SPINAL TUMORS- STUDY OF 40 CASES

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Abstract:

40 cases of spinal tumors of different types were studied. Among them 07 cases were extradural, 20 cases were intradural extramedullary, 08 cases were intra and extraduarl and 05 cases were intramedullary. 21 cases were schwannoma, 06 cases were meningioma, 03 were ependymoma, 02 were multiple myeloma, 04 were metastatic lesions. 01 very rare case of extradural primitive neuroectodermal tumor (PNET) was found. More than half of the cases were located in the dorsal region followed by cervical and lumbar region. Complete removal of tumors could be done in 80% of the cases. Metastatic lesions and one multicentric schwannoma could not be removed completely. After operation 24 (60%) cases had complete recovery of muscle power and sphincter function. 10% cases had no recovery and no patient deteriorated from preoperative neurological status.

Key words: *Spinal tumor, Extradural, Intradural, Intramedullary, Schwannoma, Meningioma*

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Introduction:

15% of primary CNS tumors are intraspinal. Most primary CNS spinal tumors are benign. Most present by compression rather than invasion[1]. When tumors grow, they result in compression of the spinal cord, which can cause limb dysfunction, motor and sensation loss, and, possibly, lead to death[2]. Spinal tumors are classified according to their anatomic location as related to the dura mater and spinal cord. These are[1,3,4]

1. Extradural(50%)- Arises outside the dura from vertebra, epidural tissue or secondaries. These may be Chondroma, Osteoid osteoma, osteogenic sarcoma, multiple myeloma, Plasmacytoma, etc.
2. Intradural extramedullary(40%)- arises in leptomeninges or roots. e.g. Schwannoma, Meningioma, Neurofibroma etc.
3. Intramedullary(10%)- Arises in spinal cord substances. e.g. Astrocytoma, ependymoma, Dermoid, Epidermoid etc.

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Symptoms and signs include those produced by the involvement of the nerve roots, cord segments and the long tracts. These includes root pain, progressive weakness with upper motor (Spasticity, exaggerated tendon reflexes and extensor planter reflex for cord segment involvement in above the level or long tract involvement) or lower motor type of features (wasting of muscles, loss of reflexes, fasciculation of involved muscles for ant. root or anterior horn of cord segment involvement) and sphincter disturbances (retention or incontinence of bowel and bladder)[3]. Some sensory symptoms include numbness, tingling, burning, sensation of cold and 'pins and needle' etc[3]. The degree of recovery after removal of the compression depends on various factors like duration, severity and location of the compression and the changes in the vascular supply of the spinal cord already produced by the lesion[3].

Schwannomas are slowly growing benign tumors occurring at any level and arising from the posterior nerve roots. They are either entirely within the spinal canal or dumbbell shaped through the intervertebral foramen, on occasion presenting as a mass in the thorax or posterior abdominal wall or in the neck[5]. Resection of spinal meningiomas can result in excellent recovery, even in patients with notable preoperative deficits. The surgical morbidity rate is low because surgical resection of a meningioma can easily be accomplished by means of simple

laminectomy. The recurrence rate is substantially lower than that seen in an intracranial lesion[6].

The goals of surgery for spinal tumors include: (i) Removal of spinal tumor, or as much of it as possible (ii) Reduction of pain and improve function and life (iii) Restore spinal stability[7].

Materials and method:

This is a prospective study. After studying the case series, world literature were reviewed and compared with the series. 47 cases were encountered during the study period, 7 cases were excluded from the study as they refused operation in our settings after counseling about the consequences of disease and operation. Operations were done in Rajshahi Medical College Hospital and Islami Bank Medical College Hospital, Nawdapara, Rajshahi during the period of January '08 to December'11. All the patients had spinal tumors in either of the intraspinal spaces in relation to the dura and spinal cord. Diagnoses were made by taking history, physical examination and investigation. All the patients had MRI for confirmation of preoperative diagnosis. Histological diagnoses were confirmed after operation by sending tissues for histopathology in all the cases. Laminectomy were done in all the cases followed by removal of the tumor tissues except in one case where CT-guided FNAC done to have the tissue for histopathology. Durotomy done for intradural lesions and myelotomy for intramedullary lesions. All the patients were discharged with advice for physiotherapy and followed up for 2 months to 2 years.

