ORIGINAL ARTICLE

# SURGICAL OUTCOME OF INTRADURAL SPINAL TUMOURS

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**Background**: This study was conducted to determine the short-term outcome of surgical procedure in patients having spinal intradural tumours. **Methods:** This cross-sectional study was conducted from 26 April 2016 to 25 March 2019 on 56 patients after approval from hospitals ethical and research committee. MRI spine were studied in detail for all patients to know about the site, size, shape, extent and nature of the tumour. History, examination, pre-operative MRI findings, post-operative findings were documented in patient's pro forma. Short term as well as long term post-operative results were documented after surgery, during stay at hospital and follow-up visits till 6 months. **Results:** In this study, 56 patients with spinal intradural tumours were observed. Male to female ratio was 1.33:1. Age ranged from 5–65 years (32.5±14.6). Paraparesis, hypesthesia, sphincter dysfunction were the presenting symptoms in most of the patients. 47% (21) patients improved according to MRC Grading system 46% (20) patients remained static 7% (3) patients deteriorated. Wound infection was found in 7 (12.5%) patients, followed by Neurological Deficit in 5 (8.9%) cases, Meningitis was found in 2 (3.57%), CSF leak was noted in 4 (7.14%) patients and mortality in 1 (1.7%) of the case. **Conclusion:** Surgery of the intradural spinal tumours carry good neurological outcome with acceptable complication rates.

**Keywords:** Spinal intradural tumours; Neurological deficit; Wound infection; Meningitis; CSF leak

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## INTRODUCTION

Central nervous system tumours occur in the spinal canal. Intradural spinal Approximately 15–20% of all the cord tumour lies inside the dura matter. These tumours comprise more than 2/3rd of all the spinal tumours. Patients with Intradural type tumours presents with progressive neurological signs and symptoms. These include pain, which is radicular in nature, dull aching sensations aggravated more at night especially at lying down and relieved in upright position.[1,2] Motor weakness is also the presenting feature with either hyper reflexia and spasticity or hypotonic paraplegia. Autonomic dysfunction, i.e., bladder and bowel incontinence or retention may occur early in course of disease specially with tumours of cauda equina[1,2] and late presentation in tumours of filum terminale[2]. Sensory deficits may occur including loss of sensations, paraesthesia & numbness.[2]

The most commonly used investigation modality is Magnetic Resonance Imaging (MRI)[2,3] Schwanomas are isointense on T1 weighted images and enhance brightly on contrast. Meningiomas are hyperintense on contrast and show linear enhancement pattern called dural tail sign.[2] The management option includes laminectomy depending on the type or location of the tumour either through the posterior approach, or posterior-lateral for tumours with extra spinal extension. A hemi laminectomy and tumour removal can be an alternative approach.[3]

Patients demonstrated significant reduction of pain on visual analogue scale postoperatively and patients with motor weakness of lower limbs improved with respect to motor strength on postoperative physical examination.[4] The success rates of surgery for spinal intradural extramedullary tumour in terms of improvement in motor and sensory function assessed on Frankel scale, according to some studies conducted internationally are 66.6%[2] and 71.1%.[5] Short term complications of surgery for spinal intradural tumours include risks of GA, haemorrhage, CSF leak, infection and new significant neurological deficits which often do not resolve.[3,6] Despite the advances in microsurgical technique, the surgery for spinal intradural tumour is associated with some serious complications. Many of these complications can be reduced by early identification of neurological symptoms to diagnose the patients at an early stage and acknowledgment of these potential per-operative and post-operative problems may assist in their prevention. This can increase the quality of life for patients afflicted with this disease. The aim of this study was to highlight the improvements in neurological state, reduction of pain and paraesthesia associated with these tumours and complication rates of surgery for these tumours in our population. The results of this study can be very useful as if significantly high, we can formulate further recommendations for further research work over it before coming on to recommendations which will help us in reducing

morbidity related to surgery for spinal intradural tumours and by early intervention, improve the quality of life of all those who are suffering from the disease.

