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Surgical Approach for Spinal Tumors: Our Experience in Combined Military Hospital Dhaka

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Abstract: (1) Background: spinal tumors not only causes structural problem but also it affects body functionality, too. Surgery has a key role in management of patients with spinal tumor. The aim of this study is that to observe their clinical profile, functional outcomes and prognostic factors. (2) Methods: 20 retrospectively consecutive patients with spinal tumors operated over a period of 2 years were analyzed. (3) Results: nine (45%) were intradural and 11(55%) were extradural. Mean age at surgery was 45.05 years (range 20–80 years). The common clinical features were pain, limb weakness and autonomic involvement. Schwannoma was common in intradural extramedullary group whereas astrocytoma and ependymoma was common in intramedullary group. In this case, 16 (80%) patients had improvement following surgery and 4 (20%) remained the same, none had deterioration. Common complications were persistent pain (1 case) and autonomic involvement (1 case). (4) Conclusion: spinal tumors need early exploration and excision and usually patients recover well without any residual effect.

Keywords: spine tumor; surgery; clinical outcomes; quality of life

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1. Introduction

Surgical outcome of spinal tumors varies depending on a number of factors such as site of tumor, extent of compression, the histological characteristics of tumor and patient's age, comorbidity, tumor extension, involvement of neighboring structures, etc. Treatment of spinal cord tumor is complex and a multidisciplinary approach is preferred. Treatment options are surgery, radiation therapy and chemotherapy. Spinal tumors are 10 times less frequent than intracranial tumors with majority of them being benign. Benign and malignant neoplasms can arise from intraspinal structures such as meninges, spinal cord, nerve roots, blood vessels and other tissues. According to their location, spinal tumors are usually classified as extradural and intradural, although some can be both inside and outside the dura. Intradural tumors can be intramedullary (intramedullary spinal cord tumor (IMSCT)) or extramedullary (intradural extramedullary (IDEM)) [1,2]. Space occupying lesions in the spinal canal causes compression of the structures with consequent neurological deficits. Rapidly growing lesions cause severe loss of function, as there is no time for the spinal cord to adjust itself. The presence of a tumor interferes with the normal movements of the cord, which occur during movements of the spinal column. Such impairment contributes to cord damage. In long standing tumors, there may be gliosis in the spinal cord due to ischemia and recovery may be incomplete despite total tumor resection. Initial assessment of the patient, with a primary spinal tumor, requires detailed history and clinical examination. Clinical presentation usually relates to pain, varying degrees of motor and sensory deficits as well as bowel, occasionally bladder symptoms, which may be due to either mass effect or neurological compression [3].

In this study, we analyzed the patients of spinal tumors that we surgically managed, to see the trend of spinal tumors in Combined Military Hospital, Dhaka. The cases were evaluated with regard to the pathological diagnosis, preoperative medical history, clinical symptoms, surgical treatment, outcome, recurrence and prognostic factors.

2. Materials and Methods

This was a retrospective study of 20 consecutive patients with spinal tumors who were treated surgically at Neurosurgery Center of Combined Military Hospital, Dhaka, from Jan 2019 to Dec 2020. This is one of the largest tertiary care referral institutes for military people. Data were collected from hospital records. This study was conducted to analyze factors with impact on the functional outcome in a series of 20 surgically treated patients with spinal tumor and to point out the characteristics of different histological entities.

Inclusion criterion

- Primary and secondary tumors of the spine.

Exclusion criterion

- Vascular malformations.
- Infective pathologies including Pott's spine.
- The patients with inadequate record.
- Follow-up < 1.5 months after surgery were excluded from the study.

Each patient's medical history, findings of the physical examination performed in an in/out-patient department, radiological examination records were investigated. All patients were examined by contrast magnetic resonance imaging of the whole spine. Appropriate radiology was obtained during follow-up to assess the extent of resection and recurrences.

3. Results

A total of 20 patients fulfilled the inclusion criterion. There were 11 patients with extradural tumors, 9 had IDEM and none had intramedullary tumors. There were 72% males. Mean age at time of surgery was 45.05 years. There were no patients in pediatric (<18 years) age group. The demographic profile of patients is represented in Table 1.

Table 1. Demographic data.

	Extradural	IDEM
No of patients	11	9
Age (mean, years)	30–75	30–80
M:F	8:3	7:2
Mean preoperative duration of symptoms (months)	4–8	18–36

Overall, 8/20 (40%) were nerve sheath tumors followed by astrocytoma 6/20 (30%). The thoracic region of spinal canal was most frequently involved (10; 50%) followed by thoracolumbar (5; 25%), cervical (3; 15%) and lumbar (2; 10%) region, see Table 2.

