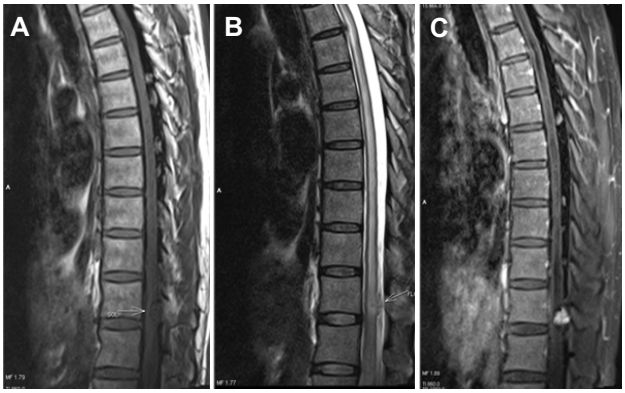

Fig.-11 (Hemangioblastoma): A small lesion in lower dorsal cord Isointense on T1WI (A), hyperintense on T2WI image with flow void and extensive edema (B). Post contrast shows intense enhancement (C).

Dermoid Cyst: A well defined elongated lesion against L2–L5 level displaying increase signal intensity on T1WI and low signal intensity on T2WI and suppression on fat sat images. Post contrast study shows no enhancement and no restriction is noted on diffusion (Fig.-12).

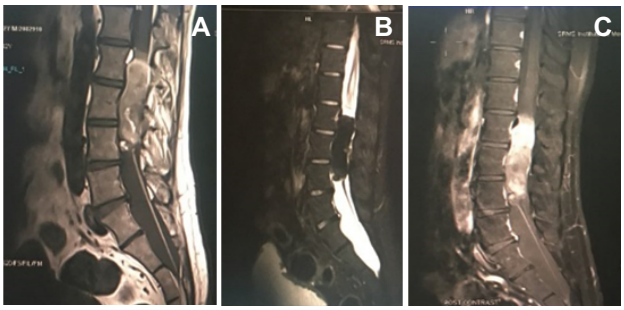

Fig.-12 (Dermoid Cyst): (A) a well defined oblong shaped lesion is noted at level of L2 –L4 verebrae displaying hyper intensity at T1Wt (B) hypointense on stir due to fat suppression (C) heterogeneous enhancement on post contrast imaging

Arachnoid Cyst: An intradural extramedullary cystic lesion showing low signal intensity on T1WI and high signal intensity on T2WI is seen distending the central portion of spinal cord. Post contrast study shows no enhancement and no restriction is noted on diffusion.

Lipoma: A lesion displaying high signal intensity on T1WI and T2WI and no enhancement on post contrast study, showed suppression on fat sat imaging.

Acute Myeloid Luekemia (AML): Lesion shows low signal intensity on T1WI and T2WI. Post contrast study shows heterogeneous enhancement of marrow and enhancing tissue seen against L5-S3.Iso to low marrow infiltration of vertebra and posterior neural arches is noted (Fig.-13).

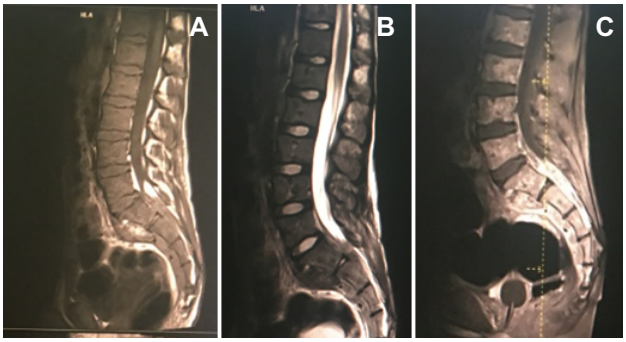

Fig.-13 (Acute Myeloid Leukemia): (A)Abnormal low signal intensity is noted on T1WI (B) Iso to increased signal intensity on T2WI. (C) Post contrast study shows diffuse enhancement of sacral vertebral. Thin rim of enhancement of anterior epidural mass.

MRI and pathological correlation:

In our study on MRI basis, there were 19 malignant lesions out of 48 cases. Eighteen proved to be malignant on cyto/histopathology and 1 case turned out to be benign (Giant Cell Tumor). Twenty nine lesions were reported benign out of which 3 turned out to be malignant (1 case each of AML, Ependymoma and Liposarcoma).