## MATERIAL AND METHODS

This was a cross sectional descriptive study of one year from 26 April 2016 to 25 March 2019 on 56 patients at Lady Reading Hospital, Peshawar. The study was conducted after approval from hospitals ethical and research committee. MRI spine with contrast were studied in detail for all patients to know about the site, size, shape, extent and nature of the tumour. History, examination, pre-operative MRI findings, post-operative complications were documented in patient's pro forma. All patients with spinal intradural tumours**,** of all ages and both genders were included in the study. Patients with metastatic lesion especially drop metastasis from the brain, patients with recurrent tumours were excluded from the study. Post-operative neurological status and complications were documented immediately after surgery, during stay at hospital and follow-up visits till 6 months.

A complete history of all patients, meeting inclusion criteria were taken and thorough physical examination were done at the time of admission in Neurosurgery ward those meeting the inclusion criteria were enrolled in the study through OPD and were admitted in the ward for further workup. Informed written consent was taken from patients or relatives.

MRI spine were studied in detail for all patients to know about the site, size, shape, extent and nature of the tumour. History, examination, pre-operative MRI findings, post-operative improvements and complications (Neurological deficit, Wound infection, meningitis, CSF leak and in-hospital mortality) were documented in patient's pro forma. Exclusion criteria were followed strictly to avoid any bias or confounding factors in our results. All the surgeries were performed by experienced neurosurgeons having minimum of 5 years of experience. All collected information was entered in SPSS version 10 and were analysed.

## RESULTS

A total of 56 patients presenting with spinal intradural tumours were included in the study. There were 32 (57.14%) males and 24 (42.86%) females' patients. Male to female ratio was 1.33:1. Average age of the patients was 32.5±14.6 years with range 5–65 years. Patient's age was divided in four categories, out of which most common age group for presenting with spinal intradural tumours were was more than or equal to 51 years. There were 11 (19.6%) patients of the age less than or equal to 30 years, 14 (25%) patients were in the age range of 31–40 years, 13 (23.2%) were of age range 41–50 years, 18 (14.3%) patients presented at age more than 50 years. (Table-1) At 6 months follow-up 47% (21) patients improved according to MRC Grading system 46% (20) patients remained static 7% (3) patients deteriorated.

The most common complication was wound infection. It 7 (12.5%) patients, followed by Neurological Deficit in 5 (8.9%) cases, Meningitis was found in 2 (3.57%), CSF leak was noted in 4 (7.14%) patients and mortality was found in 1 (1.7%) of the cases. (Table-2)

**Table-1: Age wise distribution of the patients (n=56)**

| Age in years | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| <= 30.00 | 11 | 19.6 | 19.6 |
| 31.00–40.00 | 14 | 25.0 | 44.6 |
| 41.00–50.00 | 13 | 23.2 | 67.9 |
| 51.00+ | 18 | 32.1 | 100.0 |
| Total | 56 | 100.0 | |

**Table-2: Common complication of surgery for spinal intradural tumours (n=56)**

| | | Count | |
|---|---|---|---|
| Neurological Deficit | Yes | 5 | 8.9 |
| | No | 51 | 91.07 |
| Wound Infection | Yes | 7 | 12.5 |
| | No | 49 | 87.5 |
| Meningitis | Yes | 2 | 3.57 |
| | No | 54 | 96.42 |
| CSF Leak | Yes | 4 | 7.14 |
| | No | 52 | 92.85 |
| Mortality | Yes | 1 | 1.7 |
| | No | 55 | 98.3 |

**Table-3: Presenting complaints**

| | |
|---|---|
| Paraplegic | 6 |
| Paraparetic | 20 |
| Quadreplegic | 2 |
| Quadreparetic | 8 |
| Monoplegia | 6 |
| Backache | 12 |
| Sphincter disturbance | 12 |

