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RETROSPECTIVE OBSERVATIONAL STUDY OF 25 SPINAL TUMORS: THEIR CLINICAL FEATURES & POST-OPERATIVE OUTCOME IN A SINGLE TERTIARY CARE CENTER

Neurosurgery

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ABSTRACT

Introduction: Spinal tumors form a significant crowd among the patients of neurosurgical practice. In most populated areas of the second most populous country of the world, they present with various symptoms and various factors determine their outcome. **Aims:**To analyze the clinical symptoms and correlate with the postoperative status to determine the factors leading to better outcome in spinal tumor patients. **Material and methods:** 25 patients undergoing surgical removal of spinal tumor in Uttar Pradesh, India and their preoperative status, histopathological and clinical outcome were analyzed. **Result:**60% of the patients had a schwannoma and 12% had meningioma. Most patients (52%) had tumors in the dorsal spine. A total of 7 patients motor strength was improved post-operatively. **Conclusion:** Most common tumor type was IDEM and histologically Schwannoma. Good and dedicated surgery can improve motor outcomes in a significant number of patients.

KEYWORDS

Spinal tumor, IDEM, Schwannoma

INTRODUCTION:

The spinal cord is so much more than just a caudal tail-like extension of the brain. With its millions of neurons, nerve fibrils, vessels and miscellaneous structures; it is shrouded within a long segmented strong bony cage called the spinal column. With an assortment of malignant and benign tumors at any of its levels, or the compression caused by the cord parenchyma itself, the spinal column can be the source of a plethora of neural deficits at all ages. Various types of spinal tumors have been described. Commonest among the Intramedullary (IM) are Astrocytoma and Ependymoma [1]; among the Intradural Extramedullary (IDEM) are Schwannoma and Meningioma. Metastasis forms a significant chunk among the Extradural (ED) ones. Other rare tumors have been described [2] by Ju Hyung; a case of Osteochondroma [3], spinal Burkitt lymphoma [4] and spinal Epidermoid. Some common vertebral pathologies known to be silent presented unusually in some case reports as in paper by Lee et al. where hemangioma presented with extensive arachnoiditis [5].

The hospital-based incidences of various tumors, in the occurrence of age, histological tumor type and outcome, were revealed in the analysis of 25 spinal tumors, which were managed over a period of more than 2 years in Department of Neurosurgery, Institute of Medical Sciences, Banaras Hindu University, Varanasi. This single hospital-based epidemiological study being one of its kind, will hopefully serve the purpose of spinal tumor predictability in a given population and the judicious approaches of management.

AIMS:

To analyze the clinical symptoms and correlate with the postoperative status to determine the factors leading to better outcome in spinal tumor patients.

MATERIAL AND METHODS:

The Department of Neurosurgery conducted a retrospective study on a strata of patients of spinal tumor, who were undergoing surgical intervention for the same for a period of more than 2 years beginning from September 2017 to august 2019. All the patients were admitted after clinical assessment under a standard medical protocol and subjected to complete basic hemato-chemical and radio-imaging evaluation. After pre-anesthetic check-up, patients were posted for micro-surgical procedure. The intra-operative ultrasonography was used when required. The histopathological examination of the biopsy specimen was the mainstay of the final diagnosis.

All the patients were categorized according to the anatomical site of the lesion and grouped into Extradural, Intramedullary, Intradural Extramedullary and Extradural types. The anatomical spinal level of the lesion was ascertained by clinical examination and radiological findings. The location and the nature of the lesion in the regions such as cervical, dorsal or lumbar was ascertained by the radio-imaging; for intraoperative localisation C-arm (fluoroscopy imaging) was used. MRC (Medical Research council) grading of motor strength was used for characterizing motor power. These were subdivided according to the histopathological analysis of the tumor tissue (benign or malignant) and the tissue of origin (primary or secondary). The data was compiled, analyzed.

