ORIGINAL ARTICLE

OUTCOME OF SURGICAL MANAGEMENT IN SPINAL MENINGIOMA: A STUDY OF 48 CASES

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ABSTRACT

Background: Spinal meningiomas are relatively rare in comparison to intracranial meningiomas. Spinal meningiomas occur more often in females than males. The goal of surgery is precise resection of the tumor with functional recovery. This study was conducted to assess surgical management of spinal meningiomas.

Material & Methods: This descriptive hospital-based study was conducted in Department of Neurosurgery, Lady Reading Hospital, Peshawar, from January 2006 to January 2009. Patients with spinal meningioma were selected on the basis of clinical features and MRI findings, The record of all patients was analysed. We made a proforma for collection of data, which included information about patient identity, clinical features and MRI findings and histopathology.

Results: We studied 48 patients with spinal meningioma. Their age ranged from 18 to 78 years, with mean of 48 years. Among these 43(90%) were females and 5(10%) males. Paraparesis was predominant motor symptom in 27(56.25%), while hypesthesia was predominant sensory symptom in 32(66.6%) patients. There was sphincter dysfunction in 14(30%) patients. MRI spine was performed in all cases. Surgical results showed Simpson Grade-2 removal in 40(40.32%), Grade-3 in 6(12.5%), and Grade-4 in 2(4.16%) patients. Patients were followed-up for 2 years. Post-operatively 37(77%) patients improved, 2(4.16%) deteriorated due to spinal cord injury and syrinx, and 9 (18.75%) had no change. Six (12%) patients had recurrence and there was Simpson grade 3 and 4 removal in these patients. Two patients had superficial wound infection which was subsequently managed, and 4 patients had CSF leak which was managed conservatively.

Conclusion: Spinal meningioma most commonly occurs in the thoracic and cervical regions. Posterior or posterolateral approaches are the most commonly employed. Gross total resction is the treatment of choice.

Key Words: Spinal meningioma; Spinal tumor; Surgical treatment.

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INTRODUCTION

Meningiomas involving the spinal compartment are relatively rare in comparison to the intracranial compartment accounting approximately 1.2% of all meningiomas of the central nervous system.[1,2] They are commonly Intradural, extramedullary, accounting for approximately two-thirds of all spinal cord tumors in adults. Meningiomas, neurofibromas, and schwannomas are the most common type of tumor in this location. Meningiomas represent about 40% of these tumors.[3] It is generally benign, well-circumscribed, and slow growing. It is more common in the thoracic region, although they are also found in cervical, lumber and rarely sacral area and occur most frequently in middle-aged patients. Spinal meningiomas occur about 2.5 times more often in females than males. The female preponderance is thought to arise from sex hormones or other receptor types common to women.[4] Spinal menigiomas are more common in elderly patients, thus, the occurrence in younger patients should raise the suspicion of a genetically determined disorder as neurofibromatosis type 2 or an association with aggressive histological subtypes.[5] Spinal meningiomas may lead to compression and myelopathy.

The goal of surgery is precise resection of the tumor with functional recovery. The surgical management of spinal meningiomas depends upon several factors; the patient's neurological condition, tumor size, tumor location, spine level, and anatomical relationship with spinal cord.[6,7]

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MATERIAL AND METHODS

This descriptive study was conducted at the Department of Neurosurgery, Lady Reading Hospital,

Peshawar, for three years from January 2006 to January 2009. Total 48 patients having spinal meningioma were selected on basis of clinical features and MRI findings.

We included all patients of either sex and all age group with spinal meningioma. Patients with comorbid conditions like IHD unfit for surgery, or patients on anticoagulants or having bleeding disorders were excluded. Informed consent of the patient was taken. On MRI characteristic findings suggestive of meningioma, location and size of tumor and its local effect was noted.

All patients were operated after establishing neuroradiological diagnosis. X-ray, CT scan spine in some and MRI spine with MR myelogram was performed in all cases. Preoperative, on the day of hospital admission, intravenous dexamethasone, which was continued for 5 days postoperatively up to patients discharge.

All patients were operated in prone position under GA, using a microsurgical technique via a posterior approach with the goal of spinal cord decompression. Antibiotic prophylaxis was given on the operation day and continued up to 3rd post-operative day. Posterior midline skin incision was performed extending two levels above and below the extent of the lesion. A monosegmental or multisegmental laminectomy above and below the extent of the tumor was performed, completed with partial facetectomy on tumor side in order to increase the view in only two cases. Dura was opened longitudinal under operating microscope and fixed to the sides with moderate tension in order to expose, assure. hemostasis, avoiding motor deficits. Arachnoid plane was followed. Dura mater on tumor side was gently handled in order to identify lateral tumor attachments and tumor de-bulking starts using sharp dissection using a microsurgical technique and minimal bipolar electrocoagulation in order to avoid thermal and mechanical injury to the spinal cord. Simpson grade 2 removal was done in 40(84%), grade 3 removal was done in 6(12.5%) and grade 4 removal was done in 2 (4.16%) patients. After tumor completely removal and careful hemostasis, the dura was coagulated in all cases and primarily closed in a watertight manner. No spinal stabilization was used. The pathologic examination was reported in all cases. The mean follow-up was 24 months; referring to clinical control postoperatively immediate after operation, at discharge; clinical and MRI control 1 months postoperatively and 1, respectively 2 years after operation.

