

## Surgical Outcome of Spinal Tumors in a Tertiary Care Hospital, India

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### Abstract

**Introduction:** Now a day's schwannomas, meningiomas and neurofibromas are more commonly seen spinal tumors in the cervical spine, thoracic spine and lumbar spine respectively. Intradural extramedullary spinal tumors are almost benign, however the aim of the surgical management is always total excision.

**Objectives:** The current study was conducted to know the incidence of different types of tumours in intradural extramedullary compartment and analysis of the clinical presentation, to study the radiological features, to study treatment modality and functional outcome of after surgery.

**Methodology:** A total of 44 patients with intradural extramedullary spinal tumor with all the age group and sex were included in the study. These patients were clinically evaluated for their signs and symptoms and they were investigated with X-ray, CT scan and MRI scan. The surgical excision was carried out based on the outcome of investigations. The various neurological scales like Frankel scale and McCormik scale were used to assess the functional outcome of the patients, postoperatively.

**Results:** From the current study it can be concluded that the Intradural extramedullary tumors are majorly benign type largely affecting in 41-60 years of age with male predominance. Shwannoma and Meniongioma are the typical type of spinal tumors with dorsal location largely. The significant neurological and sphincter control improvement was observed in postoperative patients. Postoperative McCormik Grade II scoring was achieved with good functional outcome.

**Keywords:** Spinal tumors, Shwannoma, Functional outcome

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### Introduction

The CNS tumors can be primary or secondary due to metastasis. Nearly 15% of CNS tumors are spinal tumors [1]. Based on the site of location, the spinal tumors can be classified in to -A) Extra dural tumors B) Intradural tumors. The Intradural tumours further categorized in to intramedullary and

extramedullary [2]. the extradural tumors arise outside the cord in vertebral bodies or epidural tissues and they contribute 55% of spinal tumors. The intradural extramedullary (IDEM) tumors arise in leptomeninges or roots and constitute 40% of all primary spinal tumors and the

intradural intramedullary tumors account for only 5% of spinal tumors. The incidence rate of IDEM tumors is only 3-10 per 100,000 people, as these lesions are exceptionally uncommon [3].

The IDEM tumors are common in young middle age group who will present with most common complaint of pain which might be radicular (increases with Valsalva maneuver and spine movement) or local pain like stiff neck or stiff back. Few patients will also present with nocturnal pain. The second most common complaint is motor weakness, followed by sensory changes or paresthesia. The urinary incontinence or fecal incontinence can also be encountered [1]. The most prevalent tumors among intradural extramedullary (IDEM) spinal tumors are Meningiomas, Neurofibromas, Filum terminale ependymomas and Lipomas [4]. The spine and spinal cord control the many vital functions of the body and the tissues of nervous system are very vulnerable, hence the treatment of spinal cord tumors should be multidisciplinary approach. The first line of investigation for all IDEM tumors is magnetic resonance imaging (MRI) with and without contrast (gadolinium). The MRI will help in assessing the exact position of the tumour and its topographical relationship with the spinal cord. The other investigations like X-ray spine, CT scan spine, MR myelogram and bone scan can be done. The asymptomatic lesions may be followed as there is significant risk of neurologic deficit with surgery. But, the symptomatic lesions require surgery as early as possible [5]. The current study was conducted to know the incidence of different types of tumours in intradural extramedullary compartment and analysis of the clinical presentation, to study the radiological features and to study treatment modality.

### Materials and Methods

The present study is a prospective observational study which was conducted in Department of Neurosurgery, Madras Medical College, Madras. After obtaining

approval from Institutional Ethical Committee, a total of 44 patients presenting with signs and symptoms of spinal tumors were included in the study. The informed consent form was taken from all the included patient before initiating the study. Patients who denied to give the informed consent and refused for the investigations or surgery were excluded from the study.