RESULTS:

We had 25 patients in our study and the majority (44%) among them were above 50 years of age. 40% people were between 15 and 50 years and 4% were under 15 years of age. We had a higher incidence in females than male with a ratio of 14:11.

Table-1: Tumor characteristics

Horizontal location		Vertical Location		Histopathology	
IDEM	18 (72%)	Cervical	8 (32%)	Schwannoma	15 (60%)
IM	6 (24%)	Dorsal	13 (52%)	Meningioma	3 (12%)
ED	1 (4%)	Lumbar	4 (16%)	Ependymoma	4 (16%)
-	-	-	-	Others	3 (12%)

Eighteen (72%) of the patients had IDEM tumors (15 Schwannoma & 3 Meningioma). Six patients had Intramedullary (one astrocytoma, one dermoid and 4 Ependymomas) and one had Extradural tumor (metastasis). Most patients had tumors in the dorsal spine 52% (13/25) and lumbar tumors were least (16%) in occurrence. None originated from the sacral level (table-1).

All schwannomas manifested as cord compressive lesions. However, 67% (2/3) meningiomas occurred in dorsal level followed by 33% (1/3) in cervical cord. Astrocytoma manifested as Intramedullary tumor in the dorsal spine. One lumbar metastasis was found in which was later found to be from renal carcinoma. Among Four IDEM Ependymoma, three in dorsal and one in cervical region.

Table-2: Pre-operative & Post-operative Motor strength

MRC grading (Motor Strength)	Pre-operative	Post-operative
2	2 (8%)	0 (0%)
3	11 (44%)	8 (32%)
4	9 (36%)	14 (56%)
5	3 (12%)	3 (12%)

Two patients had motor strength of 2 before surgery, who improved to 3 and remained so on further follow up. Eleven patients had preoperative motor of 3, which improved in five patients and remained same after surgery in others (table-2). About 28% (7/25) patients showed postoperative improvement in their neuro deficits, none worsened postoperatively.

64% of Patients had mild sensory deficit, whereas 32% patient had moderate to severe deficit and only one patient was without any sensory problem. Post-operative five patients had subjective sensory improvement, but on examination it appeared to the same as pre-operative period.

MRI (Magnetic resonance imaging) had been the mainstay of the diagnosis in all patients. The CECT (Contrast-Enhanced Computed Tomography) spine was done in one patient of Extradural lesion. Surgical excision were performed in all patients by standard approach under the control of C-arm, intraoperative ultrasonography. The total surgical excision of tumor was carried out in 92% (23/25) patients. In two patients, total excision couldn't be done and they were one astrocytoma and the only metastasis. The postoperative adjuvant radiotherapy was advised only for the metastasis patient to control pain and spread. None of the patients had mortality. Only one patient (metastasis) developed lung metastasis. Wound infection occurred in 20% (5/25) patients. No patients had CSF (Cerebro Spinal Fluid) leak [6].

DISCUSSION:

In 2012, Duong et al. reported that the incidence of combined malignant & non-malignant primary spinal tumors differs by age, sex, race & ethnicity; but incidence of malignant primary spinal tumors has been stable throughout the 1999–2007 period in United States [7].

Schellinger et al. found that incidence rates were lowest in children aged 0–19 years and highest in adults aged 75–84 years [8]. Likewise, similar age-specific rate patterns were also found in South Korea and Estonia among patients of the central nervous system tumors [9,10]. Patil et al., while analyzing a large database source of 19,017 patients of spinal cord tumor resection in the United States, noted that 9% of the patients treated were <18 years of age [11]. Our study also has more patients from older age group, only 1 out of 25 was less than 15 years of age.

Duong et al. found that among malignant cases, the frequency was distributed almost equally by sex whereas among nonmalignant cases, approximately 60% were diagnosed in women compared with 40% in men. The male:female ratio for Ependymomas was 1:3, and 1:2 for meningiomas [7]. Another study revealed that 53% were women in all spinal cord tumors [10]. The study of Loblaw et al. in 2003, observed 57% males among a population of malignant spinal cord compression [12]. Schellinger et al. found that the overall incidence rate among men was 0.70 per 100,000 persons whereas women had an incidence rate of 0.77 per 100,000 persons [8]. The present study observes a sex incidence variation consistent with most studies with women having higher incidence of spinal tumors (women: men=14:11).