A proforma was designed for collection of data, which included information about patient identity, clinical features, MRI findings and histopathology.

Results were analyzed and presented in the form of tables and pie charts using SPSS version 17 for analysis. We included all patients of either sex and all age group with spinal meningioma.

RESULTS

We studied 48 patients with spinal meningioma. Their ages ranged from18 to 78 years, with mean age of 48 years. Among these, 43 (90%) were females and 5 (10%) were males.

Paraparesis was the predominant motor symptom in 27 (56.25%), while hypesthesia was predominant sensory symptom in 32 (66.6%) patients. Neck pain, nocturnal pain and backache were more common presenting features present in 31 (64%) patients. There was sphincter dysfunction in 14 (30%) patients. MRI spine was the main diagnostic tool and was done in 48 (100%) cases. Dorsal spine was involved in 35 (74%) cases while cervical spine was involved in 8 (16.66, cervicothoracic junction in 3 (7%), thoracolumber one (2%) and lumber spine in one (2%) patients. (Table 1, 2)

Intraoperatively 44 (91.6%) were intradural extramedullary, 2 (4%) were epidural and 2 (4%)

Table 1: Level of involvement in patients with spinal meningioma.

Level	Number of patients	Frequency
Thoracic spine	35	74%
Cervical spine	8	16%
Cervico-thoracic	3	12%
Thoraco-lumber	1	2%
Lumber spine	1	2%

Table 2: Clinical features in patients with spinal meningioma.

Clinical features	Number of patients	Frequency
Neckache /backache	37	77%
Leg weakness	27	56.26%
Hypesthesias	32	66.6%
Sphincter dysfunction	14	30%
Lumber spine	1	2%

Table 3: Surgical outcome in patients with spinal meningioma.

Post-operative outcome	Number of patients	Frequency
Improved	37	77%
No change	09	18.75%
Deteriorated	02	4.16%

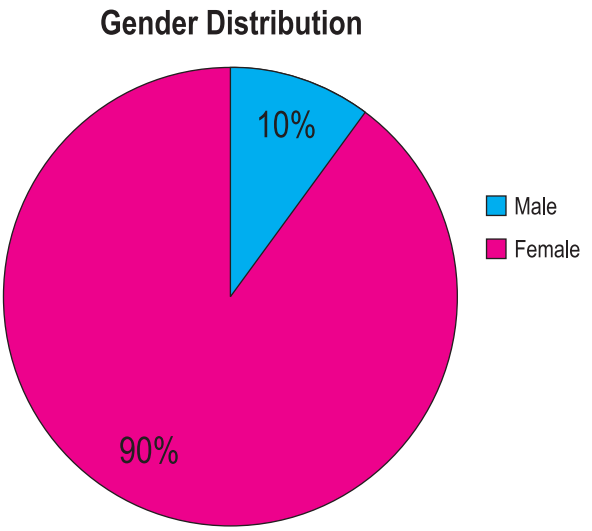

Figure 1: Gender distribution of patients with spinal meningioma.

Figure 2: MRI showing spinal meningioma.

Figure 3: MRI of 45 years old female showing spinal meningioma.

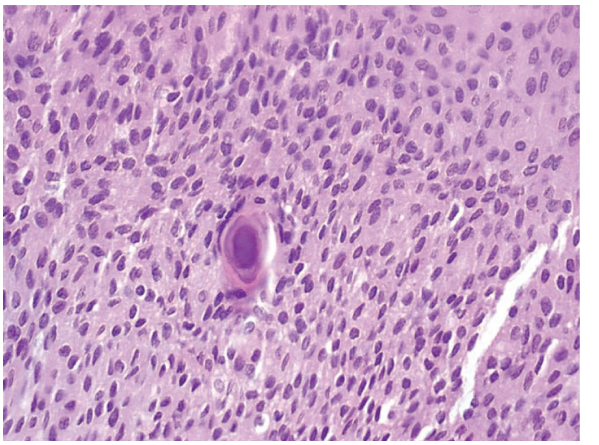

Figure 4: H&E stained microscopic structure of meningioma.

were both intra and extradural. Surgical results showed simpson grade two removal in 40 (40.32%), simpson grade three removal in 6 (12.5%), Simpson grade four removal in 2 (4.16%) patients. we had follow up of 2 years. initially 3 months then after every 6 months, and lastly after 9 months follow-up. Post-operatively 37 (77%) patients improved, 2 (4.16%) deteriorated due to spinal cord injury and syrinx, and 9 (18.75%) had no change. After follow up of two years 6 (12%) patients had recurrence and there was Simpson grade 3 and 4 removal in these patients.

