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CLINICAL ASPECTS OF SPINAL CORD MENINGIOMAS: ANALYSIS OF FORTY CASES

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ABSTRACT

A retrospective analysis was performed on forty cases of spinal cord meningiomas, operated on at Dr. Shariati Hospital from 1976 to 1990. Age and sex distribution, clinical presentation and tumor location were comparable to those reported by others.[15,21] In males the tumors were distributed evenly in cervical and dorsal areas and were often anterior to the cord. This finding makes a different surgical approach necessary. For prevention of postoperative CSF leakage and infection, repair and tight closure of the dura is mandatory. Concerning prognosis, even in paraplegic patients the chance of complete recovery is good.

Keywords: Meningioma, Spinal cord tumor, CSF leakage, Pseudomeningocele

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INTRODUCTION

Modern surgical treatment for spinal cord meningiomas (SCM) began in 1887 when Horsley for the first time successfully operated a patient with a benign spinal cord tumor which had been diagnosed and localized by Gower.[2] As the probability of recovery in such patients with profound neurological deficit is great, most neurosurgeons agree with Cushing and Eisenhart (1938) that "a successful operation for spinal meningioma presents one of the most gratifying of all operative procedures."[6]

The paucity of such cases in Iranian medical literature, the delayed diagnosis (often surpassing many months), and the potentially curable nature of this lesion, persuaded us to analyze our experience with forty cases of spinal cord meningioma that have been operated on during a fifteen year period at Dr. Shariati Hospital, Tehran.

PATIENTS AND METHODS

A retrospective analysis of forty cases of spinal cord meningioma operated on at Dr. Shariati Hospital from 1976 to 1990 was performed. 80% of the patients were female (Fig. 1) and the average age of the patients was forty years.

RESULTS

Case histories

The average duration of symptoms was approximately 5.8 months, with weakness being the most common chief complaint (92.5%), and pain and sphincter problems being present in 75% and 60% of the patients, respectively (Table I).

Two patients had a history of sudden symptom onset due to trauma. Four patients had been diagnosed as having other conditions (gall bladder disease in two, motor neuron

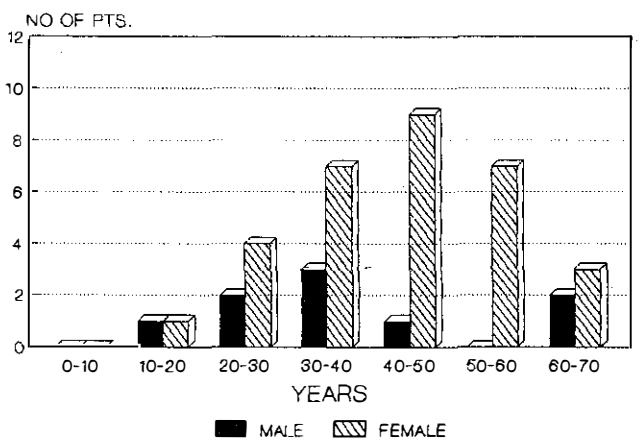

Fig 1. Age distribution in 40 cases of spinal cord meningioma.

disease in one and disc involvement in one).

Signs

Thirty-seven patients (92.5%) had weakness with different degrees of motor ability loss. Mild spastic paraparesis was present in twenty-six patients, severe spastic paraparesis in nine, and paraplegia in two cases. Three patients had intact motor functions (7.5%). Augmented reflexes were present in thirty-two cases (80%), and a positive Babinski sign in twenty-seven (67.5%). A definite sensory level and objective sphincter dysfunction were recorded in thirty-four (85%) and twenty-four patients (60%), respectively (Table II).

Preoperative studies

Routine plain films showed radiological abnormalities such as erosion of the pedicle and lamina in two cases (5%), and contrast myelography through lumbar or C_1-C_2 injection revealed incomplete or partial block in twenty and complete block in the remaining cases. Intradural extramedullary patterns were noted in thirty-eight cases, while only two cases showed an extradural pattern. CSF studies were performed in 27 out of forty cases. Only six patients had CSF protein levels below 40 mg%. On the other hand, five patients had a CSF protein level above 300 mg% (Fig. 2).

Tumor location

The distribution of the tumor along the spinal axis is shown in Table III. Eight patients (20%) had tumors in cervical and higher cervical areas, thirty-one patients (77.5%) in thoracic and one case (2.5%) in the lumbar area. In patients with thoracic lesions, twenty-seven were female (67%) and the tumors were usually located posteriorly or posterolaterally.

Pathology

Histological reports were available on all forty cases of spinal cord meningioma. The most common types were meningotheliomatous (47.5%) and psammomatous (45%). The angioblastic type was present in two cases and transitional type meningioma in only one.