Results:

Table-I
Age distribution

Age group	No	Percentage
0-14 yrs.	02	05%
15-29 yrs.	11	27.5%
30-44 yrs.	05	12.5%
45-59 yrs.	20	50%
>60 yrs.	02	05%
	40	100%

Commonest age group affected is 45-59 years. Before the age of 15 and after 60 years it was least common. Age range was from 10 years to 70 years.

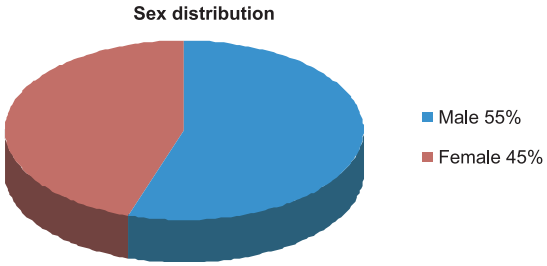


Fig.-1: *Sex distribution of spinal tumors*

Males were predominantly affected.

Table-II
Spinal level of the tumors

Spinal level	No.	Percentage(%)
Cervical	09	22.5
Dorsal	23	57.5
Lumbar	04	10
Cervico-dorsal	01	2.5
Dorso-lumbar	03	7.5
Total	40	100

Dorsal spinal level is the most commonly affected site followed by cervical level.

Table-III
Spinal location of the tumors

Spinal location	No.	Percentage(%)
Extradural	07	17.5
Intradural extramedullary	20	50
Intra & Extradural	08	20
Intramedullary	05	12.5
Total	40	100

05(12.5%) patients with extradural lesions which were not metastatic had extraspinal extension. Among them 04 had intradural component also. 05(12.5%) patients had intra-osseous extension or involvement, among them one is schwannoma which had intra and extradural, extraspinal and intraosseous component. 01 intradural lesion is metastatic adenocarcinoma.

Table- IV
Histological types of the tumors

Histological types	No.	Percentage(%)
Schwannoma	21	52.5
Meningioma	06	15
Ependymoma	04	10
Astrocytoma	01	2.5
Lymphoma	01	2.5
PNET	01	2.5
Multiple Myeloma	02	05
Metastatic	04	10
Total	40	100

Among the metastatic lesions 01 from follicular ca. of thyroid, 01 from sq. cell ca. of bronchus, 01 from seminoma of testis(Lt) and 01 is adenocarcinoma and intradural in location but primary site could not be detected. It was preoperatively diagnosed as ependymoma and located at the level of D12-L2.

Main presenting features:

Pain	:	40
Weakness	:	39
Spasticity	:	33
Flaccidity	:	06
Definite sensory level found	:	21
Sphincter involved	:	24

Among the sphincteric involvement 15 patients had urinary retention and 01 had incontinence. Rest 08 cases had difficulty in complete evacuation of bladder.

Extent of removal:

Complete removal	:	32 (80%)
Incomplete removal	:	07 (17.5%)
CT guided FNAC	:	01 (2.5%)

Among the metastatic lesions 03 could be removed incompletely and in 01 case only CT guided FNAC done to have the histological diagnosis (Seminoma of testis). Astrocytoma (01), multipl myelomas (02) removed incompletely. 01 schwannoma case had multiple extraspinal lesions from multiple spinal nerve roots, in this case all the extraspinal components could not be removed.

Recovery after operation:

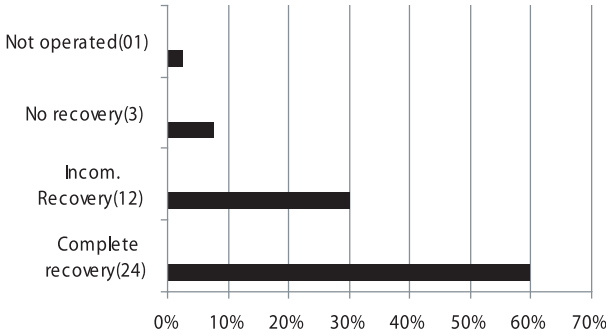


Fig.-2: *Recovery after operation of spinal tumors*

Most of the patients show improvement after operation. 60% patients had complete recovery of muscle power grade and sphincteric function. 30% patients had incomplete recovery, but several of them are still in the phase of recovery. Hopping that they will recover more. 01 patient, who was diagnosed by FNAC, was not operated and referred to oncology department for further management. Metastatic cases were also referred to the oncology department. No patient had deterioration of neurological status after operation.

