



Demographic, Clinical and Histopathological Characteristics and Outcome of Primary Spinal Tumors in a Tertiary Care Center in Nepal

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ABSTRACT

Introduction: Primary spinal tumors are described based on their location as intramedullary, intradural extramedullary, and extradural tumors. Advancements in imaging and surgical techniques have significantly improved the outcome. There are very few studies describing demographics and clinical characteristics of patients with spinal tumors from Nepal. The aim of this study is to describe demographic, clinical and histopathological characteristics and outcome of patients with spinal tumors in a University Hospital in Nepal.

Methods: Review of hospital records and follow up reports of all patients who were operated for spinal tumors at Tribhuvan University Teaching Hospital in Kathmandu, Nepal from January 2019 to January 2021 was done. Age, sex, clinical presentation, site of the tumor, degree of resection, histopathological diagnosis and neurological outcome in 3 months were analyzed.

Results: Of 41 primary spinal tumors, 56% were male patients. The most frequent tumor site was the thoracic (46.3%) followed by the cervical (24.4%) and the lumbar level (12.2%). The most common anatomical location was intradural extramedullary (51.2%). Spinal tumors were most common in the age group of less than 20 years (43.9%). Most of the patients presented with both sensory and motor symptoms (65.9%). Gross total excision of the tumor was done in 78.1%. Improved post-operative neurological status was seen in 80.5% in 3 months.

Conclusions: Results from this study document the demographic characteristics, histological subgroups, symptoms and signs, treatment, and frequency of complications in patients with spinal tumors. Data presented here can be used to gain a better understanding of patients with spinal tumors and to provide a baseline for future studies.

Keywords: Intradural extramedullary; intramedullary; primary spinal cord tumor; outcome

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INTRODUCTION

Primary spinal tumors comprise 4–8% of tumors arising from the CNS.¹ Three main types of tumors exist in the spine: extradural, intradural extramedullary (IDEM), and intramedullary tumors. The most common IDEM tumors include meningioma and schwannoma. Intramedullary spinal tumors are rare lesions. Overall, ependymomas are the most frequent intramedullary spinal tumors, followed by astrocytomas.^{2,3,4,5}

In a study published in 2004 by our group showed that in the lumbar spine extradural tumors were the commonest whereas in the cervical and thoracic areas, IDEM was the commonest site.⁶

Advancements in diagnostics, surgical techniques, equipment and oncological treatment have improved the overall outcome.

The constellation of symptoms may include sensory loss, nonspecific back pain, ataxia, motor weakness, and lack of proprioception. Radiculopathy followed by weakness may be more common in patients with nerve sheath tumors.⁷ Weakness in the setting of a nerve sheath tumor is a concerning sign for malignancy. Cervical lesions may also present with headaches and occipital pain due to involvement of the upper cervical roots.^{7,8}

There is a paucity of population-based data on demographics and outcome of primary spinal tumors in Nepal. In the absence of a comprehensive population-based national tumor registry, we depend on local hospital-based registries to describe spinal tumors in low income countries like Nepal. Hence, more and more institutional data are required to assess the actual disease load in Nepal.

METHODS

Review of hospital charts, discharge summaries and follow up reports of all patients who were operated for spinal tumors at Tribhuvan University Teaching Hospital in Kathmandu, Nepal from January 2019 to January 2021 was done. Ethical clearance was taken from the institutional review board of our institute. Age, sex, clinical presentation, anatomical location, histopathological findings, degree of resection and outcome in 3 months were analyzed. The patient's clinical outcome was evaluated comparing McCormick Scale (Table 1) pre-operatively and in three months.⁹ The outcome was described as improved, stable, deteriorated or death.

Statistical analyses were performed using IBM SPSS Statistics 21 (IBM Corporation, USA). Continuous data were expressed as means and standard deviations and nominal data were expressed as frequencies and proportions.

RESULTS

Of 41 patients with primary spinal tumors, 23 (56%) were males. The mean age was 33.9 ± 18.3 years ranging from 2 years to 73 years. Spinal tumors were most common in the age group less than 20 years as shown in Table 2. Most of the patients presented with both sensory and motor symptoms (Table 3). Duration of symptoms varied from 2 months to 4 years. Table 4 describes the location of the tumor in terms of vertebral levels. The most frequent tumor site was the thoracic level. Different types of tumors are shown in Table 5. The most common type was IDEM followed by extradural and intramedullary tumors. Figure 1 shows Pre-operative A) T2 weighted sagittal view, B) Axial T1 and C) post-contrast sagittal MRI of a patient showing a typical example of IDEM at the level of C4. This patient was found to have a nerve sheath schwannoma on histopathological examination. Out of 41 patients, we were able to achieve gross total resection in 32(78%) patients. Subtotal resection was done in 7 patients and biopsy only in 2 patients. Neurological improvement was noted in 33 (80.5%) patients while 6 (14.6%) patients were stable and 2(4.9%) deteriorated. One patient who had C7-T1 intramedullary lipoma died in our series while he has getting treatment in the rehabilitation center.

