Section: Neurosurgery

Original Research Article

CLINICOPATHOLOGICAL CORRELATION OF SPINAL TUMORS AND THEIR OUTCOME IN TERTIARY CARE CENTER

P. Muthuraman[1], P. Manojkumar[2]

[1]Professor, Department of Neurosurgery, Thanjavur Medical College, Thanjavur, India
[2]M.Ch Resident, Department of Neurosurgery, Thanjavur Medical College, Thanjavur, India

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Corresponding Author:
Dr. P. Muthuraman,
Email: pmuthuraman72@hotmail.com

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ABSTRACT

Background: Spinal cord tumors constitute nearly 15% of central nervous system neoplasms. They are broadly classified as extradural, intradural extramedullary (IDEM), and intramedullary (IM) tumors. IDEM tumors such as meningiomas and schwannomas are the most common. The objective is to study the clinicopathological features of spinal tumors and assess postoperative functional outcomes using Nurick's grading. **Materials and Methods:** This prospective study was conducted at Thanjavur Medical College over one year, involving 25 patients diagnosed with spinal tumors and planned for surgery. Patients with recurrence or not consenting were excluded. Clinical, radiological, and histopathological findings were correlated. Functional outcomes were assessed using Nurick's grading. **Result:** IDEM tumors were most common, with meningiomas and schwannomas predominating. Meningiomas occurred mainly in females in the fifth decade, commonly in the dorsal spine. Schwannomas were equally distributed in both sexes and presented in the fourth decade. Ependymomas involved the dorsolumbar spine and were seen in younger patients. Rare lesions included tuberculomas, hematomas, and Ewing's sarcoma. Postoperatively, most patients improved in Nurick's grade. Gross total resection was achieved in the majority of IDEM tumors with minimal morbidity. **Conclusion:** Intradural extramedullary tumors are the most frequent spinal neoplasms in our series. They are generally benign and respond well to gross total microsurgical resection. Early diagnosis and timely intervention are key to achieving good functional outcomes.

INTRODUCTION

Spinal cord tumors account for approximately 15% of all CNS neoplasms and are classified as extradural, intradural extramedullary, and intramedullary tumors. IDEM tumors, particularly meningiomas and schwannomas, are the most common. Other tumors include ependymomas, arachnoid cysts, dermoids, epidermoids, teratomas, neurenteric cysts, paragangliomas, drop metastases, and granulomas. IDEM tumors are generally benign, accessible via posterior surgical approaches, and have favorable outcomes.[1-3]

This study aimed to analyze the clinicopathological correlation of spinal tumors and their surgical outcomes in a tertiary care centre, emphasizing the relationship between tumor type, location, patient demographics, and postoperative functional recovery.[4,5]

MATERIALS AND METHODS

Study Design and Setting: This was a prospective observational study conducted over a period of one year in the Department of Neurosurgery, Thanjavur Medical College. The study aimed to analyze the clinicopathological features of spinal tumors and assess their surgical outcomes.

Patient Selection

Inclusion Criteria:

Patients of any age or sex presenting with progressive neurological deficits due to spinal tumors (motor, sensory, or autonomic dysfunction) who underwent surgical intervention.

Exclusion Criteria:

Patients unwilling to undergo surgery or participate in the study.

Patients with recurrent spinal tumors.

A total of 25 patients meeting the above criteria were included in the study.

Data Collection: A detailed clinical evaluation, including medical history and neurological examination, was performed for all patients.

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Radiological assessment consisted of X-rays and contrast-enhanced magnetic resonance imaging (MRI) to determine tumor location, extent, and characteristics. Histopathological analysis was conducted on all resected or biopsied specimens. Functional outcomes were assessed using Nurick's grading system both preoperatively and postoperatively.

Surgical Procedure: All intradural extramedullary (IDEM) tumors were approached via a posterior midline approach. Surgical strategy was tailored according to tumor type, size, and location. Microsurgical techniques were employed to allow:

Safe dissection of the tumor from the spinal cord and nerve roots.

Preservation of neural structures.

Complete or near-complete excision of the lesion.

Rare lesions were managed as follows:

Tuberculomas: Resected or biopsied for histopathological confirmation and followed by anti-tubercular therapy.

Hematomas: Prompt surgical evacuation to prevent permanent neurological deficits.

Ewing's sarcoma: Managed with combined surgical excision and adjuvant therapy (chemotherapy/radiotherapy).

MRI played a crucial role in preoperative planning, facilitating differentiation between benign IDEM tumors and rare or infiltrative lesions.

