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MRI Evaluation of Musculoskeletal Tumours

Medical Science

KEYWORDS : MRI-Magnetic resonance imaging,FNAC-Fine needle aspiration cytology,CT-computed tomography,MSK-musculoskeletal

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ABSTRACT

To determine the role of MRI in prospective evaluation of patients with clinical suspicion of musculoskeletal tumours.Relevance of MRI as an investigative modality in musculoskeletal tumours.To correlate the findings of MRI with final diagnosis by histopathological results1.

Introduction

''...It is much more likely that a steady reduction in the mortality from cancer will come chiefly from a large number of separate factors, of which the most significant appears to be increased control of the conditions leading to cancer, more general recognition of the preliminary stages of the disease, early diagnosis, and treatment of the established disease.[2]'' - James Ewing

Since the beginning of the twentieth century, there has been enormous progress in the diagnosis and therapy of musculoskeletal tumors, leading to substantial improvements in overall prognosis and patient survival. This progress has resulted largely from the development of an integrated, multidisciplinary approach to musculoskeletal tumors and from advances in multiple medical specialities, perhaps most notably in the new medical imaging speciality, radiology[3].

Medical imaging revolutionized both diagnostic and therapeutic approaches in musculoskeletal oncology by providing accurate information about the tissue composition and the anatomic relationships of musculoskeletal tumors that is used in tumor detection, staging, therapeutic monitoring, and post therapy surveillance.

Throughout the history of musculoskeletal tumor imaging, numerous luminaries in radiology, pathology, and surgery have made contributions that allowed the field to flourish. This multidisciplinary approach was institutionalized in 1972 with the formation of the International Skeletal Society, the concept for which was developed by three renowned musculoskeletal radiologists: Harold G. Jacobson, Ronald O. Murray, and Jack Edeiken.

Radiographs provide critical information regarding lesion location, margin, matrix, mineralisation, cortical involvement and adjacent periosteal reaction . Radiography offers more information than any other imaging modality in the study of bone lesions & remains the cornerstone for the differential diagnosis of skeletal tumours and tumour like lesion[4], or at least narrow the diagnostic possibilities, include patterns of bone destruction, lesion margins, internal characteristics of the lesion, type of host bone response, location, site and position of the lesion, the skeletal nature. The radiographic features coupled with clinical information helps define whether the lesion is neoplastic or non neoplastic, primary or metastatic and will help further in directing the subsequent work up.

Materials and Methods

The study included **40** Patients came to the radiology department Alluri Sita Rama Raju Academy of Medical Sciences , Eluru.

Inclusion criteria

All patients presenting with localized swelling.

Histopathology/FNAC a mandatory criteria as proof for final diagnosis.

Exclusion criteria

Patients with generalized oedema.

Patients presenting with recurrence of a primary lesion.

Patients in whom MRI was contraindicated eg: With pacemakers, metallic implants.

Undiagnosed suspected cases of primary musculoskeletal tumors which were diagnosed as metastasis or inflammatory/infective aetiology on histopathological examination were excluded from the study[5].

DISCUSSION

The present study was undertaken to evaluate musculoskeletal tumors by Magnetic Resonance Imaging (MRI) and to correlate findings of MRI with histopathological findings[4,5].

A total of forty patients with musculoskeletal mass lesions suspected clinically and/or on plain radiography were evaluated. All patients underwent plain radiography and MR imaging. Thirty six out of forty patients had histopathological/biopsy/FNAC/surgical findings for correlation. Five patients however were not operated upon for varied reasons (1 – AV malformation, 1 - simple bone cyst, 1 – hemangioma,1-Jugular vein thrombosis).

Specific types of tumors affect certain age groups and anatomic sites. For instance, most osteosarcomas occur during adolescence and about half of them arise in the metaphysis around the knee, either in distal femur or proximal tibia. These are the sites of greatest skeletal growth activity. In contrast, chondrosarcomas tend to develop during mid to late adulthood and frequently involve the trunk limb girdles and proximal long bones. Giant cell tumors almost always arise in the epiphysis of long bones. Thus the location of a tumor provides important diagnostic information[5].

The demographic profile in the present study is discussed as under:

AGE INCIDENCE

Patients of all age groups were included in the study (from 6 years - 75 years). Maximum number of patients were in the age group of 11-30 years (16 patients - (48%).

SEX INCIDENCE

22 males (56%) and 18 females (44%) were included in the study.

INCIDENCE OF CLINICAL FEATURES

In our study the commonest presentation was swelling followed by pain.