Table- V
Improvement of Muscle power grade after operation (n=39)

Muscle power grade	Preoperative	Postoperative
5	01	24
4	15	04
3	12	06
2	04	02
1	02	00
0	05	03
Total	39	39

Postoperative complication:

Transient CSF leak	:	07
Infection	:	00
Wound gap	:	01
Deterioration of pre-existing neurological status	:	00

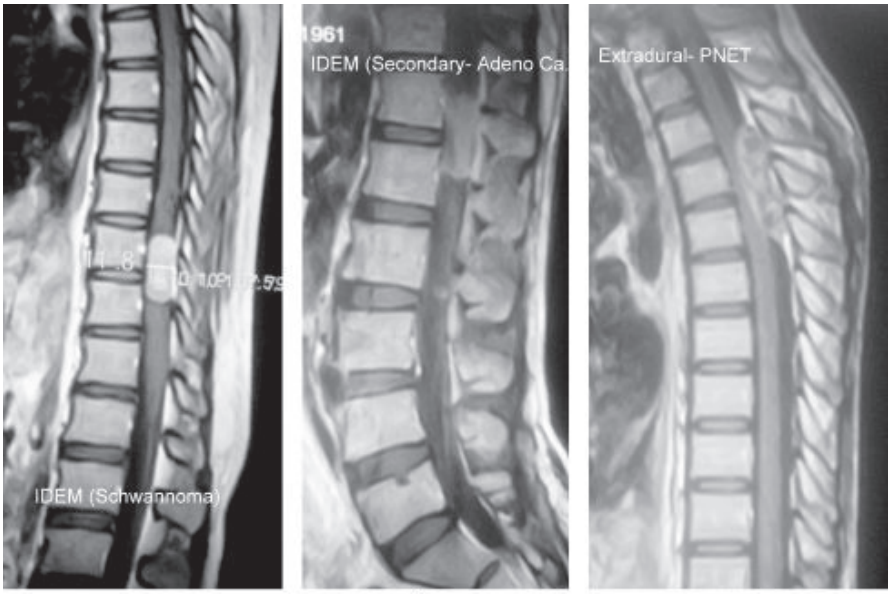


Fig.-1: *a) Intradural extramedullary SOL(Schwannoma) b) Intradural extramedullary SOL(Metastatic Adenocarcinoma) c) Extradural SOL(PNET)*

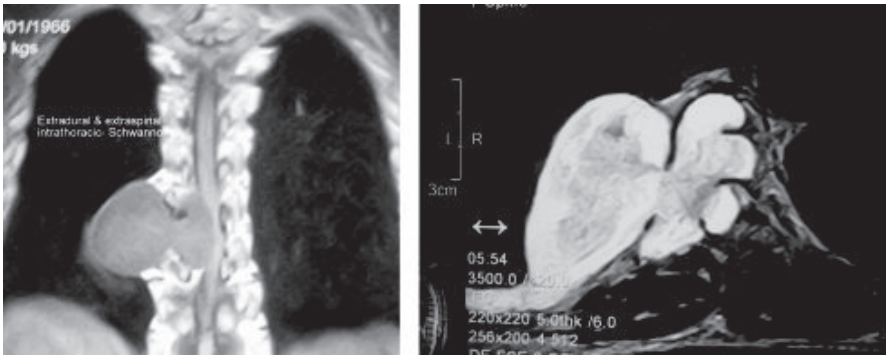


Fig 2a,b: *Extradural SOL with extraspinal intrathoracic and intraosseous extension (Schwannoma)*