Postoperative Assessment and Outcomes

Patients were closely monitored for neurological recovery and postoperative complications. Functional outcomes were evaluated using Nurick's grading at follow-up. Complications were categorized as minor (transient motor or sensory deficits, minor wound issues) or major (life-threatening events or permanent neurological deficit).

Gross total resection was achieved in the majority of IDEM tumors. Postoperative functional improvement correlated with the preoperative Nurick grade and degree of spinal cord compression. Patients with mild-to-moderate preoperative deficits demonstrated more significant recovery compared to those with severe or long-standing compression. Intramedullary ependymomas, due to their intraparenchymal location, had a comparatively guarded prognosis, but near-total excision still resulted in meaningful functional improvement.

RESULTS

Demographics - A total of 25 patients were included. Age ranged from less than 20 to over 60 years, with most patients in the 50–59 years group (9 patients), followed by ≥60 years (6 patients) [Table 1]. There were 11 males and 14 females [Table 2].

Clinical Presentation-Most patients (12) presented within 1–12 months, while 6 had symptoms for 13–24 months, and 4 patients had symptoms longer than 24 months [Table 3].

Tumor Location Was Predominantly Dorsal (16), followed by lumbar (5) and cervical(4) [Table4]. Pain Distribution Corresponded With Tumor Site, most commonly dorsal (16patients) [Table 5].

Neurological Status-Preoperative Nurick grading showed most patients in grade 3 (11) and grade 4 (6), reflecting significant motor and functional deficits [Table 6].

Histopathology- IDEM tumors predominated, with 7 meningiomas, 5 schwannomas, and 4 neurofibromas. Ependymomas were seen in 4 patients. Rare lesions included tuberculomas (2), hematomas (2), and a single Ewing's sarcoma [Table 7].

Table 1: Age Distribution of Patients

Age group (years)	Number of patients
<20	1
20-29	2
30-39	3
40-49	4
50-59	9
≥60	6

Table 2. Sex Distribution

Gender	Number of patients
Male	11
Female	14

Table 3. Duration of Symptoms

Duration (months)	Number of patients
<1	3
1-12	12
13-24	6
25-36	2
>36	2

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Table 4. Tumor Site Distribution

Tumor site	Number of patients
Cervical	4
Dorsal	16
Lumbar	5

Table 5. Pain Location Distribution

Location of pain	Number of patients
Cervical	2
Dorsal	16
Dorsolumbar	3
Lumbar	5

Table 6. Nurick Grade Distribution

Nurick Grade	Number of patients
1	2
2	2
3	11
4	6
5	4

Table 7. Histopathological Diagnosis Distribution

Histopathological Diagnosis	Number of patients
Schwannoma	5
Meningioma	7
Neurofibroma	4
Ependymoma	4
Tuberculoma	2
Haematoma	2
Ewing Sarcoma	1

DISCUSSION

This prospective study of 25 patients with spinal tumors demonstrates that intradural extramedullary (IDEM) tumors are the most common neoplasms encountered in our population, consistent with global and Indian series. Among IDEM tumors, meningiomas and schwannomas predominated, reflecting their benign nature, slow growth, and accessibility for surgical resection.

Meningiomas: Meningiomas were the most frequently observed tumor (7 patients) and showed a clear female predominance, consistent with prior literature (Helseth et al., 1989; Ahn et al., 2009). Most patients presented in the fifth decade, with the dorsal spine being the most commonly affected site. This predilection for the thoracic spine may relate to the higher density of arachnoid cap cells in this region. Clinically, dorsal pain, sensory deficits, and motor weakness were the most common presentations. The slow-growing nature of meningiomas explains delayed presentation in many patients. Microsurgical gross total resection via posterior approach yielded excellent functional outcomes, with minimal morbidity, highlighting that IDEM meningiomas are highly amenable to curative surgery.

Schwannomas: Schwannomas (5 patients) were equally distributed between males and females and primarily presented in the fourth decade. These tumors arise from Schwann cells of the spinal nerve roots and typically present with radicular pain, sensory deficits, and occasionally motor weakness. In our series, the symptom duration was often prolonged, reflecting their slow progression. Surgical excision is usually curative, and in our cohort, gross total resection was achieved in all IDEM schwannomas with minimal complications.

Neurofibromas: Neurofibromas were observed in 4 patients and are known to be associated with neurofibromatosis type 1 in some cases, although no patients in our study had clinical stigmata of the syndrome. They tend to arise from peripheral nerves, presenting similarly to schwannomas but sometimes demonstrating more infiltrative growth, which can pose surgical challenges.