NATURE OF LESION

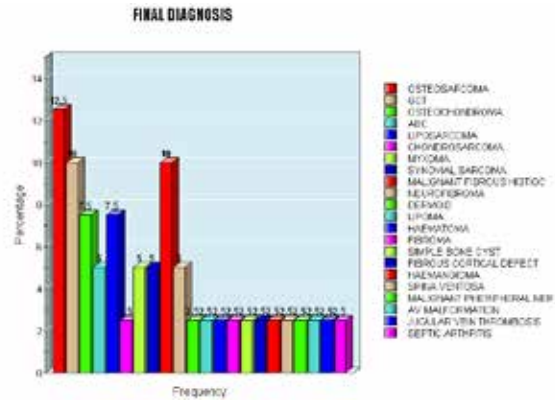
In our series there were 22 (56%) benign lesions, 18 (44%) malignant lesions.

INCIDENCE OF MUSCULOSKELETAL TUMORS

The most common malignant tumor of bone is metastatic carcinoma. Primary malignant tumors are listed according to WHO classification. The frequency of the tumor types is estimated from the extensive experience with 8542 bone tumors at the Mayo Clinic for more than 40 years. Marrow tumors (Multiple myeloma and lymphoma) comprised 3401 (40%) cases and most were diagnosed by marrow aspiration. Of the remaining 5141 (60%) primary non marrow bone tumors, 3113 (61%) were malignant and 2078 (39%) were benign. The malignant tumors consisted of 1330 (43%) of osteosarcoma, 732 (23%) malignant cartilage tumors, 402 (13%) Ewing sarcoma cases, 262 (8%) chordomas, 207 (7%) fibrosarcomas and 187 (6%) miscellaneous tumors. The benign lesions consisted of 1090 (52%) benign cartilage tumors and 142 (13%) miscellaneous tumor types.[5]

In our study also, osteosarcoma was the most frequent malignant primary bone tumor (5 cases-16% of total cases). However instead of benign chondroid lesions, Giant cell tumor was the most common benign primary bone tumor in our series of 40 patients (4 patients -8% of all cases). This may be because most of the patients with GCT came for further imaging and surgical intervention.

DIAGNOSIS	Frequency	Percent
OSTEOSARCOMA(5)	5	12.5%
GCT(4)	4	10%
OSTEOCHONDROMA(3)	3	7.5%
ABC(2)	2	5%
LIPOSARCOMA(3)	3	7.5%
CHONDROSARCOMA(1)	1	2.5%
MYXOMA(2)	2	5%
SYNOVIAL SARCOMA(2)	2	5%
MALIGNANT FIBROUS HISTIOCYTOMA(4)	4	10%
NEUROFIBROMA(2)	2	5%
DERMOID(1)	1	2.5%
LIPOMA(1)	1	2.5%
HAEMATOMA(1)	1	2.5%
FIBROMA(1)	1	2.5%
SIMPLE BONE CYST(1)	1	2.5%
FIBROUS CORTICAL DEFECT(1)	1	2.5%
HAEMANGIOMA(1)	1	2.5%
SPINA VENTOSA(1)	1	2.5%
MALIGNANT PHERIPHERAL NERVE SHEATH TUMOUR(1)	1	2.5%
AV MALFORMATION(1)	1	2.5%
JUGULAR VEIN THROMBOSIS(1)	1	2.5%
SEPTIC ARTHRITIS(1)	1	2.5%
TOTAL	40	100%



Conclusion

1. Magnetic Resonance Imaging is the mode of choice for evaluation of musculoskeletal tumours.
2. It is highly specific & sensitive in diagnosing musculoskeletal tumours.
3. Its combination with conventional radiograph leads to better analysis & accuracy.
4. It gives added information of surrounding tissues including joints & neurovascular bundle.

In the final analysis a combination of Radiography & MRI evaluation gives accurate & all round information regarding the musculoskeletal tumours, increasing the sensitivity & specificity to a much higher extent than if done independently.

RESULTS

The present study was carried out on 40 patients of musculoskeletal tumors suspected clinically and/or on plain radiography. All the cases in the study attended outpatient or were inpatients at ASRAMS. Patients were examined radiologically and findings were recorded as per proforma attached, in all cases. In all patients, plain radiographs were done first followed by MRI (T1W, T2W, STIR, sequences were used to obtain images in coronal, sagittal and axial planes).

FNAC/Biopsy/Histopathological findings were recorded where ever possible

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