Table 1. Modified McCormick Scale

Functional grade	Clinical prerequisites
I	Intact neurologically, normal ambulation, minimal dysesthesia
II	Mild motor or sensory deficit, functional independence
III	Moderate deficit, limitation of function, independent with external aid
IV	Severe motor or sensory deficit, limited function, dependent
V	Paraplegia or quadriplegia, even w/ flickering movement

Table 2. Age distribution of Patients with Spinal Tumor (n = 41)

Age in years	No.(%)
<20	14(34.1)
20-39	10(24.4)
40-59	13(31.7)
≥60	4(9.8)

Table 3. Clinical Manifestations (n=41)

Presentations	No. (%)
Sensory symptoms only	8(19.5)
Motor symptoms only	6(14.6)
Sensory and motor symptoms	22(53.6)
Sensory, Motor, Bowel and Bladder involvement	4(9.7)
Others- lump only	1(2.4)

Table 4. Spinal Level of the Tumors (N =41)

Spinal Level	No.(%)
Cervical	10(24.39)
Thoracic	19(46.34)
Lumbar	5(12.19)
Sacral	2(4.87)
Multiple Levels	5(12.19)

Table 5 . Site of the Tumor and Pathological Diagnosis (N=41)

Site	Pathological diagnosis	Number	No.(%)
Extradural	Sacral chordoma	1	8(19.5)
	Hemangioma	1	
	Neurogenic tumor	1	
	Schwannoma	3	
	Meningioma	1	
	Lipoma	1	
	Schwannoma	13	
	Meningioma	3	
	Arachnoid cyst	1	
	Granuloma	1	
IDEM	Lymphoma	1	23(56.1)
	Ependymoma	2	
		2	
	Dermoid cyst		
Intramedullary	Lipoma	2	8(19.5)
	Astrocytoma	2	
	Dermoid	1	
	Ependymoma	3	
Mixed	Schwannoma	2	2(4.9)

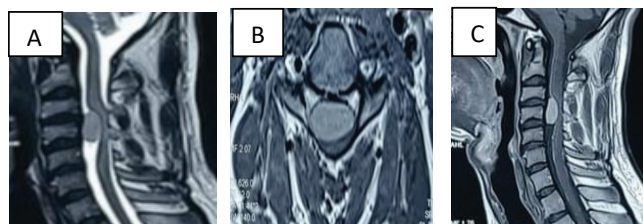


Figure 1. Shows a representative case 35 years male diagnosed with C4 IDEM

DISCUSSION

There is a paucity of population-based data on demographics and outcome of primary spinal tumor in Nepal. With this study, we tried to analyze hospital-based data on demographics, clinical characteristics and outcome of spinal tumors.

The most common site for extradural tumors is the vertebral body. Metastatic disease is the most common source of an extradural neoplasm.¹⁰ The most common IDEM tumors are nerve sheath tumors (Schwannomas) arising from sheath cells of spinal nerve roots and meningiomas from arachnoid cap cells.^{11,12,13} Lipomas and dermoid/epidermoid cysts are less common.^{12,13} Patients with IDEM tumors mostly present with features of spinal cord or root compression. Local pain or radicular pain are common presenting features. Paresthesia and numbness associated with motor and sensory deficits are other common presentations.^{11, 12, 13}

Intramedullary spinal tumors arise from the spinal cord proper, leading to invasion and destruction of the gray and white matter. Ependymomas and astrocytomas are the most commonly encountered intramedullary spinal tumors, followed by hemangioblastomas.^{14,15,16}

Spinal tumors contribute a good percentage in the workload of spinal surgery in our institute. In a study by Shah et al., out of 63 operated spine patients during the period of 11 months (April 2019 – February 2020) in our department, spinal tumors constituted 17.4% of the cases.¹⁷

In our study there was male preponderance (56%), almost similar to the findings by Schellinger et.al. (58% males, 44% females). The most common spinal tumor overall was meningioma (29%) in their study¹⁸ while schwannoma was the most common spinal tumor overall in our series (39%).

The average duration of presenting symptoms was 11.1 months in our series while previous reports ranged from 2 to 9 months.^{19,20,21}

Bouffet et al. reported that patients with primary spinal tumors had pain and weakness as the predominant presenting features in many patients similar to our findings.²¹

The most common type of primary spinal tumor (56.1%) in our study was IDEM followed by extradural and intramedullary tumors similar to the findings in most of the series.^{22,23}

The thoracic spine was the most common spinal level involved in 46.34% patients, followed by the cervical spine (24.4%) and lumbar spine (12.2%). These findings are comparable to the data reported by Zhou et.al {thoracic spine (38.1%) followed by the cervical spine (27.4%) and lumbar spine (18.4%).}²⁴

In a study by Sharma et.al, the most common extradural tumor was neurofibroma (44.4 %) but in our study, it was schwannoma (37.5%).²⁵

In our study, 32 cases (78%) had complete excision of the tumor whereas 7 cases (17.1%) had subtotal excision and 2 cases (4.9%) had biopsy only. In one case, surgery was aborted due to massive bleeding and re-surgery was done after 4 days. No other major intra-operative complications were noted.

In a study by Sharma et.al, functional outcome of spinal tumors after total surgical resection was excellent. More than 95% of patients in their series had achieved near to normal neurological function after surgical intervention in 3 months.²⁶ In our study, 33 patients (80.5%) had improved neurological status, 5 patients (12.2%) had stable neurology whereas 2 patients (4.9%) had neurological deterioration postoperatively. One patient died of unknown cause while getting rehabilitation in another center 2 months after surgery.

CONCLUSIONS

In this study, majority were male patients and most of them presented with both sensory and motor symptoms. The most common spinal level was thoracic and the most common site of the primary spinal tumor was IDEM. The common histological finding overall was schwannoma. Post-operative neurological deterioration was uncommon and there was no direct surgery related mortality.

Results from this study provide information on demographic, clinical and histopathological characteristics and outcome of primary spinal tumors

in our institution. Some of the results confirm those in the literature, while others represent new information. Data presented here can be used to gain a better understanding of patients with spinal tumors and to provide a baseline for future studies.

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