

# Spinal Intradural Meningioma and Neurofibroma: Personal Experience, Clinical Presentation, Surgical Outcome

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## ABSTRACT:

### BACKGROUND:

Meningiomas and neurofibromas are the most common intradural extramedullary tumors of the spine

### OBJECTIVE:

To study the incidence, behavior and surgical outcome of intradural meningioma and neurofibroma.

### METHODS:

This study was undertaken to analyze the 48 cases of intradural meningiomas and neurofibromas between January 1995 and December 2014. A total of 48 patients underwent surgical resection of a spinal meningioma and intradural neurofibromas. There were 14 female and 10 male patients. 24 cases of meningioma and 24 cases of neurofibroma (13 male & 11 female). Age ranged from 20 to 70 years. The mean follow-up period was 50 months (range 1–116 months) including a complete neurological examination and postoperative MRI studies. The pre- and postoperative neurological state.

### RESULTS:

Surgery was performed under standard microsurgical conditions with neurophysiological monitoring if needed. In meningioma, 11 the lesion was located in the thoracic region, in 6 in the cervical region, in 1 at the cervico-thoracic junction, in 1 at the thoraco-lumbar junction and in 5 in the lumbar region. Neurofibromas in 24 patients (13 male and 11 female). In 10 the lesion was located in the thoracic region, in 8 in the cervical region, and in 5 in the lumbar region, 1 in the thoraco-lumbar. Surgical resection was complete in 46 patients and subtotal in 2 patients. At the last follow-up the neurological state was improved or unchanged in 46 and worse in 2 patients in meningiomas.

### CONCLUSION:

resection of spinal meningiomas and neurofibromas can be performed with good functional outcome

**KEY WORD:** spinal meningioma, neurofibroma, intradural surgery.

## INTRODUCTION:

Spinal tumors According to their topographical relationship to dura mater and spinal cord, are generally classified as extradural, intradural extramedullary, and intradural intramedullary<sup>(1,2)</sup>. Meningioma and neurofibroma are intradural extramedullary<sup>(3)</sup>, but rarely Neurofibromas presented as intramedullary mass, 16% of Neurofibromas are partially or totally extradural mass<sup>(4,5)</sup>.

Spinal meningioma arise from cap cells of the arachnoid in proximity to nerve roots<sup>(6)</sup>. While neurofibroma arise from dorsal and, much less frequently, ventral nerve roots and therefore present eccentrically in a dorsolateral or ventrolateral position<sup>(4,5)</sup>.

these tumors are usually solitary but rarely multiple in neurofibroma seen in Von-Reckling-Hausen disease<sup>(4,5)</sup>.

Most of the neurofibroma were thoracic, but appeared roughly evenly distributed along the spinal canal with regard to the length of each area. Then appeared in cervical, lumbar, & cauda equina, single root<sup>(4)</sup>.

Meningioma are more frequently located in the thoracic spine and mostly involve the lateral intradural compartment of the vertebral canal, then appeared in the cervical, cervico-thoracic, lumbar & lumbosacral to a lesser extent respectively.<sup>(7,8,9,10,11)</sup>

In cervical and foramen magnum region, Meningiomas and neurofibromas are the most common intradural tumors, located ventrolateral or ventral to the spinal cord and the medulla.<sup>(3)</sup> Pain is the most frequent complaint in patients with neurofibroma and sometimes constituted the only

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symptoms in patients as a radicular pain or poorly localizing pain. Bowel or bladder disturbances which mainly noticed in patients with meningioma & early impotence also a complaint may be seen. In meningioma, 10% of patients are normal, 30% had sensory changes & 30% had motor changes, 40% with external plantar responses<sup>(4,7)</sup>. The most common presenting symptom was motor and sensory deficits and unsteady gait, also myelopathic ataxia, quadriplegia, and cauda equina syndrome<sup>(12,13)</sup>

In the cervical tumors the initial symptoms is occipital pain, other symptoms, numbness or pain of the extremity and clumsiness of the upper extremity<sup>(14)</sup>