Malignant lesions

MR Imaging	Cytology / Histopathology Findings		Total
	Positive	Negative	
Positive	18	1	19
Negative	3	26	29

PVP (predictive value for positive) =18/19 x 100 =94.73%; PVN (predictive value for negative) =26/29 x 100 =89.65 %; False positive = 1/27 x 100 = 3.70%; False negative = 3/21 x 100 = 14.28%; Specificity =26/27 X 100 =96.29%; Senstivity =18/21 X 100 =85.71%; P Value =0.000 (P value< 0.05 is statistically significant)

Benign lesions

MR Imaging	Cytology / Histopathology Findings		Total
	Positive	Negative	
Positive	26	3	29
Negative	1	18	19

PVP (predictive value for positive) =26/29 x 100 =89.65%; PVN (predictive value for negative) =1/27 x 100 =3.70 %; False positive = 3/21 x 100 = 14.28%; False negative =1/27 x 100 = 3.70%; Specificity – 18/21 X 100 = 85.71%; Senstivity – 26/27 X 100 = 96.29%; P value = 0.000 (P value< 0.05 is statistically significant)

DISCUSSION

Demographic Comparison

Rajnish et al[5] in his study of 111 patients in Rishikesh region found the most common lesions were neuroepithelial tumors (ependymomas and astrocytomas; 30.63%) followed by nerve sheath tumors (22.53%), dermoid/epidermoid (9.9%), and meningiomas (6.3%). The thoracic region of spinal canal was most frequently involved (34.2%) followed by cervical (18.91%), thoracolumbar (13.5%) and lumbar (10.8%) region.

In present study the metastatic lesions were more common, the reason may be dedicated cancer centre present in institute, however the distribution of nerve sheath tumors was similar. In present study incidence of ependymoma was very less (2.08% vs 30.63%) which may be attributed to smaller sample size and different demographic distribution.

Uma et al[6] in their dedicated study on intradural lesions in Vishakhapatnam showed most common tumor was

schwannoma (22/40), followed by ependymoma (7/40), meningioma (4/40), astrocytoma (4/40), one each of hemangioblastoma, neuroentericcyst and dermoid cyst. In the present study nerve sheath tumors were most common tumors, though only single Ependymoma case was seen which may represent different demographic distribution.

Ravi et al[3] in Bangalore medical college and research institute studied 35 patients and showed that the spinal tumors were localized into extradural, intradural extramedullary and intramedullary compartments 28.5%, 48.5% and 23% respectively. Nerve sheath tumors were most common (28.5%), followed by meningioma (17%). Hemangioma, ependymoma, astrocytoma, metastasis, lipoma, myxopapillary ependymoma, chordoma, Sacrococcygeal teratoma and multiple myeloma formed the remaining cohort of patients. Study concluded that MRI is the modality of choice for the tumors.

Study by Chandy et al[7] on intramedullary mass lesions (n=68; male=47, female=21) in Christian medical college, Vellore found astrocytoma (41.17%) and Ependymoma (22.05%) to be the common spinal tumors.

Ashish et al[8] in their study of 49 patients found nerve sheath tumor to be the most common lesion(51%) followed by metastasis (26%), meningioma (10%), astrocytoma (4%) & one case each of chordoma (2%), lymphoma (2%) & haemangioblastoma (2%). The compartment distribution was extradural (30%), intradural extramedullary (61%) and intradural intramedullary (8%). Distribution of the location of lesion were similar to present study.

Jae et al[9] found that most common lesion was neurilemmoma (n=19), meningioma (n=5), neurofibroma (n=4), hemangioma (n=3) and arachnoid cysts (n=2). The other single lesions found in this study were giant cell tumor, ganglioneuroma, lymphoma, neuroblastoma, metastatic tumor from the prostate and vascular malformation.

Metastasis

We studied 14 cases of metastasis of spine and involving mainly dorsal spine. Age group ranged from 45 years to 68 years with mean age being 53 years and male predominance was seen which is close to the study conducted by Malik et al[10], who in their study showed male predominance in metastatic cases with mean age of 62 years. Matheus et al[11] in a study of 68 patients concluded spinal metastasis more common in males than females (66.17% vs 33.83%).

In a study of 37 spinal tumors by Nancy et al[12] showed metastatic lesion to be most common (45.94%) followed by Plasmacytoma (21.62%), neurofibroma (16.21%) with one case each of Gorham's disease, aneurysmal bone cyst, fibrous dysplasia, fibrous histocytoma, osteosarcoma and dermoid. Hwang et al[13] reported metastatic lesions from hepatocellular carcinoma (27%) followed by lung (25%), breast (9.09%) and prostate (6.81%).

Chasnik et al[14] in his study on 30 patients found lung cancer to be the most common primary for spinal metastasis (23.33%) followed by breast (20%), colorectal carcinoma (23.33%), hepatocellular carcinoma (23.33%) and stomach cancer (10%). In present study also the most common site for the spinal metastasis was lung carcinoma, followed by hepatocellular carcinoma.

In present study, (85.72%) were hyposignal intensity on T1WI and 14.28% showed iso signal intensity, which was close to the Yasin et al[15] study who found most common appearance of metastases was hypo signal intensity (74%).

