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A study on the distribution of osseous spine tumors in terms of age, sex and Incidence: MRI Study

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Abstract

Magnetic resonance is defined as the enhanced absorption of energy that occurs when the nuclei of atoms within an external magnetic field are exposed to radiofrequency energy at a specific frequency called "the Larmor frequency" The phenomenon was first reported in an article by Rals and co-workers in 1939. In the case of a patient with clinical suspicion of osseous spine tumor, a complete clinical history with special reference to neurological symptoms was taken, followed by general physical examination and detailed central nervous system examination. Other systems were also examined and findings were noted. Next, the procedure for MRI was explained to the patient and consent was taken. In this study, 42 patients were studied by MRI. The patients referred for MRI were those suspected to have osseous spine tumors. The sequences used were spin echo T1 Sagittal and axial, FSE T2 sagittal and axial, and GRE T2 axial. Gadolinium DTPA was administered as and when indicated.

Keywords: Magnetic resonance, MRI, spine tumors

Introduction

CT scan, new method of forming images from X-rays was developed and introduced into clinical use by the British physicist Godfrey Hounsfield in 1972. This is referred to as Computed transmission tomography, or computed tomography, or computerised axial tomography (CAT). In CT, the X-ray output is collimated to a very narrow beam. After passing through the patient, it is partially absorbed and the remaining photons of the X-ray photons are converted to scintillations. These can be quantified and recorded digitally. The information is fed into a computer which produces different readings as the X-ray beam is traversed around the subject ^[1].

The spinal cord is difficult to demonstrate routinely by CT. After intrathecal injection of water soluble contrast medium, the CSF space can be opacified providing differentiation of intradural anatomy from the extradural compartment. The value of CT examination of spine is limited by several factors — the contrast and spatial resolution within the spinal canal, the length of spine which is much greater than that of head and the difficulties of localising the level to be scanned.

In 1984, reports began to appear that MRI was potentially more useful than CT in examining the central nervous system. By 1986, surface coils were more readily available, as were thin section imaging techniques and fast scanning using flip angles of less than 90Q with short repetition time and echo time (TRITE) ^[2, 3].

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Bloch in 1946, placed his own finger within the probe of an early MR spectrometer and observed strong signals from hydrogen nuclei. Bloch and Purcell shared the Nobel Prize for elucidating the phenomenon of MR in solids and liquids. It was in 1977 that Damadian and colleagues acquired the first human image with a prototype superconducting magnet ^[6].

Methodology

This was a prospective study of 42 cases with clinical suspicion of osseous spine tumors who had undergone Magnetic Resonance Imaging. The study was conducted in the Department of Radiodiagnosis & Imaging.

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Selection of cases

The cases studied were those from our own hospital — inpatients, outpatients and those referred from other hospitals and clinics.

Screening population

All age groups of both sexes who were suspected to have osseous spine tumor were included.

Method followed

In the case of a patient with clinical suspicion of osseous spine tumor, a complete clinical history with special reference to neurological symptoms was taken, followed by general physical examination and detailed central nervous system examination. Other systems were also examined and findings were noted. Next, the procedure for MRI was explained to the patient and consent was taken.

A detailed history pertaining to the contraindications to MRI was taken. Ear plugs were provided to the patient to minimise noise within the gantry. The patient was then placed in supine position with head first inside the gantry. Proper positioning and immobilisation was done.

Equipment

This study used the MRI machine “Signa Contour’ (General Electric, USA).

It possesses a super conducting K4 magnet with a magnetic field strength of 0.5 Tesla.

Coils used: Phased array Cervical,- Thoracic, Lumbosacral

Pulse sequences

Coronal localiser was obtained first. Then, from this coronal localiser, sagittal localiser was obtained. This was done to apply saturation pulse anterior to the vertebral column to reduce motion artefacts.

Results

Table 1: Tumors of osseous spine — Age Incidence

Age	No. of cases	Percentage
0-10	0	0%
11-20	1	2.38%
21-30	4	9.52%
31-40	10	23.81%
41-50	9	21.43%
51-60	6	14.29%
61-70	9	24.43%
71-80	1	2.38%
>80	2	4.76%

Table 2: Gender wise incidence

Sex	No. of cases	Percentage
Males	27	64.29%
Females	15	35.71%

Table 3: Tumors of osseous spine — Nature

Nature	No. of cases	Percentage
Benign	10	23.81%
Malignant	32	76.19%

Discussion

10 patients in this study were of the 31-40 years age group. 9 cases each were in 41-50 and 61-71 years age groups. Only 2 patients were older than 80 years. In the 0-10 years

of age group there were no cases. The number of male patients was 2/7 and was higher as compared to female patients. The age and sex incidence of each tumor of osseous spine have been compared with the literature subsequently.

Eight patients were in the 31-40 years of age group. 6 patients were in the 61-70 years of age group. Middle aged and elderly adults are most commonly affected. It was noted in this study also that middle aged and elderly adults were most commonly affected.

In this study, 42 patients were studied by MRI. The patients referred for MRI were those suspected to have osseous spine tumors. The sequences used were spin echo T1 Sagittal and axial, FSE T2 sagittal and axial, and GRE T2 axial. Gadolinium DTPA was administered as and when indicated. Additional sequences like STIR and MR myelography were done whenever indicated. The patients were followed up till an operative/biopsy/therapeutic diagnosis was reached.

In this study, 32 cases were malignant and 10 cases were benign. Malignant tumors were more common than benign tumors. Out of the 42 cases, 22 cases were metastasis. Other cases were haemangioma (9), multiple myeloma (5), chordoma (2), chondrosarcoma (2). There was a case each of Ewing's sarcoma | and aneurysmal bone cyst. According to Kricun ME, metastasis is the most frequent tumor in adults and children [7, 8].

Conclusion

Malignant tumors were more common than benign tumors. It was noted in this study too that metastasis was the commonest tumor of the osseous spine.

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