Surgery is the only treatment option for symptomatic tumor and is commonly associated with a good outcome. However, risk factors such as age and/or severe preoperative neurological deficits have been considered as predictors of a poor surgical outcome<sup>(7)</sup>

Several anterior and posterior surgical approaches have been described<sup>(15)</sup>

the surgical approach for resection of intradural-extramedullary spinal cord tumors has been approached by posterior laminectomy with or without facetectomy and/or pediculectomy, depending on tumor size and involvement of the intervertebral foramina. This is largely a reflection of the posterior and lateral orientation of most intradural tumors<sup>(5)</sup>, number of anterior approaches

to the craniocervical junction have been described to allow exposure to the midline and lateral aspects of both the cranial base and upper cervical<sup>(16)</sup>. Introduction of microscopic surgery, using the CUSA (cavitronic ultra-sonic aspirator) two point coagulation forceps improving the surgical outcome,<sup>(17,18,19,20)</sup>

En bloc resection using transoral-transpharyngeal approach, provides surgical access to the anterior clivus, C1, and improve the outcome<sup>(16)</sup>

Posterior approach for anteriorly located meningiomas is a safe procedure with the use of intraoperative monitoring, less invasive and well-tolerated especially in older patients. Complete tumor excision can be performed with satisfactory results<sup>(12,21,22)</sup>

Prognostic value of spinal tumors show that slow growing benign tumors that produce indolent neurological deficits, which are often reversible following operation,

Posterior or lateral tumor position in the spinal canal, location below C4, age less than 60 years, and duration of preoperative symptoms seem to be correlated with a good outcome<sup>(23)</sup>, also gross total resection & tumor grading extensive tumor calcification affect the outcome and prognosis<sup>(24,25)</sup>. Pre-surgical assessment & the assessment of functional outcome of surgery, by using American spine injury association score (ASIA Score).

	Grade1	Grade2	Grade3	Grade4
sensory	Local pain, normal sensory function	Local+radicular pain	Impaired sensory function	anesthesia
motor	walk	Walk with aids	No walk but resistance less than gravity	paraplegia
Voluntary sphincter control	yes	Slight disturbance	Often loss of control	no

American spine injury association<sup>(7)</sup>

## PATIENT AND METHODS:

This prospective study was undertaken to analyze the 48 cases of intradural meningiomas and neurofibromas in AL-Kadhimiya teaching hospital between January 1995 and December 2014. A total of 48 patients underwent surgical resection of a spinal meningioma and intradural neurofibromas, confirmed by histopathology. Age ranged from 20 to 70 years. The surgical approach was posterior midline

approach with laminectomy at level of the lesion, confirmed by preoperative marker, some cases using metal with plain x-ray, and other cases using special water marker in M.R.I study, then dura opened after laminectomy, followed by tumor resection then sent for histopathology.

Twenty-four cases of meningioma, there were 14 female and 10 male patients & 24 cases of neurofibroma, there were 13 male and 11 female.

## SPINAL INTRADURAL MENINGIOMA

In this study the patients ruled in four category as grade one to grade four according to motor,sensory,sphincter disturbance of each group. The mean follow-up period was 50 months (range 1–116 months) including a complete neurological examination and postoperative MRI studies. The pre- and postoperative neurological state.

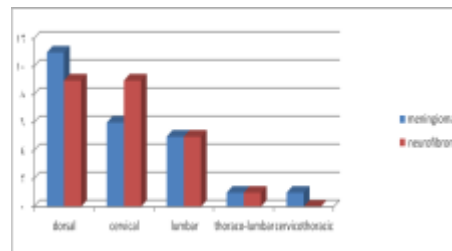
### RESULTS:

Surgery was performed under standard posterior approach and microsurgical conditions used in most of the cases.

There is 24 cases of meningioma,10 male(41.7%)

and 14(58.3%) female , and 24 cases of neurofibroma,13(54.2%) male,11(45.8%) female.