Table 2. Location of the spine lesions.

Location of the Spine Lesions	Patients (%)
Cervical	3 (15%)
Thoracic	10 (50%)
Thoracolumbar	5 (25%)
Lumbar	2 (10%)

The common clinical symptom was motor weakness 9 cases; (45%) followed by sensory loss and pain. Sphincter disturbances were present in 6 patients (30%). The weakness in the majority was spastic. Table 3 shows all details.

Table 3. Clinical presentation.

Presenting Feature	Patients (%)
Motor weakness	9 (45%)
Pain	14 (70%)
Sensory loss	8 (40%)
Autonomic involvement	6 (30%)
Localized tenderness	2 (10%)

A posterior approach using standard microsurgical techniques was performed in all cases, and this was irrespective of the location of a tumor. We did not require instrumentation in any case. Total excision was achieved in 90% (18 patients). We defined a "good outcome" the improvement in patient's preoperative modified McCormick score, at the time of last follow-up, usually at 6 to 8 months after surgery. Those who had an improvement of $\geq$2 grades were labeled as having "significant improvement". The patients who either remained the same or showed a deterioration of modified McCormick score were considered "poor outcome". In our series, 16/20 (80%) patients had a good outcome during last follow-up

4. Discussion

Primary spinal tumors account for 4–10% of all central nervous system tumors and are based on their location as intramedullary (IMSCT), IDEM and extradural [4]. In total, two-thirds of all spinal tumors were reported to be IDEM and 10% IMSCT [5] but we had more incidence of extradural tumor in our series. This difference may be due to tertiary referral at our institute or this may represent the epidemiological trend among our population.

The literature indicates that in Western populations, the primary spinal tumors occur more frequently in females, whereas Asian studies show a slight male preponderance [6,7]. Similar male to female ratio has been reported by other studies from India [8–12].

Astrocytomas and ependymomas represent the most common intramedullary neoplasms. Ependymomas are the most frequent IMSCTs in adults while astrocytomas are more frequent in the pediatric population [8,13,14]. Other intramedullary lesions include dermoid, epidermoids, hemangioblastomas (HGBs), lipomas, gangliogliomas, lymphomas and metastasis etc., congenital malformative tumors such as dermoids and epidermoids (not associated with spina bifida) account for only 5–8% of intramedullary lesions in Western populations. The most common IDEM spinal cord tumors are nerve sheath tumors (schwannomas/neurofibromas) followed by meningiomas. Fewer frequent subtypes include epidermoids, dermoid, developmental cysts, paraganglioma, lipoma, spinal nerve sheath myxoma, etc. [15]. We had 8/20 (40%) nerve sheath tumors and 6/20 (30%) astrocytoma. These data are aligned with existing literature.

Surgery has a key role in management of patients with spinal tumor, however radiation therapy and chemotherapy have sometimes to be taken into account. Complete resection may be accomplished and is often curative. Radiotherapy is reserved for rare malignant variants and for patients in whom surgery is contraindicated [16]. Chemotherapy is administered for recurrent primary spinal cord tumors without other options, that is, reoperation or re-irradiation [16]. Laser Interstitial Thermal Therapy (LITT) can be both feasible and safe alternative to separation surgery in carefully selected cases of spinal metastatic tumor epidural compression, but rarely used in primary spinal tumor [17,18].

Overall, in our series of spinal tumors, the most common histological is nerve sheath tumors (8/20; 40%), followed by astrocytoma (6/20, 30%). Our series represents single handed experience of the senior author. Histology and location of the tumor affect the extent of surgical resection. However, astrocytomas infiltrate the spinal cord and complete resection is rare. The extent of resection is based on presence/absence of a cleavage plain observed intraoperatively. IDEM tumors (represented by schwannomas, neurofibromas and meningiomas are usually amenable to surgical resection. We could excise 18/20 (90%) of tumors totally and only biopsy was possible in two cases. These rates are comparable to

resection rates reported by others [19–25]. An improvement of ≥2 grades according with preoperative modified McCormick score was reported in 16 out of 20 patients (80%).We evaluated the effect of different preoperative factors on outcome of patients. Age and gender had no effect on outcome. We found a statistically significant effect of the preoperative neurologic status on the postoperative outcome of patients.

5. Conclusions

Surgery should be considered as first option of choice in patients with primary spinal tumors. Complete resection of spinal tumor is almost always possible. After spinal tumor surgery, the majority of our patients turned out tumor free and asymptomatic. More researches are needed in order to achieve a consistent approach about spinal tumor surgery, but maybe it can represent a first step of a new journey and a better approach to life.

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