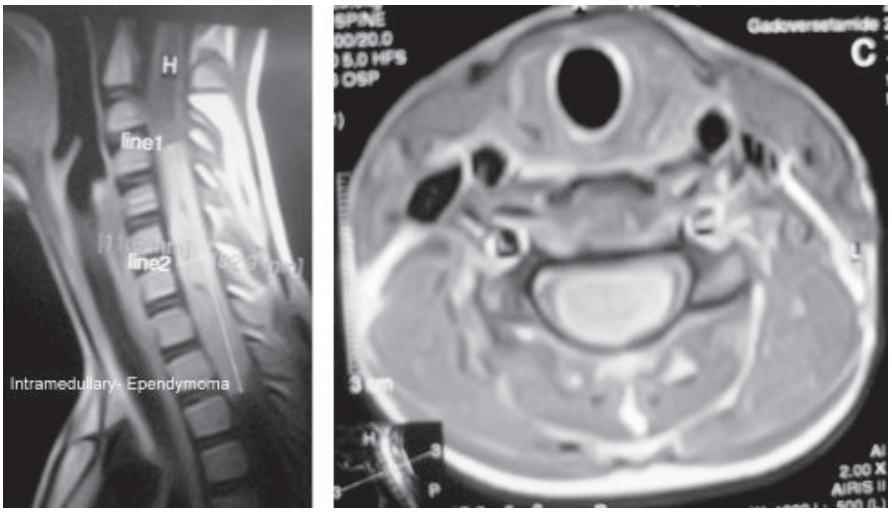
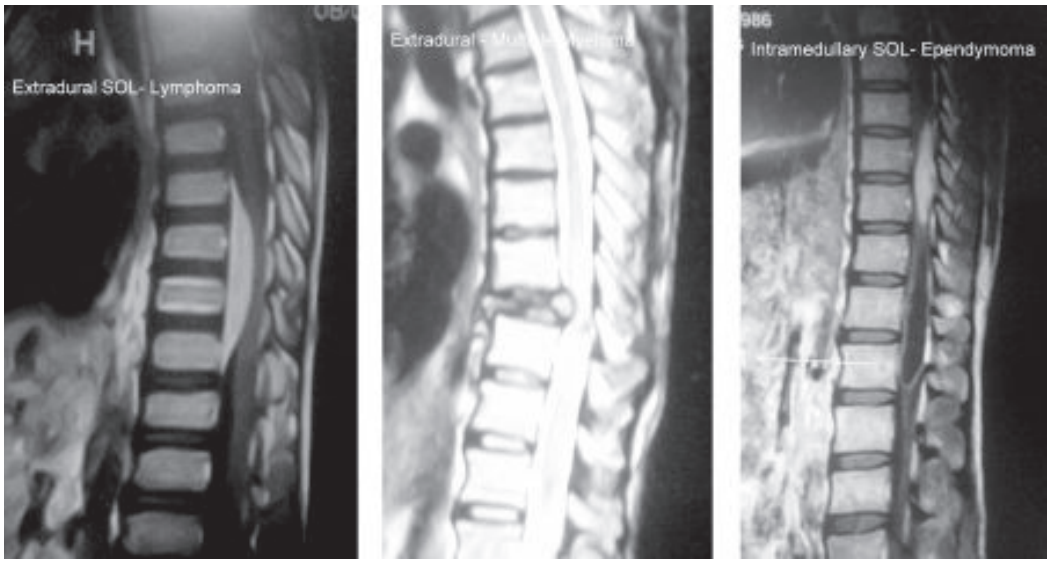
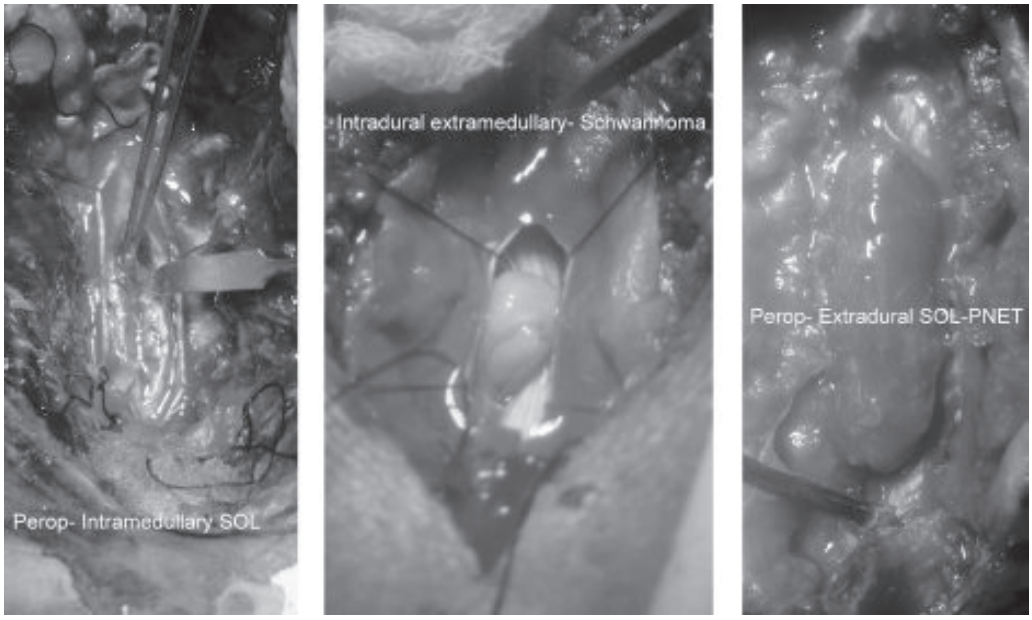