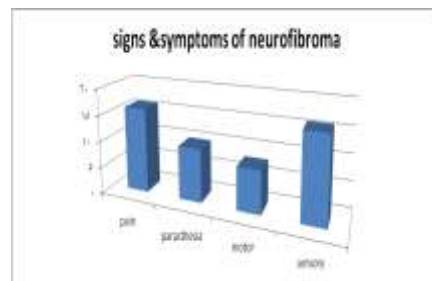
The presenting sites of tumor that observed is cervical region were 9 cases of neurofibroma& 6 cases of meningioma, followed by dorsal neurofibroma, 9 cases and 11 cases of meningioma ,then lumbar region were 5 cases of neurofibroma&5 of meningioma followed by 1 case of neurofibroma,inthoaco-lumbar & another single case in thoracolumbar region of meningioma ,with only1cervico-thoracic case of meningioma observed at these sites in our study.



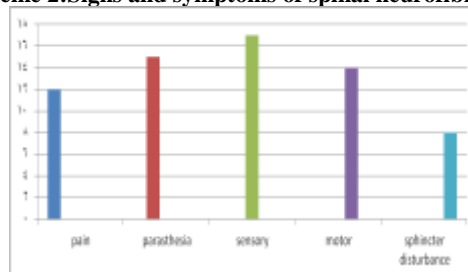
scheme1:no. of cases in relation to the site of tumor.

The signs & symptoms of neurofibroma that observed were,16 cases had back & radicular pain,followed by sensory disturbance below the

level of lesion about 16 case, then 9cases of parasthesia and 8 cases of motor disturbance



Scheme 2:Signs and symptoms of spinal neurofibroma.



Scheme 3:Signs and symptoms of meningioma.

In meningioma ,the sensory disturbance was the most presenting symptoms in 17 cases,followed by motor disturbance in 14 cases & lower limb

parasthesia in 15 cases,thenbackpain in 12 cases &lastly sphincter disturbance in 8 cases.

## SPINAL INTRADURAL MENINGIOMA

**Table1: Grading at presentation.**

	Grade1	%	Grade2	%	Grade3	%	Grade4	%
meningioma	12	50	5	20.8	5	20.8	2	8.4
neurofibroma	14	58.3	7	29.2	3	12.5	0	0

Regarding the grading at presentation, in meningioma 12(50%) patients presented with grade1, while there is 14 (58.3%) in neurofibroma. In grade 2 there is only 5(20.8%) in meningioma with 7 (29.2%) of neurofibroma, in grade 3 only 8

patients 5(20.8%) with meningioma and 3(12.5%) with neurofibroma, in grade 4 there is only 2(8.4%) patients with meningioma while there is no grade4 presentation in neurofibroma.

**Table 2: Percent of grades at presentation.**

	meningioma	neurofibroma	total	%
Grade1	12	14	26	54.2
Grade2	5	7	12	25
Grade3	5	3	8	16.7
Grade4	2	0	2	4.1

Surgical resection was complete in 46 patients, subtotal resection in 2 patients, one with posterolateral cervical (C 3-4) neurofibroma extending intraforaminal, and the other big tumor extending

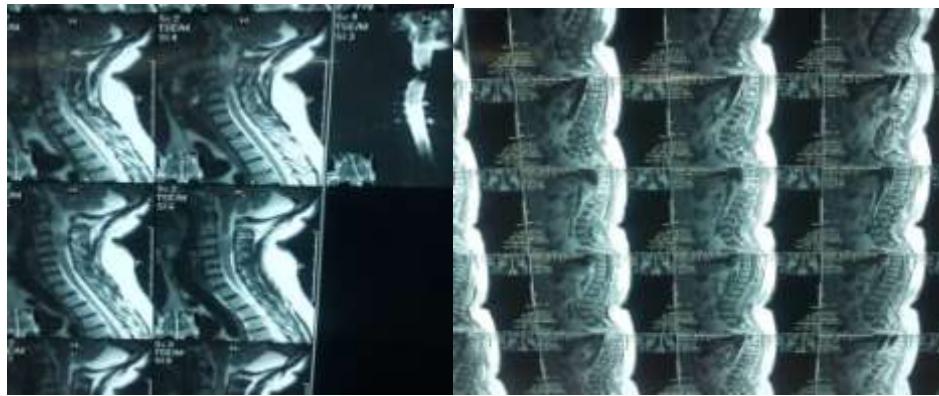
from lower thoracic to the lower lumbar region. At the last follow-up for 1 year postoperatively, the neurological state was improved or unchanged in 46 and worse in 2 patients in meningiomas .