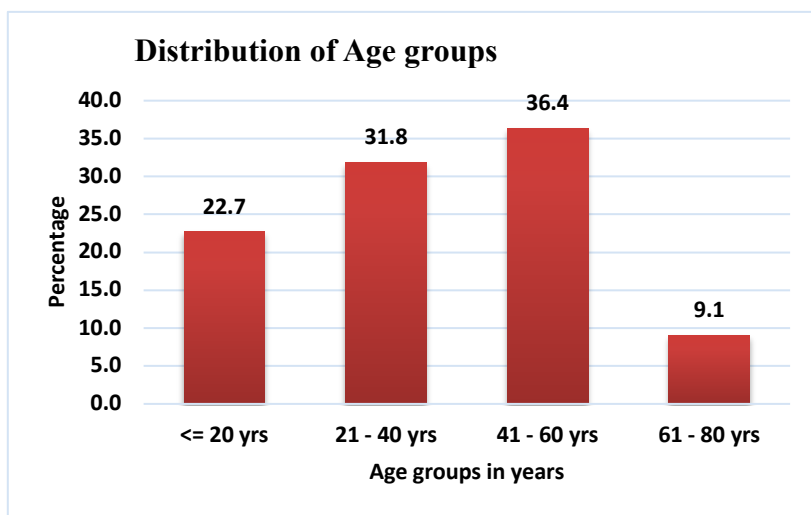
The special performa was designed to collect the data of patient. All the patients who met the inclusion criteria underwent the proper clinical evaluation and demographic details, signs and symptoms, duration of illness, complaints of sensory and motor deficit were collected in the performa. The preoperative functional status and severity of the pain were assessed using Frankel grading and the Nurick grading scale and Denis pain scale (DPS) respectively. All the patients were evaluated with radiological investigations like X-ray spine and MRI spine, to mark the variations in spine and its joints and to assess the extension of the tumor with cord. A total of 44 patients were operated for the tumors and total excision of tumor was done via classical laminectomy. Various neurological examination scales and functional outcome scales are available to describe the patients with spinal tumors. The Modified Frankel scale and Nurick scale are used in the current study to assess the preoperative and postoperative functional status of the patients. Most of the spinal cord tumors causes the loss of control on bowel and bladder leading to bowel incontinence and urinary incontinence. In the present study, we have assessed the sphincter control preoperatively and postoperatively to find out the significance of surgical management. The postoperatively, all the patients were followed up regularly and treated for complications if any. The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find

the significance in categorical data Chi-Square test was used similarly if the expected cell frequency is less than 5 in 2x2 tables then the Fisher's Exact was used. In both the above statistical tools the probability value 0.05 is considered as significant level.

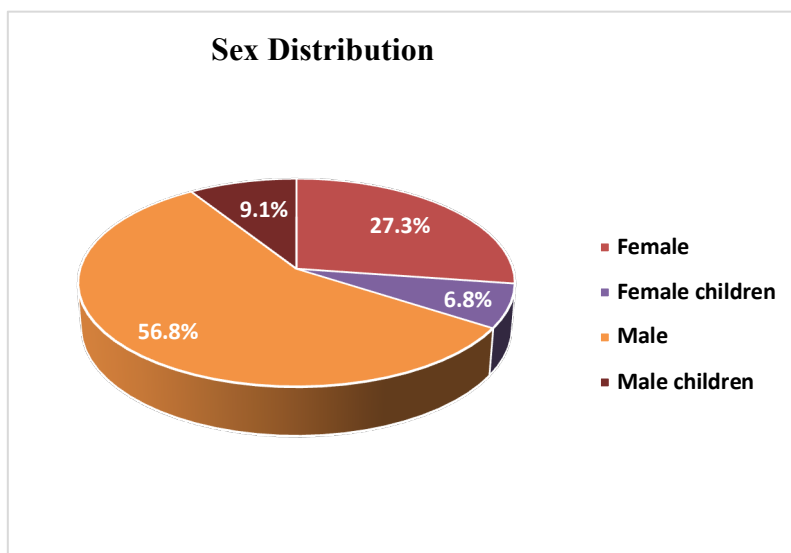
**Results**

In the present study it is observed that, out

of 44 IDEM tumor patients, 10 cases were less than 20 years of age group. And 13 cases were with age group of 21-40 years, 16 cases were with age group of 41-60 years, and 5 cases were with age group of 61-80 years. The mean age of the patients was 36.7 years. (Figure 1) In the present study, it is observed that IDEM spinal tumors were affecting majorly in male population than females. (Figure 2)