The statistical report of Central Brain Tumor Registry United States-2005 reported that the primary tumors of the spinal cord, spinal meninges, and cauda equina (subsequently referred to as “spinal tumors”) are relatively rare [13]. The similar findings were revealed in 2010 by the study of Engelhard et al. [14]. Tihan et al. reported that Intramedullary spinal cord tumors are rare and account for only 5–10% of spinal tumors [15]. Duong et al. reported that among 11,712 primary spinal tumor incident cases, diagnosed from 2004 to 2007, there were 22.0% (2576) malignant cases and 78.0% nonmalignant primary spinal tumors. The most common histologic types of tumors (62%) were Myxopapillary Ependymomas. The most common spinal tumor was meningiomas (33%) followed by tumors of spinal nerves (27%) and Ependymomas (21%). The spinal cord was the origin of 60.5% of all the primary spinal tumors (combined) followed by spinal meninges (36.0%) and cauda equina (3.5%) [7]. Albanese and Platania in 2002, reported that spinal IDEM tumors account for 2/3 of all intra-spinal neoplasms and are mainly represented by meningiomas (25–46%) and schwannomas [16]. Researchers in another study of primary spinal cord tumors reported that the spinal cord was the origin of tumor in 70.0% patients, spinal meninges in 26.0%, and cauda equina in 4.0% patients. While the most common histologic type of spinal tumors were meningiomas (29%), this was followed by nerve sheath tumors (24%) and ependymomas (23%) [17]. The Croatian study noted that more than 50% of the spinal tumors diagnosed in the population were located in the spinal meninges [18]. However, these results differed from a Norwegian study that found equal proportions of tumors originating from spinal cord and spinal meninges [19]. The present study varied from the above reports, where the spinal cord was origin to only 24% (one astrocytoma, one dermoid and 4 ependymoma). Rest of the tumors arose from Extradural or IDEM region. The possible explanations for these variations in the present study may be the small sample size and the difference in the size of population.

Frank et al. reviewed a series of 95 patients in which 28% patients were negative for a bone scan, but MRI scan revealed the tumor and the study found a discordance rate of 31% between the two imaging modalities [20]. The study of Patchell et al. in 2005, revealed that MRI with whole spine sagittal T1 and T2 and axial T1 images were superior for detecting metastatic spine as compared to all other investigations [21]. Bilsky et al. observed that though MRI has revolutionized assessment of metastatic spinal tumor, many other imaging modalities play a role in evaluation of metastatic spinal tumor including plain radiographs, bone scan, CT scan, myelogram, and positron emission topography [22]. Algra et al. in a research study reported that bone scans rely on an osteoblastic reaction or bone deposition to detect spinal metastases [23] while Gosfield et al. stated that patients with rapidly progressive and destructive tumors, such as multiple myeloma, may not be detected by the bone scan [24]. In our study also MRI has been the mainstay of the diagnosis in all patients.

It is reported that removal of the tumor was complete in 90% of meningioma and 94% of schwannomas [16]. Patchell et al. found the direct decompressive surgery plus postoperative radiotherapy is superior than treatment with radiotherapy alone for patients with spinal cord compression caused by metastatic cancer [21]. The present study shows that total surgical excision of the tumor was carried out in 92% (23/25) patients.

CONCLUSION:

This study provided an insight into incidences of primary benign, malignant and metastatic spinal cord, meningeal and vertebral column tumors on the basis of histopathological evidence. MRI continues to be the imaging modality of choice for spinal tumors. Most common tumor type was IDEM and histologically most common was Schwannoma. Maximum safe resection can improve outcomes in a significant number of patients.

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