Ependymomas: Intramedullary ependymomas were seen in 4 younger patients, primarily involving the dorsolumbar region. Ependymomas arise from ependymal cells lining the central canal and are slow-growing. They often present with motor deficits, sensory disturbances, and autonomic dysfunction such as bladder or bowel involvement. Complete resection is challenging due to proximity to the spinal cord parenchyma, but in our series, microsurgical techniques allowed safe excision with functional improvement postoperatively. Preoperative Nurick grade strongly correlated with postoperative recovery, underscoring the importance of early diagnosis and intervention.

Rare Lesions: Rare lesions encountered included tuberculomas (2 patients), hematomas (2 patients), and a single case of Ewing's sarcoma. Spinal tuberculomas, although uncommon, remain a significant consideration in endemic regions like India. Surgical biopsy or decompression followed by antitubercular therapy is the standard approach.

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Hematomas typically present acutely and require urgent surgical evacuation to prevent permanent neurological deficits. Ewing's sarcoma of the spine is rare but aggressive, often necessitating multimodal therapy including surgery, chemotherapy, and radiotherapy. Recognition of these rare entities is essential to avoid misdiagnosis and ensure appropriate management.

Clinical Correlations: Pain was the most frequent presenting symptom, correlating closely with tumor location. Dorsal pain predominated due to the high incidence of thoracic IDEM tumors. Duration of symptoms varied widely, with meningiomas and schwannomas often presenting late due to their indolent growth. Preoperative Nurick grade strongly predicted postoperative functional outcomes; patients with milder deficits experienced more significant improvement after surgery, while those with long-standing severe deficits demonstrated partial recovery.

Imaging and Surgical Planning: MRI with contrast was essential for diagnosis and surgical planning. IDEM tumors were typically well-circumscribed, facilitating complete microsurgical resection. Imaging also aided differentiation from rare lesions like tuberculomas and metastases. The posterior approach was employed for all IDEM tumors, allowing safe access and minimal disruption to surrounding structures. Microsurgical techniques, including careful dural opening, nerve root preservation, and meticulous tumor dissection, were crucial in minimizing morbidity and achieving gross total resection.

Postoperative Outcomes: Postoperatively, most patients demonstrated improvement in Nurick grade, reflecting recovery of motor and functional status. Complications were minimal, limited to transient motor or sensory deficits and minor wound-related issues. No major morbidity or mortality was reported. IDEM tumors, being generally benign and well-circumscribed, showed excellent recovery patterns. Intramedullary ependymomas had a more guarded prognosis but still demonstrated meaningful functional improvement when gross total or near-total resection was achieved.

Literature Comparison

Our findings are consistent with multiple studies: Helseth et al,[4] (1989) reported a predominance of IDEM tumors in Norway, with favorable outcomes after gross total excision. Ahn et al,[1] (2009) and Song et al,[2] (2009) similarly highlighted that meningiomas and schwannomas are the most common IDEM tumors, predominantly thoracic, and that surgical resection leads to excellent neurological recovery. The correlation between preoperative neurological status and postoperative functional outcome in our series aligns with these reports.

Limitations and Future Directions

Limitations include small sample size, single-center design, and short follow-up. Larger multicenter studies with long-term outcomes are needed. Advanced imaging, intraoperative monitoring, and molecular profiling may further enhance surgical planning and prognostication.

CONCLUSION

Intradural extramedullary tumors are the most common spinal neoplasms in our experience. They are generally benign, amenable to gross total microsurgical resection, and demonstrate excellent functional outcomes. Early diagnosis, accurate imaging, and timely surgery are key determinants of recovery. Rare lesions require individualized management.

"There is but one treatment, viz. removal of source of pressure by operation." – Victor Horsley.

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REFERENCES

1. Ahn DK, Park HS, Choi DJ, Kim KS, Kim TW, Park SY. The surgical treatment for spinal intradural extramedullary tumors. Clin Orthop Surg. 2009;1:165-172.
2. Song KW, Shin SI, Lee JY, Kim GL, Hyun YS, Park DY. Surgical results of intradural extramedullary tumors. Clin Orthop Surg. 2009;1:74-80.
3. Abul-Kasim K, Thurnher MM, McKeever P, Sundgren PC. Intradural spinal tumors: current classification and MRI features. Neuroradiology.
4. Helseth A, Mørk SJ. Primary intraspinal neoplasms in Norway, 1955 to 1986: a population-based survey of 467 patients. J Neurosurg. 1989;71:842-845.
5. Prevedello DM, Koerbel A, Tatsui CE, Truite L, Grande CV, Ditzel LF, Araújo. Prognostic factors in the treatment of intradural extramedullary tumors: a study of 44 cases.

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