Surgery

In all of the cases laminectomy at the site of the tumor including one lamina above and below the lesion was performed, accompanied by opening of the dura and excision of the tumor. The dural tumor bed was coagulated in 17 cases with posterior, posterolateral, and anteriorly located tumors. Tight closure of the dura was achieved in most cases. Dural removal with tumor and dural graft was performed in 9 cases with posterolateral and posteriorly located tumors. The dura at the site of the tumor was removed in seven cases of anterolateral and anteriorly located tumors, in which applying a dural graft was impossible.

The technique of dural removal was inconclusive from available records in 7 cases.

Table I. Presenting complaints in 40 cases of spinal cord meningioma.

Complaint	Cases	
	No.	Percent
Weakness	37	92.5
Pain	30	75
Sphincter problems	24	60

Table II. Neurological findings in forty cases of spinal cord meningioma.

Findings	Cases	
	No.	Percent
Mild paraparesis	26	65
Severe spastic paraparesis	9	22.5
Paraplegia	2	5
Normal strength	3	7.5
Reflex change	32	80
Babinski sign	27	67.5
Sensory level	34	85
Sphincter dysfunction	24	60

Table III. Location and position of 40 cases of spinal cord meningioma.

Location / Position	Cervical		Thoracic		Lumbar	
	Female	Male	Female	Male	Female	Male
Dorsal	-	-	12	-	1	-
Dorsolateral	2	-	12	3	-	-
Ventral	2	2	1	1	-	-
Ventrolateral	-	2	2	-	-	-

Surgical results

According to Frankel's classification of spinal recovery (Table IV), the follow-up outcome in thirty-three cases of SCM was as follows. Postoperatively, recovery was rather rapid and gratifying. As shown in Table V, all patients except one from preoperative group B recovered postoperatively within 2-6 months, while only two patients from preoperative groups B and C remained unchanged (almost paraplegic) even one year postoperatively. Two patients were lost to follow-up and the rest were followed-up to 13 years with a mean of 22 months.

Complications

The early complications seen in these patients are shown

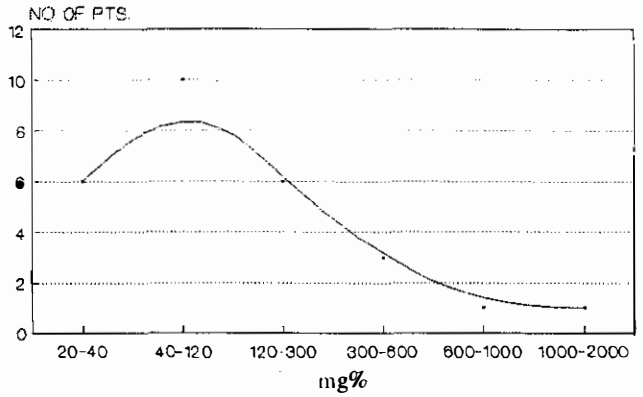

Fig 2. CSF protein (mg%) in 27cases of spinal cord meningioma.

Table IV. Frankel's classification.[9]

A- Complete sensorimotor loss
B- Sensory only (complete motor loss)
C- Motor useless. This implies that there was some motor power present below the lesion but it was of no practical use to the patient.
D- Motor useful. This implies that there was useful motor power below the level of the lesion. Patients in this group could move the lower limbs and many could walk, with or without aids.
E- Recovery. This implies that the patient was free of neurological symptoms, i.e., no weakness, no sensory loss, and no sphincter disturbance. Abnormal reflexes may have been present.

in Table VI. CSF leakage was seen in ten cases, most of them belonging to the group whose dura was not repaired. Bacterial meningitis occurred in seven cases, wound infection in six, myocardial infarction in one and pulmonary embolism in one case.

A late complication occurred in a 38 year old man who had undergone surgery for a C_2-C_3 anterolaterally located meningioma 13 years previously. He developed progressive weakness of a few months' duration of both upper and lower extremities. Clinical investigation revealed no recurrence of the tumor but a pseudomeningocele was diagnosed at the site of previous operation. This was treated surgically, and the patient gained almost normal strength one month post-operatively.

Cause of death

Causes of death in five patients with SCM were bacterial meningitis in three, myocardial infarction in one and pulmonary embolism in one case.

DISCUSSION

Meningiomas constitute about 25% of primary spinal cord tumors. They arise from arachnoid cap cells near the nerve root and extend along the lateral gutter of the spinal cord. Meningiomas usually produce signs of cord compression rather than radicular root pain.[7,15]

Davis reported radicular pain in eight of forty-five patients (18%), and Levy in 21% of his subjects.[7,15] In our study, radicular pain was present in seven patients (17.5%).