**Table 3: Post-operative evaluation according to ASIA Score.**

	G1	%	G2	%	G3	%	G4	%
meningioma	13	54.1	4	16.7	3	12.5	4	16.7
neurofibroma	15	62.5	6	25	3	12.5	0	0



(pic.1):intraoperative field & dorsal spine MRI using skin marker for D5 meningioma, for 70 y old man presented with backpain, tumor resected totally.



a.cervical neurofibroma

b.dorso-lumbar neurofibroma

Pic.2(a&b) neurofibroma

### DISCUSSION:

Surgical resection done for all cases in our study through posterior standard approach ,using microscope and microsurgical instrument for resection,which is one of the preferable approaches depending on the tumor location also in other studies were other extreme lateral , anterior& trans-oral approaches may be used<sup>(3,5,7,8,12,15,16,18,20)</sup>

Both meningioma and neurofibroma are equally observed in our study,the female:male in meningioma was 1.4:1 and in neurofibroma 1.1:1.3,while in other studies female:male in meningioma 7:1<sup>(8)</sup>, & 4:1<sup>(20)</sup> and in neurofibroma 1:1.2<sup>(4)</sup> which is equal to our study.

The most presenting sites for meningioma ,was ,dorsal, cervical ,lumbar ,thoraco-lumbar respectively,and there is only 1 cervico-thoracic presentation ,while neurofibroma there is equal presentation in cervical and dorsal region then lumbar, thoraco-lumbar respectively ,which in other study ,the dorsal ,cervical &cervico-thoracic<sup>(7,26)</sup>,and the other ,thoracic & less often the cervical ,then the lumbar and sacral tumors are relatively rare<sup>(8)</sup>

Pain and sensory disturbance was the most presenting symptoms in neurofibroma in our study,as other studies which presented as neck pain and radiculopathy in cervical& other loctions of tumor<sup>(3,4)</sup>

In meningioma sensory disturbance followed by motor disturbance was the most presenting symptom.As in other study,The most common presenting symptom was motor and sensory

deficits, back pain, unsteady gait, sphincter dysfunction, whereas no patient presented with paraplegia<sup>(8)</sup>.

According to American spine injury association score, 50% of meningioma presented as G1 & about 58% in neurofibroma, then 20.8% in G2& G3 in meningioma , & about 29% in G2 12.5% in G3 inneurofibroma. But there is no G4 presentation in neurofibroma with only 2 cases of meningioma.in other study most cases presented at G4 &G3<sup>(7)</sup> and this wide variety in related to the time of presentation and progression of symptoms.

Also according to the score ,the postoperative evaluation there is one case improved from G2 to G1 and 2 cases deteriorated from G3 to G4,which is similar in other study ,that 2/48 cases were deteriorated but with different percentage<sup>(27)</sup> may be due to late presentation ,while in neurofibroma ,one case improved from G2 to G1,and this improvement due to rapid decompression of the cord after early presentation., this score also used in other studies to assess postoperative results but differ in progression of cases which is related to the time of presentation ,site ,size of tumor and the clinical condition of the patients<sup>(7,28)</sup>

Gross Surgical resection should be the goal ,most cases ,grossly totally removed as in other studies<sup>(27)</sup>& only 1 case with subtotal resection in neurofibroma because the tumor was in the upper dorsal region with antero-lateral location.

### CONCLUSION:

Gross total resection should be the goal of the surgeon & the surgical outcome depend on the

location ,size of the tumor & the chronicity of the symptoms & signs, which can be assessed and evaluated with surgical outcome by using ASIA Score.

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