**Figure 1: Distribution of Age groups**

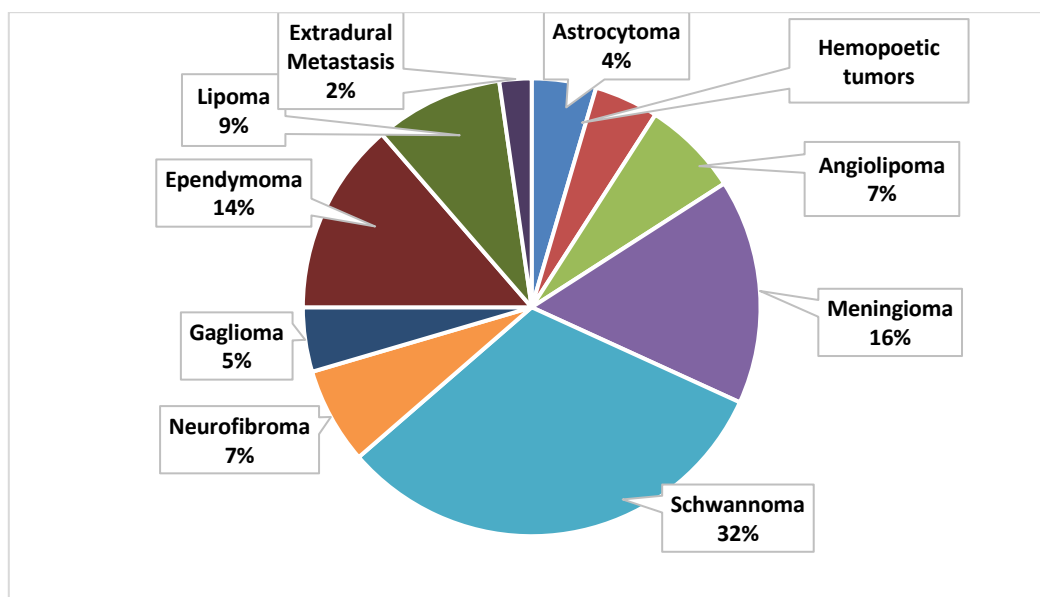


**Figure 2: Sex Distribution**

In the present study, among 45 patients, majority of them presented with motor weakness (37.7%) followed by pain along with motor weakness in 33.35% of the patients.

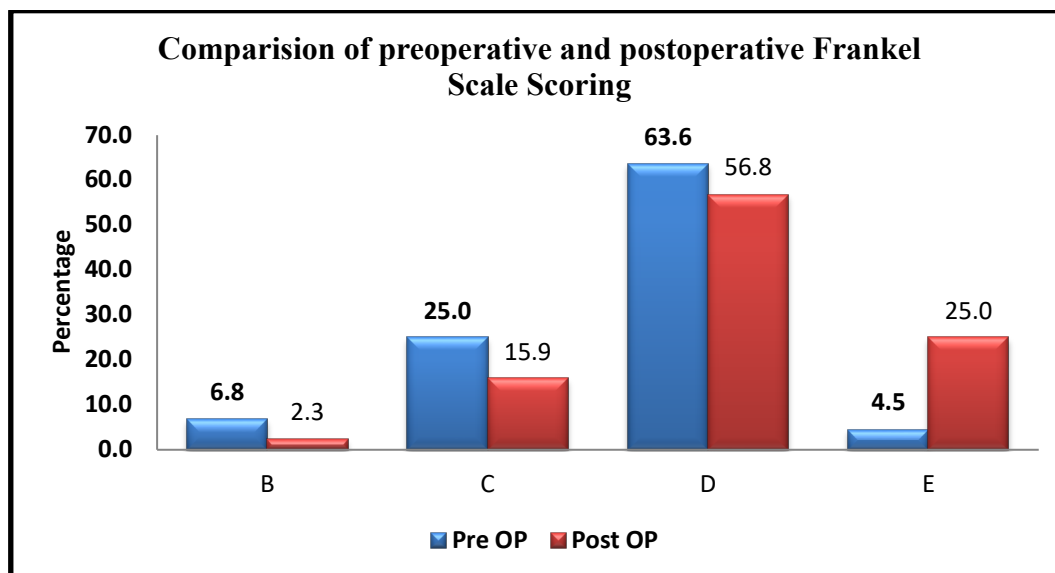
Figure 3 shows the distribution of various types of spinal tumors which were diagnosed after MRI scanning. Schwannoma were diagnosed in 32 % of the total cases. The second most common spinal tumor was found to be Meningioma (15.5%) and further more, 13.8% cases of Ependymoma, 9% cases of Lipoma, 6.6% cases of Angiolipoma and Neurofibroma, 4.4% cases

of Astrocytoma, Hemopoetic tumors and Gaglioma, only 2.2% cases of Extradural Metastasis were encountered in the present study.