Most of our patients were female (79%), which compares with the 78% reported by Davis, 80% by Levy, and 85% by Bull.[5,7,15] The most common presenting symptom in our forty cases of SCM was motor weakness (92%), which is usually slowly progressive. It happened rather suddenly following trauma in two cases and was progressive with remissions and exacerbations in a few others. Four cases had been misdiagnosed as either other forms of spinal cord disease (multiple sclerosis in one, and motor neuron disease in one) or as gall bladder disease (two cases).

Pain was the second most common complaint (75%). In Levy's series pain was the most common complaint in seventy out of 97 cases of SCM (72%). This difference is due to the late referral of our patients to the neurosurgery ward.[15]

Table V. Surgical results in 33 cases of SCM.

Cord injury / Site of tumor	At time of admission A B C D E	At time of discharge A B C D E	6 months postoperatively A B C D E	12 months postoperatively A B C D E
Cervical 5 cases	-, 1, 4, -, -	-, -, 3, 2, -	-, -, 1, 4, -	-, -, 1, 2, 2
Thoracic 27 cases	-, 6, 10, 11, -	-, 2, 6, 19, -	-, -, 1, 5, 21	-, -, 1, 2, 24
Lumbosacral 1 case	-, 1, -, -, -	-, -, 1, -, -	-, -, -, -, 1	-, -, -, -, 1
Total	-, 8, 14, 11, -	-, 2, 10, 21, -	-, -, 2, 9, 22	-, -, 2, 4, 27

Table VI. Early complications.

CSF leakage	10
Bacterial meningitis	7
Wound infection	6
Myocardial infarction	1
Pulmonary embolism	1

Plain x-rays showed radiological abnormalities in two cases (5%), while abnormalities in the plain x-ray were reported by Davis in one out of forty-five (2.2%), and by Levy in about 20% of cases.[7,15]

Myelography has been the most useful investigative tool in diagnosing spinal cord tumors, including SCM. Myelograms were positive in all patients. There were twenty cases of partial (50%) and twenty with complete blockade. An intradural extramedullary pattern was present in thirty-eight and an extradural pattern in the other two cases.

In the present series there were thirty-one cases (77.5%) with involvement at the thoracic level, eight cases (20%) with the tumor present at the cervical or high cervical level, and one case with the lumbosacral region affected.

From thirty-one cases with thoracic spinal meningiomas twenty-seven were female (87%), and the tumor was usually located posterior or posterolaterally, which is in accordance with Levy's (83%) and Davis' series (86%).[7,15] In males the tumor was either cervical or thoracic, and was located ventral or ventrolateral to the cord, which is also similar to Levy's results.[15]

In a woman with an intradural tumor of the lumbar area the tumor extended from L_1-S_2 and was thus unique for its length.

Complete tumor removal was attempted in all cases, with removal of the dura or coagulation of the tumor base in both anteriorly and posteriorly located tumors. Whenever a defect was left in the dura, it was simply covered with "Surgicel" (R).

No recurrence of the tumor was seen in a follow-up period ranging from two months to thirteen years, as was the case in Solero et al.'s study.[21]

Concerning complications, CSF leakage developed in ten cases, bacterial meningitis in seven, wound infection in six, and myocardial infarction, pulmonary embolism and pseudomeningocele each in one case. This high complication rate had caused a high mortality rate, i.e., five cases (12.5%), compared to that reported by Rand, Iraci, and Levy.[13,15,18] This is particularly due to postoperative CSF leakage and infection in cases with no dural closure. This situation most commonly occurs in cases with anterior or anterolaterally located tumors, in which dural closure or repair is not possible, the dura being simply covered with "Surgicel" (R). CSF leakage, a condition usually leading to infection, bacterial meningitis and other complications such as pulmonary emboli (due to prolonged immobilization), should be prevented by definite closure of the dura, and in cases with anterior or anterolaterally located tumors, possibly an anterior spinal approach to the tumor could be more helpful.

The postoperative recovery of SCM patients is rather rapid and encouraging. Eighty percent of our patients were either neurologically intact, or improved after twelve months of follow-up. Two patients could walk with assistance, and two patients remained paraplegic. These figures agree with the results of Levy et al.[15]

Patients with less neurological deficit recover faster and better. The long-term follow-up of our subjects (13 years) reaffirms that even paraplegia is not a hopeless situation.

In conclusion, concerning spinal cord meningiomas and the results of our study on forty cases, the following statements could be considered relevant:

1. Spinal cord meningiomas may mimic and thus be mistaken for other spinal cord diseases.

2. Cervical lesions are usually anterior, and there was not a predominance of thoracic lesions in males.

3. A recovery rate of 80%, including patients with profound neurological deficit, is encouraging and comparable to that reported in the literature.

4. The high mortality rate (five cases, 12.5%) seems to be mostly due to inappropriate or unperformed dural closure and uncontrolled infection.

5. Pseudomeningocele can occur as a late complication of spinal meningioma surgery, which in turn has a good prognosis after surgical repair.

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