

## SPINAL MENINGIOMAS \*

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### ABSTRACT:

Between 1985 and 1995, fourteen patients affected by spinal meningiomas underwent surgery at our department. All patients were female. 86 per cent of tumors were thoracic, and the rest was cervical. Thoracic meningiomas occurred predominantly in the lower thoracic spine. One patient had multiple spinal meningiomas, while two other patients had concurrent spinal and cranial meningiomas.

The cases are studied in respect to their epidemiology, tumor location, clinical presentation, type of the surgical procedure, histopathology and outcome.

*Key words:* Spinal meningioma, spinal cord tumor, spinal surgery

Next to the neurofibromas, meningiomas represent the second most common intradural spinal tumor, accounting for approximately 25% of all primary spinal tumors (2, 9, 13, 15). About 80% of affected patients are female (2, 12, 13). Meningiomas predominantly arise in middle-aged women (2, 12, 13). This is attributed to the dependency of those tumors on sex steroid hormones (5, 9, 10, 12). They tend to arise at the thoracic level (8, 12, 13). The overall distribution of spinal meningiomas is 17% cervical, 80% thoracic and 3% lumbar (14). Levy (8) reports the frequency of lumbar meningiomas to be higher (7%).

The distribution is different in men and women. Cervical meningiomas are more common in men, whereas thoracic lesions are more common in women (8). The ratio between a thoracic and cervical location is approximately 8:1 in females and 1:1 in males (8).

Although the majority of spinal meningiomas are located intradural, 3.5%-15% are reported to be purely extradural in different series (13, 14, 15). Many extradural meningiomas have an intradural component (1, 8, 15). Extradural meningiomas are more common in children (13, 14). Pediatric spinal meningiomas can be associated with neurofibromatosis (3).

The majority of spinal meningiomas are benign, slow-growing lesions. This tumor arises from arachnoid cap cells (2). Spinal meningiomas are almost always adherent to the inner layer of the dura (16).

The histologic classification of spinal meningiomas is the same as that used for the intracranial variety (11). Most spinal meningiomas are meningothelioma-

tous (syncytial) followed by the transitional, fibrous and psammomatous types in order of their frequency (8, 14). Angiomatous examples are uncommon (8). Psammomatous changes in the spinal lesions are more common than intracranial meningiomas (14). Malignant meningiomas are rare and tend to occur in younger patients (7).

Localized or radicular pain, lower extremity paresthesias and sensorimotor deficits are the most common presenting symptoms (13, 14). The neurological examination usually reveals evidence of a spastic myelopathy (13, 14). Levy (8) has proposed a grading scheme for clinical status in spinal meningiomas (grade 0: Normal walk, grade 1: walking with assistance, grade 2: strength better than antigravity, grade 3: strength less than antigravity, grade 4: paraplegia). After surgical removal clinical prognosis is good and recurrences are rare. In a large series of 174 spinal meningiomas the recurrence rate is reported to be 6% with an average follow up of 14 years (13).

MRI is the diagnostic procedure of choice because it clearly demonstrates the intradural location of the lesion, its extension and its relationships with the spinal cord (13).

### MATERIAL AND METHOD

Between 1985 and 1995 fourteen patients were operated upon because of spinal meningiomas. During this period 92 operations were performed for spinal tumors (49 intradural and 43 extradural) and 101 operations for intracranial meningiomas. All patients with spinal meningiomas were female. The ages of the patients ranged from 35 to 651 years (mean age 48 years). 86% of patients were older than 40 years. 86%

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of the lesions were located in the thoracic region, while the rest was cervical. In 9 patients the lesions were at the level of T8 to T11. One of the cervical meningiomas had a dorsal location and the other was ventrolateral. Among the thoracic lesions, 3 occurred dorsal (25%), 2 ventral (17%), 4 dorsolateral (33%) and 3 ventrolateral (25%) to the spinal cord.

A patient had multiple spinal meningiomas, while two other patients had concurrent spinal and cranial meningiomas. All tumors were intradural except for one, that was completely epidural (7%).

None of the intradural tumors had an extradural component. Complete tumor removal was achieved in 13 patients. In one patient only subtotal removal could be performed because the tumor was very adherent to the spinal cord. The dural attachment was extensively coagulated in all patients. No dural resection was done and duras were closed in a watertight fashion. No postoperative complication was observed.