**Figure 3: Pathology of Spinal Tumors**

In the present study, Frankel Scale Scoring shows that 63.6% of patients were having functional motor sparing (Group D) preoperatively. And 25% of the patients were having functionally useless motor sparing. Few patients (6.8%) had complete motor involvement, some sensory sparing including sacral sparing and 4.5 % of patients and no neurologic involvement. However, in after surgical management, 56.8% of patients had Group D scoring and 25% of patients had Group E scoring. According to Pearson Chi-square test a clinically significant (p value 0.0005) improvement in motor and neurological functions was seen. (Figure 4)



**Figure 4: Comparison of preoperative and postoperative Frankel Scale Scoring**

In the present study, among the 44 cases, 33(75%) patients had a control over bowel and bladder and 11(25%) patients had lost their sphincter control due to nerve compression. However, after surgical management two more patients (36 patients) gained control over the

bowel and bladder. And in 18.2% of the patients, sphincter control was absent postoperatively. The level of significance was less than 0.0005. (Figure 5)

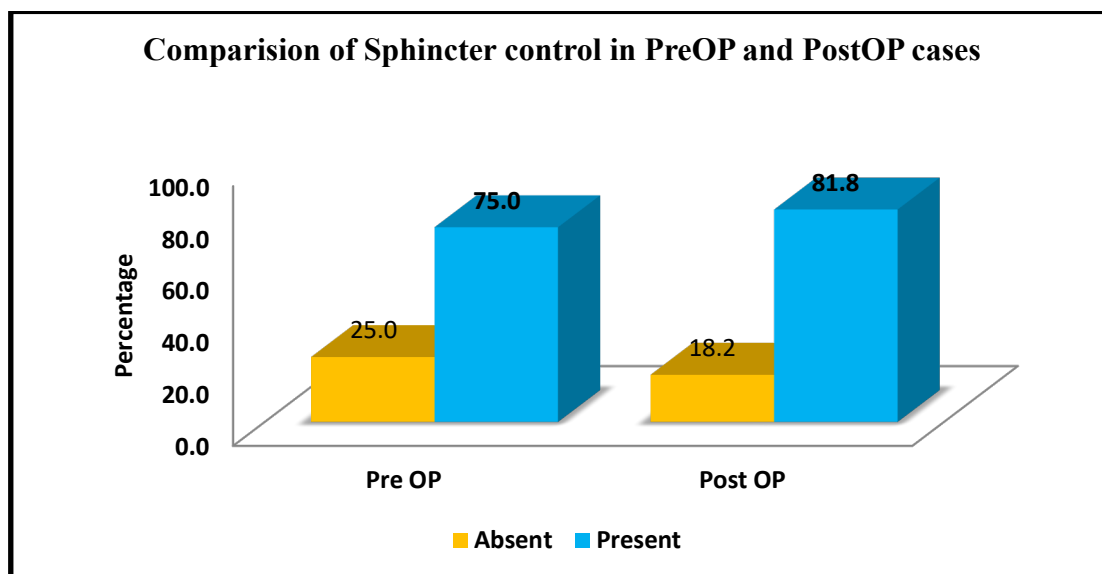


Figure 5: Comparison of Sphincter control in PreOP and PostOP cases

A modified McCormick Scale (Grades I-V) was used to assess ambulatory ability (I = normal ambulation; II = mild motor sensory deficit, independent without external aid; III = independent with external aid; IV = care required; and V = wheelchair required).