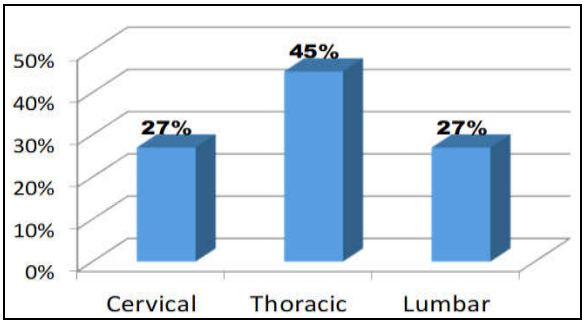


**Figure-1: Level of spinal involvement**

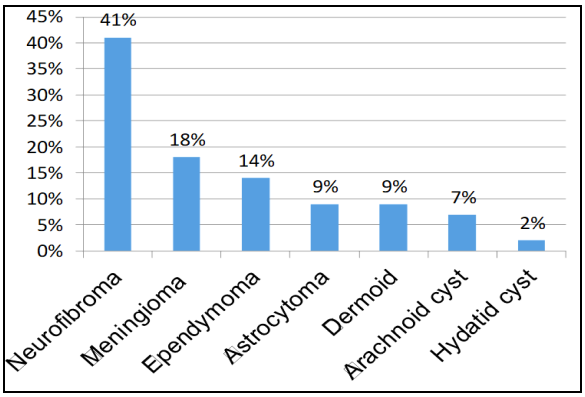


**Figure-2: Frequency of I/D spinal tumour**

## DISCUSSION

Intradural spinal tumours account for only a small proportion of central nervous system tumours with an incidence of 0.3 per 100,000 per year. Despite their rarity, there is an extensive literature on the management of these tumours. Over the past 30 years, the approach towards management of these tumours has become more aggressive in an attempt to preserve or improve neurological outcome and to prevent the neurological deficit.[7,8]

These lesions are broadly divided into two categories based on location: intramedullary and extramedullary. In adults, extramedullary tumours comprise approximately 70% of intradural spinal tumours. In the paediatric population, the distribution of intramedullary and extramedullary tumours is roughly even.[9,10] In the adult population, the most common intradural, extramedullary spinal tumours arise from the nerve sheath (approximately 30%) and from the meninges (approximately 25%).

Most of these lesions are benign and patients typically benefit from surgical resection which most often consists of posterior midline approach to the lesion by removing underlying lamina and spinous processes. A bilateral laminectomy is usually performed from one level above the lesion to one level below the lesion. Most Surgeons have reported excellent results in resecting intradural-extramedullary spinal tumours. Haq *et al*[11] reported 77% improvement and 19% static condition of the patients with spinal intradural extramedullary tumours who were surgically treated. Similarly, Sepalla *et al* reported a series of 187 patients that underwent surgical resection for spinal schwannomas. In this large series, 90% were completely resected with a 10% surgical complication rate and 1.5% surgical fatality rate. Levy[12] also reported similar results on 66 patients with a 9% surgical complication rate and a 1.5% mortality rate. The Neurological deficits may be motor sensory or autonomic ranging from 16.6–38.8%.[2,7] CSF leak according to some studies is 13–23%.[2,7] is treated with either lumbar puncture, lumbar drain or re exploration of the wound.[6] Wound infection according to some studies range from 9–13.7%[7,12] may need intravenous antibiotics and or debridement for treatment[6]. The overall complication rate according to some studies ranges from 32–75%.[3,7,12]

The earlier the diagnosis and radical resection of an intramedullary tumour, the greater the likelihood of preserving the patient's neurological function.

47% patients improved in the immediate post op period in our study which is slightly less improvement than that of internationally mentioned. This is because our study was based on short term outcome in the immediate post op period while these patients continue to improve in the long term to a much better level of neurology. 46% remained the static state means they never deteriorated from the initial presenting neurology. 7% patients deteriorated in the terms of sensory or motor involvement.

Approximately 8.9% of patients in this study experienced residual focal deficits, none of which were disabling. Others report similar outcomes among patients with similarities to our study, with significant improvement in 62–88% of cases and clinical worsening in only a minority of patients (10–15%).[14,15] Some of the patient outcomes on discharge and/or follow-up may differ because of different assessment tools being used by different authors.[14,15]

Complete surgical removal is the ultimate treatment method and the treatment outcome is dependent on the neurological condition, the extent of the excision, and histopathological findings. Klempki and Samii reported that the overall outcome could be favourable when the interval from the diagnosis prior to the development of severe neurological deficits to surgery was short and improvements in Frankel grade were observed in 8 of the 12 patients.[16]

Bhatti *et al* in their study of outcome of 18 intramedullary spinal tumours showed that about 55% patients showed improvement in neurology where as in only 16% patients the neurology deteriorated.[17] of patients deteriorated neurologically. This closely concides with the results of current study, both the studies being conducted in Northern Province of Pakistan.

