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# FUNCTIONAL OUTCOME OF INTRADURAL EXTRAMEDULLARY SPINAL TUMORS-OUR EXPERIENCE AT A TERTIARY CARE CENTER IN CENTRAL INDIA

Neurosurgery

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## ABSTRACT

**Background:** IDEM can present with back pain, cervical pain, radicular symptoms, myelopathy and sphincter dysfunction. With use of operating microscope good results and outcome can be expected in these patients.
**Methods:** Functional outcome of 50 patients was analysed with respect to symptom improvement. Comparing pre-op and post op status Nurich and Frenkel scale and status of pre-op and post op sphincter control.
**Results:** We observed 45 out of 50 operated patients had excellent recovery,4 patients had shown good recovery and 1 patient had shown fair recovery as per Frankel grading system .3 patients out of 50 had sphincter dysfunction which was not recovered after surgery.
**Conclusions:** Although, we obtained good surgical results after tumour excision without using neuromonitoring, it is always advised to use neurophysiological monitoring, whenever and wherever available to ensure better treatment outcome. Use of intraoperative microscope is associated with excellent outcome.

## KEYWORDS

IDEM, Central India spine tumours, Frenkel Grading, Nurick ambulatory status

## INTRODUCTION:

Primary spinal cord tumours constitute 2% to 4% of all central nervous system neoplasms and are characterized based on their location as intramedullary, intradural extramedullary, and extradural. Intradural extramedullary (IDEM) tumours account for two thirds of all primary intraspinal neoplasms. These include schwannomas, meningiomas and other rare tumours ependymomas dermoid, epidermoid, lipomas, metastatic tumours, paragangliomas.[1,2,3] IDEM can present with significant pain, gait disturbances, sensory changes and bladder and bowel incontinence.When IDEM tumours compromise the pyramidal tract, they produce an upper motor neuron syndrome where they compress the roots lower motor neuron syndrome develops, which is accompanied by a sensory deficit according to the level affected. Technical advances in imaging techniques, MRI and surgical instruments especially with the use of high-resolution intraoperative microscopes have brought about excellentclinical results of IDEM tumours after surgery.[4,5]

The aim of study was to analyse patient demographics, symptoms (severity & duration), tumour characteristics (anatomical & pathological) in all operated spinal intradural extramedullary (IDEM) tumours & to co-relate pre-operative neurological status & post-operative functional outcome in intradural extramedullary (IDEM) spinal tumours.

## MATERIALS AND METHODS:

This prospective and retrospective study was conducted in department of neurosurgery of Sri Aurobindo Institute of Medical Sciences, Indore. All the patients were admitted to neurosurgery department of this hospital. All the patients operated with the diagnosis of IDEM lesions having solitary spinal tumour were included in the study, however patients having metastatic (Drop metastasis) Spinal tumours, multiple Spinal Tumours and those with Chronic debilitating illnesses limiting surgical intervention were excluded from the study. All patients included were operated by single surgeon to prevent surgeon bias.

A total number of 50 patients included in this study were operated in department of neurosurgery from 1 Aug 2012 to 1 Sept 2020. All patients were operated through posterior approach by performing laminectomy, longitudinal incision of dura and removal of tumour under operating microscope. The functional outcome of all patients were compared on the preoperative Frenkel grade, Nurich grade and sphincter disturbance with that of post-operative Frenkel grade, Nurich grade and sphincter control at 1week, 3month and 6 months[6] (Table 1).

**Table 1: Grading system**

| Modified Frankel Classification for Cord Damage Caused by Any Cause |
|---|
| **Grade A:** complete motor and sensory involvement. |
| **Grade B:** complete motor involvement, some sensory sparing including sacral sparing. |
| **Grade C:** functionally useless motor sparing. |
| **Grade D:** functional motor sparing. |
| **Grade E:** no neurologic involvement. |
| **Nurick Classification Scale for ambulatory status** |
| **Grade 1:** signs of spinal cord disease but no difficulty in walking. |
| **Grade 2:** slight difficulty in walking but does not prevent full-time employment. |
| **Grade 3:** severe difficulty in walking that requires assistance and prevents full-time employment and avocation. |
| **Grade 4:** ability to walk only with assistance or with the aid of a frame. |
| **Grade 5:** chair-bound or bedridden. |

## RESULTS:

Out of 50 patients operated 31 were male (62%) and 19 were female (38%). Intra-operative localization of tumour was done using fluoroscopy to locate the level of vertebra corresponding to tumour on MRI done preoperatively. Post-operative was uneventful in all cases and none of the patient deteriorated in neurological outcome. The most common site of lesion on MRI in our study was dorsal with 22 cases, 6 dorsolumbar cases, 12 cervical and 10 lumbar cases (figure 1). Sphincter control was lost in 3 cases.