In the contemporary study, out of 44 cases, 27(61.4%) patients were falling into the grade II of McCork scale during the preoperative period. Further, 11 (25%), 4(9.1%) and 2 (4.5%) patients were falling into grade III, grade IV and grade I, respectively. However, the McCork scale scoring done during the postoperative period (after surgical excision of the tumor) were as follows-11(25%) patients with grade I, 25(56.8%) patients with grade II, 6 (4.5%) patients with grade III and 2(4.5%) with grade IV. The ambulatory status was significantly improved (p less than 0.0005) in postoperative patients. (Figure 6)

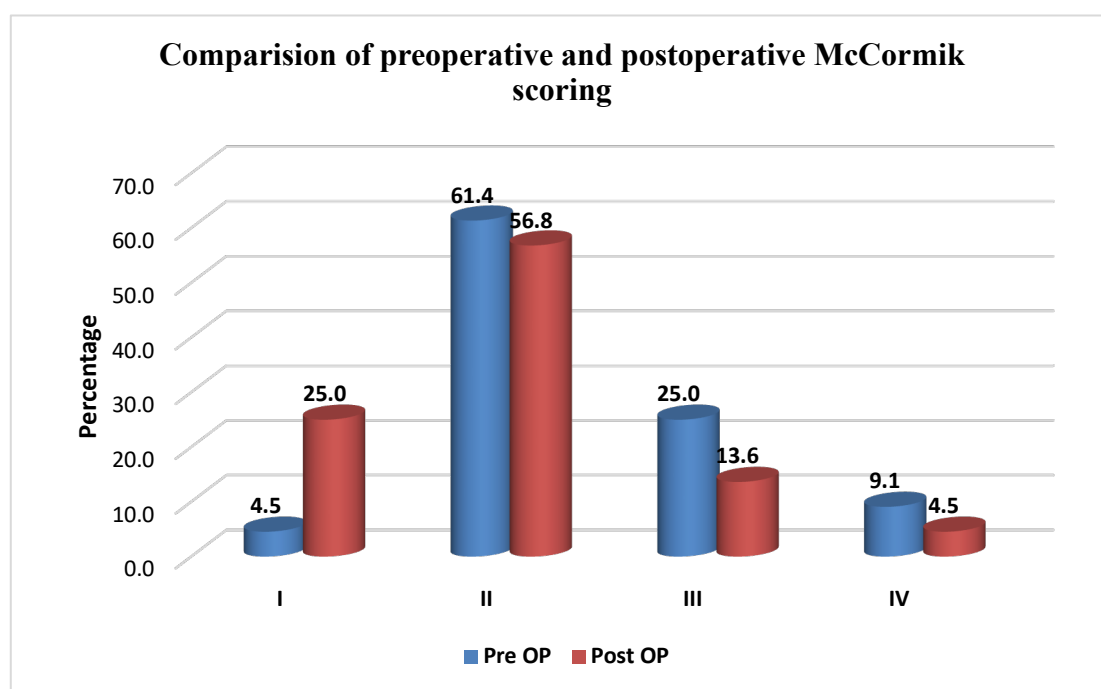


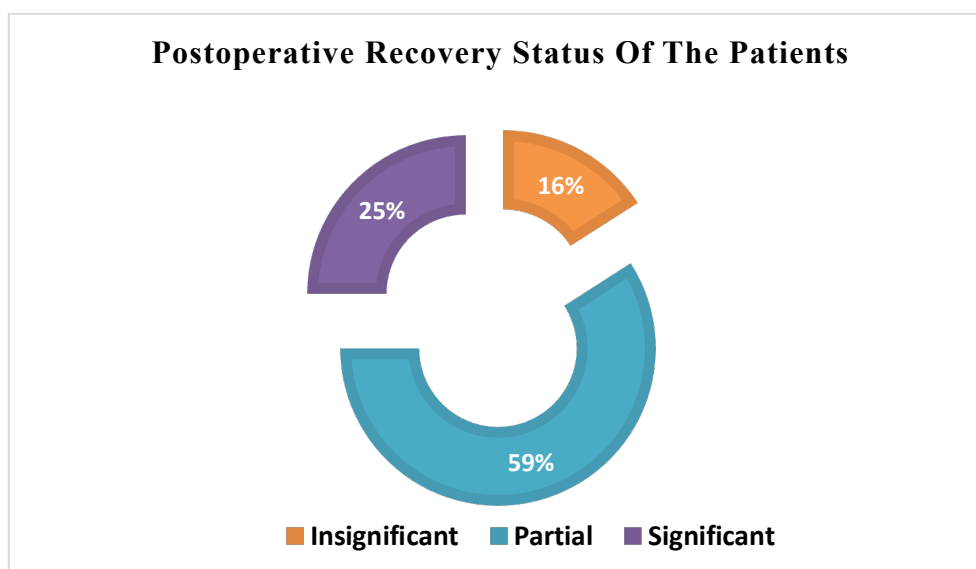
Figure 6: Comparison of preoperative and postoperative McCormik scoring

**Table 1** shows the various surgical procedures carried out in 44 patients with spinal tumors. In the present study, majority of the patient (84.1%) underwent Laminectomy. The biopsy, laminectomy with drainage, foraminotomy, partial excision and total excision was also done in required patients.