Two patients had superficial wound infection which was subsequently managed. Four patients had CSF leak which was managed conservatively.

DISCUSSION

In 1887, Sir Victor Horsley and Sir William Gowers are credited with the first successful surgical removal of a spinal meningioma. Meningiomas are benign tumours arising from arachnoid cells and mostly located in the intracranial compartment. Extradural meningiomas without an intradural component are rare.[8,9] In our study we had 2(4%) had both intra and extradural components.

The exact incidence of spinal meningiomas is not known; however, the total incidence of spinal intradural tumors is estimated to be from 3 to 10 per 100,000 persons per year with two thirds of the tumors being extramedullary[10]. Spinal canal meningioma is a benign lesion that commonly occurs in women of middle age. It accounts for approximately 25-46% of spinal tumors[11,12]. In the recent series, the female to male ratios in patients with spinal meningioma ranged from 3 and 4.2 to 1, and the ages of the people who were affected ranged mostly from 40 to 70 years. In our study female were 43(90%) and males 5(10%).

In our study spinal meningiomas are most prevalent in the thoracic region, followed by the cervical

region. 74% of our cases were thoracic, 16%cervical and 2% lumbar. The incidence of thoracic location was reported to be 75% by Levy et al[13]. 66% by Namer[14] et al and 79.5% by Roux et al[15]. So our results are comparable with study of levy et al. Clinical findings in spinal meningiomas variate from mild to significant neurologic dysfunction, with many patterns of clinical presentation depending on: tumor location, the rate of tumor growth - onset and development are insidious, generally with a long clinical history until a diagnosis is made.

Neckache, backache, and nocturnal pain were the most common symptoms in our study 77%. Paraparesis 56%, hypesthesia 66.6%, and sphincter dysfunction 30%. Study conducted by mathias setzer etal in johann wolfgang university showed pain was the least common feature. Pain had been reported as the most common sign in the recent series[16,17,18]. The rate of motor deficits as the presenting symptom (56%) was higher in the present series with compared with Solero's series who reported a rate of only 25%[19] but in accordance with Sandalcioglu's series (84%).[20]

MRI is the imaging investigation of choice since it often shows the characteristic dural origin of meningiomas. They are typically isointense or hypointense to gray matter on T1, and isointense or hyperintense on T2. Intraspinal meningiomas radiographically display avid homogenous enhancement with gadolinium contrast. Enhancement of the adjacent dura, or dural tail, is also characteristic of a meningioma. In our study MRI with and without contast was done in all cases.[21] 15% of patients with calcified meningiomas are hypointense on T1 and T2; T1 weighted images + Gadolinium: immediate and moderate homogeneous enhancement or only minimal contrast enhancement.[22]

Surgical treatment is treatment of choice. gross total removal should be the objective. Tumors carry a favorable prognosis if completely resected. To facilitate tumor removal and diminish the risk of intraoperative spinal cord damage, at surgery: general anesthesia, high-dose corticosteroids, the operating microscope, the irrigating bipolar forceps to minimize heat transfer To the spinal cord, ultrasonic dissection, peroperative monitoring somato-sensory evoked potential (SSEP) - easily recordable without adjusting the anesthetic regimen, transcranial motor-evoked potentials (TcMEPs) and continuous free running electromyography (EMG) - evaluate the pyramidal motor pathways, giving an immediate and conclusive feedback of motor tract integrity should be used.[23] Posterior approach, and if tumor is more extensive posterolateral approach with or without facetectomy is commonly used. In our study posterior approach was used for all cases. We did simpson grade 2 removal in 84% of cases, and simpson grade 3 removal in 12.5% of cases. The rate of total tumor resection was reported to be 82% by Levy et al[13]. 92.6% by Roux et al[15], and 97% by Solero et al[24]. So our results regarding resection of tumor are comparable to levy et al.

We had follow up of two years. After 2 years 6(12%) patients had recurrence of tumor. Cohen-Gadol et al. reviewed data obtained in a cohort of 40 patients aged less than 50 years .They reported a recurrence rate of 22%. There are various rates of meningioma recurrencies after operation: King et al[24] and Solero et al[17] reported the recurrence rate of 8%, Levy et al[25] 4%, Klekamp and Samii[19] 26.1 and 31.3 after a 5-year follow-up.

CONCLUSION

Spinal meningioma commonly occurs in the thoracic and cervical regions. Posterior or posterolateral approaches are the most commonly employed. Gross total resection is the treatment of choice.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.