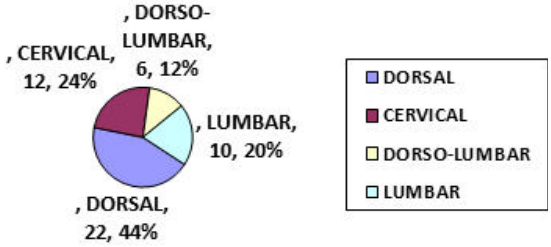


**Figure 1: Location of lesion.**

Histopathological reports have confirmed the diagnosis of schwannoma in 18 patients, meningioma in 17 patients, neurofibroma in 10 patients, dermoid in 2 patients, myxopapillary ependymoma in 2 patients and lipoma in 1 patient. All patients were given iv antibiotics for 5 days and were discharged with oral medications. Suture removal was done on 10th post-operative day. Local wound infection and wound dehiscence was seen in 2 patients. follow up of patients was done on 1st week,1 month and 6 months for documenting post-operative recovery of motor/sensory deficits based on Frenkel grade and improvement in ambulatory status was documented based on Nurich grade.

We observed 45 out of 50 operated patients had excellent recovery, 4 patients had shown good recovery and 1 patient had shown fair recovery. 3 patients out of 50 had sphincter dysfunction which was not recovered after surgery (table 2).

**Table 2: Recovery in post-operative patients**

| | |
|---|---|
| EXCELLENT | Frenkel E with sphincter control (90%) |
| GOOD | Partial recovery (8%) |
| FAIR | Clinical insignificant recovery (2%) |

**Table 3: Demographic profile and functional outcome**

| AGE/ SEX | CHIEF COMPLAINTS | DIAGNOSIS | LEVEL | FRENKEL GRADE | | NURICH GRADE | | SPHINCTER CONTROL | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | PRE- OP | POST-OP | PRE- OP | PRE- OP | PRE- OP | POST - OP |
| 40/f | MW/RS | MENINGIOMA | D9 | D | E | 3 | 1 | + | + |
| 64/F | MW/RS | SCHWANNOMA | D12-L1 | D | E | 2 | 1 | + | + |
| 32/M | MW/RS | SCHWANNOMA | D11-L1 | D | E | 3 | 1 | + | + |
| 50 /M | MW/RS | NEUROFIBROMA | C5-C7 | D | E | 4 | 1 | + | + |
| 27/M | MW/RS | NEUROFIBROMA | C3-C4 | D | E | 4 | 1 | + | + |
| 63/F | MW/RS | MENINGIOMA | D7-D8 | D | E | 2 | 1 | + | + |
| 41/M | MW/RS | SCHWANNOMA | D7-D8 | C | E | 4 | 2 | + | + |
| 55/M | MW/RS | NEUROFIBROMA | D5-D6 | C | D | 3 | 2 | + | + |
| 53/M | MW/RS | NEUROFIBROMA | D5-D6 | D | E | 2 | 1 | + | + |
| 40/M | RS | NEUROFIBROMA | L5-S1 | E | E | 2 | 2 | + | + |
| 60/F | MW/RS | NEUROFIBROMA | D9-D10 | C | E | 3 | 1 | + | + |
| 28/M | RS | SCHWANNOMA | L4 | E | E | 1 | 1 | + | + |
| 50/F | RS/MW/SD | MENINGIOMA | D7 | C | D | 4 | 3 | - | - |
| 43/M | RS | SCHWANNOMA | D6 | E | E | 2 | 1 | + | + |
| 28/M | MW/RS | SCHWANNOMA | D3-D4 | C | D | 4 | 2 | + | + |
| 52/M | MW/RS | SCHWANNOMA | D5-D6 | D | E | 3 | 1 | + | + |
| 48/F | MW/RS | MENINGIOMA | D9 | D | E | 2 | 1 | + | + |
| 50/M | RS | NEUROFIBROMA | D8 | E | E | 1 | 1 | + | + |
| 30/F | MW/RS | MENINGIOMA | D7 | D | E | 2 | 1 | + | + |
| 40/M | MW/RS | SCHWANNOMA | D8 | D | E | 2 | 1 | + | + |
| 52/F | RS | MENINGIOMA | C5-C7 | D | E | 3 | 1 | + | + |
| 40/M | RS | MENINGIOMA | D10 | E | E | 2 | 1 | + | + |
| 50/F | MW/RS | MENINGIOMA | D7-D8 | E | E | 2 | 1 | + | + |
| 38/F | MW/RS/SD | SCHWANNOMA | D11-L1 | C | D | 4 | 3 | - | - |
| 58/M | RS | MYXOPAPILLARY EPENDYMOMA | L5-S1 | E | E | 2 | 1 | + | + |
| 50/M | MW/RS | MENINGIOMA | D10-D11 | D | E | 3 | 1 | + | + |
| 48/M | MW/RS | MENINGIOMA | C5-C6 | C | E | 3 | 1 | + | + |
| 38/M | RS | SCHWANNOMA | L2-L3 | E | E | 2 | 1 | + | + |
| 20/M | RS | SCHWANNOMA | C2-C3 | D | E | 2 | 1 | + | + |
| 28/M | RS | DERMOID | L2-L4 | E | E | 2 | 1 | + | + |
| 32/M | RS | SCHWANNOMA | L4-L5 | E | E | 2 | 1 | + | + |
| 40/M | RS/MW | MENINGIOMA | C2 | C | E | 3 | 1 | + | + |
| 20/F | RS | SCHWANNOMA | L1-L3 | E | E | 2 | 1 | + | + |
| 58/F | MW/RS/SD | MYXOPAPILLARY EPENDYMOMA | D12-L2 | B | C | 5 | 4 | - | - |
| 46/M | MW/RS | MENINGIOMA | C5 | D | E | 2 | 1 | + | + |
| 22/F | MW/RS | SCHWANNOMA | D12-L1 | E | E | 1 | 1 | + | + |
| 32/M | MW/RS | NEUROFIBROMA | C6 | D | E | 2 | 1 | + | + |
| 61/F | MW/RS | MENINGIOMA | D3 | D | E | 3 | 1 | + | + |
| 40/M | RS | LIPOMA | L3-L4 | E | E | 1 | 1 | + | + |
| 28/M | RS | SCHWANNOMA | L3-L4 | E | E | 2 | 1 | + | + |
| 78/F | MW/RS | MENINGIOMA | D2 | D | E | 3 | 1 | + | + |
| 65/F | MW/RS | SCHWANNOMA | C2 | D | E | 2 | 1 | + | + |
| 28/M | MW/RS | NEUROFIBROMA | C4-C5 | C | E | 3 | 1 | + | + |
| 42/F | MW/RS | MENINGIOMA | D5 | D | E | 3 | 1 | + | + |
| 41/F | MW/RS | MENINGIOMA | D7-D8 | D | E | 3 | 1 | + | + |
| 60/M | MW/RS | SCHWANNOMA | D10 | D | E | 2 | 1 | + | + |
| 45/M | MW/RS | DERMOID | L2-L4 | D | E | 3 | 1 | + | + |
| 54/M | MW/RS | NEUROFIBROMA | C5-C7 | D | E | 4 | 1 | + | + |
| 45/M | MW/RS | SCHWANNOMA | C3-C4 | D | E | 4 | 1 | + | + |
| 40/F | MW/RS | MENINGIOMA | D10 | D | E | 2 | 1 | + | + |