Fig 3a,b: *Intramedullary SOL (Ependymoma)*



a) b) c)

Fig.4: *a) Extradural SOL(Lymphoma) b) Extradural SOL(Multiple Myeloma) c) Intramedullary SOL(Ependymoma)*



a) b) c)

Fig 5: *Peroperative pictures **a**) Intramedullary(Ependymoma) **b**) Intradural extramedullary (Schwannoma) **c**) Extradural (PNET) SOL*

Discussion:

A spinal tumor can originate from structures inside spinal canal or vertebral column or may spread into the spinal canal from outside[3]. It may be from neural tissue, its coverings, vascular tissue or bony element or marrow. Metastatic lesions may spread to the spine from distant primary tumor sites by hematogenous or lymphatic routes[8]. In 1769 Morgagni referred to the occurrence of spinal cord paralysis due to compression by a tumor. In 1792 Phillips first convincingly described a tumor of dorsal and lumbar cord. Victor Horsley, in 1887 was the first to successfully remove a spinal cord tumor diagnosed by William Gower[3]. This lesion was an intradural extramedullary tumor that compressed the spinal cord[2].

In 1961 Lombardi, M.D. and A. Passerini published their series of 244 patients with 249 spinal tumors and found Spinal tumors occurred about equally in the two sexes: 128 in men and 116 in women. If 6 cases of Recklinghausen's neurofibromatosis in which the medullary involvement was generalized are excluded, the remaining 243 tumors were distributed as follows: The thoracic spine was the most frequent site with 156 tumors, corresponding to 64.2 per cent of the whole series. Meningiomas predominated here, with 65 cases, followed by 37 neurofibromas, 29 malignant extradural tumors, and 21 gliomas. There were 42 tumors (17.2 per cent) in the cervical spine: 20 neurofibromas and 12 intramedullary tumors. The lumbar spine was the site of 41 tumors (17 per cent), of which 19 were ependymomas and 16 neurofibromas. Four sacral tumors were recorded (1.6 per cent)[9]. In that series intradural tumors were 57%, extradural were 17%, intra and extradural were 11% and intramedullary were 15%[9]. In another study, of the 71 tumors, 48 were subdural; 11 were subdural and extradural; 12 were intramedullary[7]. Their incidence of intramedullary tumors 16 per cent, is slightly higher than the 11.5 per cent reported by Rasmussen, Kernohan, and Adson, but it is within the limits of 10 to 20 per cent quoted by others[10]. Intramedullary spinal cord tumors account for approximately 2% of adult and 10% of pediatric central nervous system neoplasms[2]. Intradural extramedullary spinal cord tumors (IESCT) account for approximately two thirds of all intraspinal neoplasms[11].