This study had a few limitations. This was a single center study with limited number of patients. We didn't have the luxury of intra-operative neuromonitoring. Still the results of the study are promising.

## CONCLUSION

Surgery of the intradural spinal tumours carry good neurological outcome with acceptable complication rates.

## AUTHORS' CONTRIBUTION

GA: Conceived the idea, data collection, write-up. SAK: Literature search, data analysis, write-up. EAKA: Literature search, data analysis, write-up. AA: Supervised the study, proof read. GA: Literature search, data analysis, write-up SK: Data analysis, write-up

## REFERENCES


1. Traul DE, Shaffrey ME, Schiff D. Spinal-cord neoplasms-intradural neoplasms. Lancet Oncol 2007;8(1):35–45.
2. Song KW, Shin SI, Lee JY, Kim GL, Hyun YS, Park DY. Surgical Results of Intradural Extramedullary Tumours. Clin Orthop Surg 2009;1(2):74–80.
3. Avramov T, Kyuchukov G, Kiryakov I, Obreshkov N, Handjiev D, Nedelko R. Results of spinal tumours surery. J IMAB 2009;09:84–8.
4. Ahn DK, Park HS, Choi DJ, Kim KS, Kim TW, Park SU. The Surgical Treatment for Spinal Intradural Extramedullary Tumours. Clin Orthop Surg 2009;1(3):165–72.
5. Sun CX, Meng XL, Xie SN, Yu Y, Yang HJ, Wu B. Unilateral hemilaminectomy for patients with intradural extramedullary tumours. J Zhejiang Univ Sci B 2011;12(7):575–81.
6. Nagasawa DT, Smith ZA, Cremer N, Fong C, Lu DC, Yang I. Complications associated with the treatment for spinal ependymomas. Neurosurg Focus 2011;31(4):E13.
7. Cooper PR, Epstein F. Radical resection of intramedullary spinal cord tumours in adults. J Neurosurg 1985;63(4):492–9.
8. Gowers WR, Horsley V. A case of tumour of the spinal cord. Removal; recovery. Med Chir Trans 1888;71:377–430.
9. DeSousa AL, Kalsbeck JE, Mealey J Jr, Campbell RL, Hockey A. Intraspinal tumours in children. A review of 81 cases. J Neurosurg 1979;51(4):437–45.
10. Epstein F, Epstein N. Surgical treatment of spinal cord astrocytomas of childhood. A series of 19 patients. J Neurosurg 1982;57(5):685–9.
11. Ul Haq N, Shah R, Khan HM, Usman M, Ali M. Outcome of surgical management in spinal meningioma: A study of 48 cases. Gomal J Med Sci 2015;13(1):49–53.
12. Levy WJ, Latchaw J, Hahn JF, Sawhny B, Bay J, Dohn DF. Spinal neurofibromas: A report of 66 cases and a comparison with meningiomas. Neurosurg 1986;18(3):331–4.
13. Yadla S, Malone J, Campbel PG, Maltenforte MG, Harrop JS, Sharan AD, *et al*. Early complications in spine surgery and relation to preoperative diagnosis: a single-center prospective study. J Neurosurg Spine 2010;13(3):360–6.
14. Hufana V, Tan JSH, Tan KK. Microsurgical treatment for spinal tumours. Singapore Med J 2005;46(2):74–7.
15. Albanese V, Platania N. Spinal intradural extramedullary tumours. Personal experience. J Neurosurg Sci 2002;46(1):18–24.
16. Klekamp J, Samii M. Surgical results for spinal meningiomas. Surg Neurol 1999;52(6):552–62.
17. Bhatti SN, Khan SA, Raja RA, Shah R, Aurangzeb A, Khan AA, *et al*. Outcome of intramedullary spinal cord tumours: experience with 18 patients operated at Ayub Teaching Hospital, Abbottabad. J Ayub Med Coll Abbottabad 2010;22(3):15–7.



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