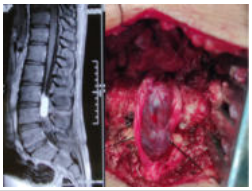

**Figure 2: Mri Contrast Image Showing Well Defined Smoothly Marginated Sol L3-l4 And Intraoperative Picture On Right Side Showing Tumour Encased By Nerve Roots.**

**DISCUSSION:**

**a. Schwannomas:** Nerve sheath tumours usually arise from the dorsal roots at various segmental levels of the spinal cord. Schwannomas appear as grossly smooth, globoid, eccentric masses with identifiable

attachment to the nerve root from which they arise. Microscopically, schwannomas consist of elongated bipolar cells with fusiform, darkly staining nuclei arranged in compact interlacing fascicles with a tendency towards palisade formation (Antoni-A).[7] A loosely arranged pattern of stellate shaped cells (Antoni-B) is less common. M.R.I is investigation of choice.

**b. Neurofibroma:** Neurofibromas are benign tumours that arise from peripheral sensory nerves. There are two types of neurofibromas one is called solitary and other one as plexiform. In contrast to schwannomas, neurofibromas encase nerve roots rather than displacing them. Pain and paraesthesia are the most common presenting symptoms. Type I neurofibromatosis (NF 1) may have multiple neurofibromas that may increase in number and size with increasing age of patient. The neurofibromas intensely enhance on contrast. Total surgical resection is primary treatment. To obtain this, the ventral and the dorsal roots are commonly sacrificed. On radiology they appear as Dumbbell-shaped, circular defect may have Vertebral erosion and rib thinning.[8,9]

**c. Meningiomas:** Meningiomas usually arise from arachnoid cap cells located at exit zones of nerve roots or the entry zones of arteries into the spinal canal, accounting for their predominant lateral location. More common in females then in males. Consistency can vary from soft friable, fleshy rubbery to stony calcified. The Dural attachment is broader than expected. Unlike intracranial meningioma, spinal meningiomas never penetrate the pia. This simplifies surgical resection.[10]

## CONCLUSION:

Spinal cord tumours are uncommon cause of back pain, cervical pain, radicular symptoms, myelopathy and sphincter dysfunction. Most IDEM tumours tend to be histopathologically benign, and have excellent outcome when adequately treated with surgery. Although, we obtained good surgical results after tumour excision without using neuromonitoring, it is always advised to use neurophysiological monitoring, whenever and wherever available to ensure better treatment outcome. Use of intraoperative microscope is associated with excellent outcome.

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