In T2WI, the majority of metastatic lesions were hyper signal intensity (85.72%) in the present study. Similar findings of hyper signal intensity (67%) was seen by Yasin et al[15]. Guillevin et al[16] reported that metastasis will have lower signal intensity than marrow on T1WI and higher signal intensity on T2WI, which correlated with present study.

Schwannoma

The present study of 12 cases of schwannoma involving mainly lumbar spine is correlating with the studies of Jae et al[9], De Verdhelan al[17] and Govind et al[18]. Age group ranged from 34 years to 77 years with mean age 55.83 years, which is almost similar to the study by Jae et al[9] (mean age 50.2 years). The male to female ratio encountered in the present study was 9:3. Kobayashi et al[19] and Jae et al[9] reported a ratio of 22:16. The discrepancy in male female ratio from their study is likely due to variation in size of the study.

In present study all schwannomas had iso-hypo signal intensity (100%) on TIWI and hyper signal intensity on T2WI (83.33%) which was almost similar to the study of Friedman et al[20].

Uma et al[6] in her study of 40 patients found male predominance (17:4) and the entire lesion appeared iso to hypointense (100%) on T1WI & hyperintense on T2WI (100%) which was almost similar to the present study.

Neurofibroma

The present case had similar findings with Patel et al[21] who concluded the lesion appears hypointense to cord to T1WI & hyper on T2WI and shows post contrast enhancement.

Meningioma

The common location of dorsal spine lesion was correlating with the studies of Uma et al[6] (75%) and Sang et al[22] (73.3%). The mean age in the present study (45.28 years) was almost similar to that of Sang et al97 (Mean age 52 years).

The male to female ratio in present study was 2:5 with female predominance which correlated with study of Sang et al[22] (82%) and Aaron et al[23] (87.5%). The MRI findings are compared in Table-5.

Table-5: MRI features of meningioma on T1WI

MRI features	Present Study (n=7)		Uma et al (n=4)		Jae et al (n=5)	
	T1WI	T2WI	T1WI	T2WI	T1WI	T2WI
Hypo signal intensity	2(28%)	2(28.57%)	1(25%)	1(25%)	-	1(25%)
Hyper signal intensity	-	4(57.14%)	-	2(50%)	-	-
Iso signal intensity	5(72%)	1(14.28%)	3(75%)	1(25%)	5(100%)	4(75%)

Epidermoid

In the present study there were 4 cases of epidermoid of spine which involved mainly the lumbar spine. The findings are correlating with the studies of Huabin et al[24] who found 6 cases (100%) in lumbar spine. Age group ranged from 10 years to 53 years with mean age being 25.5years. The discrepancy in mean age is due to more number of epidermoid cases.

The MRI features of T1WI correlated with Huabin et al[24] who found most common appearance of epidermoid was hypo signal intensity (68%) followed by iso signal intensity (16%).

On the contrary the T2WI, our MRI findings (hyper signal intensity 100%) were different from Huabin et al[24] (hyper signal intensity 67%). Post contrast study showed peripheral enhancement in all cases which was similar to the finding of Ming et al[25].

The findings of present study were also similar to the study by Gupta et al[26] who in their retrospective evaluation of MR images of nine intraspinal tumour (dermoid (n=4) & epidermoid (n=5)) showed that on T1WI, the epidermoid were either iso to mildly hypointense to the cord (n=3), isointense to CSF (n=1) or markedly hyperintense (n=1). On the post diffusion images, the epidermoid were either isointense to cord (n=3) or markedly hyperintense (n=1). All the lesions were iso-to hyperintense to CSF on T2WI.

Teratoma

The present study showed mixed hyperintense signal intensity on T1WI and T2WI and focal enhancement after contrast enhancement. The findings are correlated with Wang et al[27] (n=8) where three cases (37.5%) that contained fatty tissue showed markedly heterogeneous hyperintense signal on T1WI, and mixed hyperintense and hypointense signal on T2WI and fat-suppression sequences. The remaining five cases without fatty tissue displayed heterogeneous hyperintense signal on T1WI and T2WI (62.5%) and also on fat-suppression sequences. Contrast-enhanced MRI images showed only slight enhancement in 3 cases (37.5%).

Liposarcoma

The present study showed an intradural lesion in a 13 year old male, hyperintense signal intensity on T1WI and T2WI and showed peripheral post contrast study. Mark et al1[28] in his retrospective study on 60 patients with almost same male:female ratio (31:29) and mean age 56 years (range 1-88 years) concluded statistically significant imaging features favoring a diagnosis of Liposarcoma. The findings included lesion larger than 10 cm, presence of thick septa, globular and/or nodular non adipose areas or masses, and lesion less than 75% fat. The most statistically significant radiologic predictors of malignancy were male sex, presence of thick septa, and associated non adipose masses, which increased the likelihood of malignancy by 13, 9 and 32-fold, respectively. Both lipoma and liposarcoma demonstrated thin septa and regions of increased signal intensity on fluid-sensitive MR images.