**Table 1: Types of the Surgical Procedures**

Procedure	Number(n=44)	Percentage (%)
Biopsy	1	2.3
LE	37	84.1
LE+ Draniage	1	2.3
LE+Foraminotmy	1	2.3
LE+Partial Excision	2	4.5
LE+TE	1	2.3
LE+TE+Fixation	1	2.3

**Figure 7** shows recovery status of the patients postoperatively, where 59% of the patients had partial recovery and 25% of the patient had significant recovery.



**Figure 7: Postoperative Recovery Status of the Patients**

## Discussion

Among all the central nervous system (CNS) tumors, spinal tumors are relatively rare accounting 5%–10%. And 70%–80% of them are being intradural extramedullary in location [6]. The laminectomy is considered as traditional approach for excising these tumors at the involved levels for adequate exposure. However, the surgical excision of the tumors are associated with significant tissue trauma and blood loss and long hospital stays [7]. A total 45 cases of IDEM spinal tumor were analyzed in the present study and we could

observe the male predominance with majorly affecting the age group of 41–60years (36%). Similar type of findings were observed in a study done by Venugopal G *et al*, where of most of them were in 30–40 years age group (37.5%), with slightly female predominance (59.4%). [8]. We have also observed that maximum number of patients (37.7%) presented with motor weakness and few had pain in addition to motor weakness (33.3%). The maximum patients attending the Department of Neurosurgery, NAMS,

Kathmandu, Nepal, also with the complain of local pain (33%), radicular pain (31.4%), motor deficit (29.8%) [9].

In the present study, majority of the patients were suffering with Schwannoma (31.1%),

followed by Meningioma (15.5%) and Ependymoma (13.3%). These findings were nearly similar to study done by Cafano *et al.* However, extradural metastasis was largely seen in a study carried out by Das S *et al* [9,10].

**Table 2: Various pathology compared with other studies**

Pathology	Present study	Das S <i>et al.</i>	Cofano <i>et al.</i>
Schwannoma	31.1%	18.6%	43.7%
Meningioma	15.5%	19.7%	37.7%
Ependymoma	13.3%	6.97%	12%
Lipoma	11.1%	2.3%	00
Neurofibroma	6.6%	11.6%	1.6%
angiolioma	6.6%	1.1%	0.8%
Astrocytoma	4.4%	2.3%	00
Hemopoetic tumors	4.4%	1.1%	1.2%
Extradural Metastasis	2.2%	23.2%	00

In a study carried out by Fathy *et al.*, when the patients were evaluated with MacCormick scale post-operatively, 56.25% of the patients improved, 37.5% of the patients showed no improvement and one patient got worsened. Similar findings were observed in present study, where 56.8%, 25% and 13.6% of the patients achieved grade II, I, III respectively [11].

According to the postoperative Frankel scoring of the present study, 56.8% of patients had Group D scoring and 25% of patients had Group E scoring. 15.9% and 2.3% of the patients achieved Group C and B respectively. A quite higher improvement values were achieved in a study done by Narayan S *et al.* in their study 77.14% of the patients had good outcomes, followed by 5.71 % of the patients improved with  $\geq 2$  grades on Frankel scoring [3].

### Conclusion

The spinal tumors are wide variety with different locations and their radiologic manifestations greatly facilitates narrowing of the diagnostic considerations. The spinal tumors are majorly benign type largely affecting in 41-60 years of age with mean age of 36.7year. In the present study male predominance was seen. The contrast-enhanced MRI scans help in the effortless

diagnosis. Shwannoma and Meniongioma are the typical type of spinal tumors with dorsal location largely. After surgical excision of the tumors, a significant improvement in sphincter control and functional status was observed.

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