Motor deficit was the presenting symptom in 12 patients (86%). Localized or radicular pain and sensory disturbances were the other presenting symptoms. The duration of symptoms ranged from 1 month to 5 years (mean 21 months).

Neurological examination revealed motor signs in all patients, sensory signs in 13 patients (93%) and sphincter deficit in one patient (7%). According to Levy's grading scheme, 5 patients were grade 0 (36%), 5 patients were grade 1 (36%), 2 patients were grade 2 (14%) and 2 patients were grade 3 (14%).

In 3 patients myelography was the diagnostic investigation (before 1988). Since 1988 CT and/or MRI have been the diagnostic procedures performed to all 11 patients.

All patients were operated on by a posterior approach. For ventral and ventrolateral tumors the laminectomy was extended far lateral to avoid retraction of the spinal cord. In 2 patients the tumor was removed en-block, resection of the tumor by piecemeal removal was done in all others. 5 operations were performed with the aid of the operating microscope.

At the time of discharge, 10 patients (72%) were neurologically improved, 3 patients (21%) unchanged and one patient (7%) had worsened.

The patients were followed up for 1 to 11 years (mean follow up 4,6 years) and no cases of recurrence occurred.

Histological examination revealed transitional meningiomas in 6 patients, fibrous meningiomas in 4 pa-

tients and meningotheliomatous meningiomas in 4 patients.

## DISCUSSION

Meningiomas represent about 25% of primary spinal cord tumors (1, 2, 3, 4). During the period 1985-1995, 14 spinal meningiomas have been operated on during the same period was 92. 65 of them were primary lesions and 27 lesions were metastatic. So spinal meningiomas account for 22% of primary spinal tumors. The ratio of spinal meningiomas to intracranial meningiomas has been reported as 1:20 in Cushing's series (4), and as 1:8 in Solero's series (3). In most reports it is 1:4 or 1:5 (5). In our institution this ratio is approximately 1:7.

The female to male ratio has been reported as 5:1 and 4:1 (3, 5, 8). According to Poisson et al. this ratio is 9:1 (7). In our series all patients were women. These patients were 35 to 61 years of age. 85% of them were older than 40 years. The mean age was 48 years. This data is in accordance with Sawa, who reports that spinal meningiomas often occur in women 40 to 70 years of age (5).

Spinal meningiomas are most prevalent in the thoracic region, followed in frequency by the cervical region (3, 5, 8, 9). Of our cases 86% were thoracic and 14% cervical. Among thoracic meningiomas lower thoracic lesions predominated (9 of 12). The ratio between a thoracic and cervical location is reported as 8:1 in females (8). This ratio is 6:1 in our series.

Many authors classify the tumors as anterior or posterior. Elsberg (9) classifies them as ventral, ventrolateral, dorsolateral and dorsal taking into account the ventral and dorsal roots and the dentate ligaments. Most cervical meningiomas are ventral or ventrolateral to the spinal cord while thoracic and lumbar lesions are frequently dorsal (8). In our series, the lesions were distributed among all four locations with similar frequencies.

The incidence of multiple meningiomas is reported to be 1 to 9 per cent (15). Multiple spinal meningiomas are usually no more than two in number (15, 16). The concurrence of spinal and cranial meningioma is reported to be extremely rare (15, 16). One of our patients had multiple spinal meningiomas (7%) and two patients had concurrent spinal and cranial meningiomas (14%).

The rate of motor deficits as the presenting symptom (86%) is high compared with Solero's series (3)

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who reports that only 25% of patients had motor deficits as a presenting symptom. Neurological examination demonstrated motor signs in all our patients. This is in accordance with Solero (3) reporting motor signs in 173 of 174 patients.

Posterior approach has been safely performed to ventral, ventrolateral, dorsal and dorsolateral tumors.

Some authors claim that the dural attachment of spinal meningiomas should be radically removed (8). Other authors point out that there is no clear correlation between late results and the extent of the resection of the dural attachment (3). Our results also suggest that extensive coagulation of the dural attachment might be satisfactory in preventing recurrences.

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