Germ Cell tumour

Present study showed an extradural lesion in 16 year old girl at dorsal vertebrae which showed a isointense signal intensity on T1WI and hyper signal intensity on T2WI. Present study correlated with study conducted by Shekhar et al[29] in which the lesion most commonly involved dorsal vertebrae (67%) and had equal gender predilection (1:1). Jong et al[30] in a study of 10 patients showed thoracic (30%), sacrum (30%), lumbar (30%) and cervical spine (10%) involvement. Heterogeneous low to intermediate signal intensity on T2WI was noted in 90% and a curvilinear signal void was also noted in T1WI & T2WI in 90% cases.

Ependymoma

In a study by Uma et a[6] male pepondence was seen with MRI showing hypo signal intensity on T1W1 and hyper signal intensity on T2W1 which correlated with our present study. The author concluded that on MRI both Ependymomas and Astrocytomas could not be differentiated preoperatively as both of them revealed similar features of cord expansion, T2 hyper intensity and contrast enhancement. But multi segment involvement on MRI was more in favour of Astrocytoma than Ependymoma.

Plasmacytoma

The present study showed a low signal intensity expansile lesion on T1WI and high signal intensity lesion on T2WI in 65 year old male patient in dorsal spine. It correlated with Sevil et al[31] who stated that the lesion is seen more commonly in males (2:1) and Lafforgue et al[32] which showed 90% of lesion appear hypointense on T1WI and hyperintense on T2WI along with post contrast enhancement. Nancy et al[12] in a study of 10 cases found the lesion is more common in males (6:4) with mean age 48.1 years having expansile lesions of low signal intensity on T1WI and high signal intensity on T2WI involving the entire vertebral body. All ten lesions had curvilinear low-signal intensity structures on all imaging sequences that extended partially through the vertebral body & resemble sulci seen in the brain, which is termed a mini brain appearance on axial images.

Haemangioblastoma

The findings of present study correlated with Andrei et al[33] who stated it occurs more commonly in males (62.5%), Joon et al[34] who showed the lesion most commonly occurs in intramedullary location (67%) and Bao et al[35] who concluded the most common location is thoracic spine (50%).

Dermoid Cyst

Suocheng et al[36] showed that it commonly occurs in males (60%) with age group 2-24 years. Uma et al[6] in her study of 40 intradural spinal tumours reported about dermoid cyst that clinching point for diagnosis was presence of fat within the lesion as T1 hyper intense signal getting suppressed on Fat sat sequence. Sharma et al[37] stated the lesion was hyperintense on both T1WI & T2WI sequences, with signal suppression on fat saturation images. The findings were similar to present study.

Arachnoid Cyst

The findings of Jae et al[9] correlated with our present study who stated the lesion is equally distributed in male and female (1:1) and appear hypointense on T1WI and hyperintense on T2WI equal to CSF signal intensity (100%).

Lipoma

Lee et al[38] showed the patient age group 8-45 years and Erhan et al[39] showed the most common location of lipoma is thoracolumbar (100%) and MRI findings of lipomatous tissue are relatively high signals on T1WI and relatively low signals on T2W images. The findings in our present study showed hyper intensity on T1WI and T2WI with no post contrast enhancement.

Acute Myeloid Leukemia

The present study revealed a lesion involving multiple lumbar & sacral vertebrae in a 16 year male which revealed hypo signal intensity and hyper signal intensity on T2WI and heterogeneous enhancement after contrast enhancement. Almost similar findings were seen by Anna et al[40] which showed male predominance (58.5%) and hypo signal intensity on T1WI and hyper signal intensity on T2WI (41%) and significant enhancement (42%) cases followed by slight enhancement (17%).

Pathological Correlation

On correlation of MRI finding with cytohistopathology for malignant lesion the sensitivity was 85.71% & specificity 96.29 %, while for benign lesion the sensitivity was 96.29% and specificity was 85.71 %. The present study was close to the findings of Pourissa et al[41] where in the study on 50 cases of spinal tumours senstivity was 94% and concluded injection of a contrast media is considered the best neuroimaging tool for diagnosis of the types of spinal tumours. Brotchi et al[42] reported correlation of 70% between MR images and histologic diagnosis.

CONCLUSION

In the present study in our demographic area the most common lesions were metastasis followed by nerve sheath tumours and meningioma. Rest of lesions were sporadic.

Magnetic resonance imaging is useful in effectively defining the size, shape and position of tumour along with accurate localization of particular compartment of tumour and correlation with cytohistopathology.

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