In our series we found 47 cases, among them 03 intramedullary, 02 multiple spinal lesion(NF-1 and NF-2), 02 other cases were excluded from the study as they refused operation in our settings after counseling. 40 cases were studied. Males are affected more (55%) than females (45%). Dorsal spine is the commonest site of involvement (57.5%) followed by cervical (22.5%) and lumbar (10%). 7.5% were in dorso-lumbar and 2.5% in cervico-dorsal region. Intradural-extramedullary is the commonest location for spinal tumors. It is 50% of all spinal tumors in our series. 20% tumors were intradural and extradural, 17.5% were only extradural, 12.5% were intramedullary. 12.5% non-metastatic tumors had extraspinal extension. This result is comparable to other studies. Spinal schwannomas account for about 25% of intradural spinal cord tumors in adults. Most are solitary schwannomas which can occur throughout the spinal canal. Most schwannomas are firm, encapsulated neoplasm that are composed principally of neoplastic schwann cells. Microscopically, schwannomas are characterized by high cellularity, and relative lack of an antoni B pattern. The "multiple" form of neurofibromas is known as von Recklinghausan's disease[12]. Meningiomas are the second most common tumor in the intradural extramedullary location, second only to tumors of nerve sheath. Meningiomas account for approximately 25% of all spinal tumors. Approximately 80% of meningiomas are located in the thoracic spine, followed by cervical spine (15%), Lumbar (3%), and foramen magnum (2%)[6]. In Lombardi and Passerini's (1961) series of 243 patients meningiomas were 28%, neurofibroma (schwannomas) 30%, intra medullary tumors (both astrocytomas and ependymomas) were 21%, malignant tumors were 12% and others were 9%[4]. In A retrospective review of 67 operative IESCT cases between 1974 and 2001 performed by S.P. Stawicki & J.J. Guarnaschelli and found 36 schwannomas, 21 meningiomas and 10 ependymomas[11]. In our series meningiomas were 15%, schwannomas were 52.5%, intramedullary tumors (both astrocytomas & ependymomas) were 12.5%, metastatic lesions were 10% and others were 10%. Our series is a smaller one and some patients refused to undergo operative treatment in our settings after counseling. Cooper PR in 1989 showed in his series of 51 patients of intramedullary tumors, 24 had ependymomas, 18 had astrocytomas, and the remainder had a variety of less common lesions[16]. Our intramedullary tumors are only 5 among them 4 were ependymoma and 01 is astrocytoma.

Plain X-ray of the spine and CT are of limited diagnostic value in cases of intramedullary pathology. Magnetic resonance imaging should be performed as soon as possible and as the first technique[13]. In our series, we have done MRI in all the cases to diagnose spinal tumors.

In Cooper's (1989) series of 51 intramedullary tumors, thirty-seven patients survive and have been followed for periods up to 72 months (mean 38 months). The neurological conditions of 21 patients are improved or have stabilized following operation. The conditions of 16 patients are worse postoperatively: 11 from operation and 5 from progression of disease. 14 patients died[16]. In the series of Stawicki and Guarnaschelli Sixty-three (94%) of patients demonstrated significant improvement at one-month and 62 (92%) at 8.5-month mean follow-up as

compared to the index exam. Only 13/67 (19.4%) patients had residual focal deficits on long term follow-up[11]. In our series no patient died and no patient deteriorated from his/her preoperative condition. 60% patients recovered completely, 30% had incompletely recovery and 10% had no recovery.

The most common tumors that metastasize to the spine are as follows: prostate, breast adenocarcinoma, lung adenocarcinoma, renal cell carcinoma, gastric carcinoma, thyroid[3,8,14]. The spine is the third most common site for cancer cells to metastasize, following lung and liver. Approximately 60-70% of patients with systemic cancer will have spinal metastasis; fortunately, only 10% of these patients are symptomatic. Approximately 94-98% of these patients present with epidural and/or vertebral involvement. Intradural extramedullary and intramedullary seeding of systemic cancer is unusual; they account for 5-6% and 0.5-1% of spinal metastases respectively[15]. In our series we found 04 (10%) metastatic lesions among them 03 were epidural and 01 (2.5%) case was intradural extramedullary spinal metastatic lesion (adenocarcinoma).

In conclusion, it appears that though the series is a smaller one, the results are comparable to the other studies, published in world literature.

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