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D. Balasa,  
H.A. Tunas,  
M. Banculescu,  
L. Seicaru



# Giant T1–T3 spinal meningioma in an elderly patient: a rare case and surgical management

D. Balasa<sup>1</sup>, H.A. Tunas<sup>1</sup>, M. Banculescu<sup>2</sup>, L. Seicaru<sup>3</sup>

<sup>1</sup> Department of Neurosurgery, Clinical Emergency County Hospital, Constanța, ROMANIA

<sup>2</sup> Intensive Care Unit, Clinical Emergency County Hospital, Constanța, ROMANIA

<sup>3</sup> Department of Pathology, Clinical Emergency County Hospital, Constanța, ROMANIA

## ABSTRACT

We present the case of a 77-year-old female patient with complete paraplegia of two weeks duration, occurring on a background of slowly progressive bilateral lower-limb motor deficit spanning approximately three years. Imaging studies revealed a giant spinal intradural extramedullary (IDEM) meningioma at the T1–T3 level. The patient had a very good neurological postoperative outcome, and the associated complications also resolved.

## INTRODUCTION

Meningiomas are often benign, slow-growing tumors with a peak age incidence between 40 and 70 years and a male:female ratio of 1:42. Spinal meningiomas represent 12% of all meningiomas and 25–45% of all intradural spinal tumors<sup>1</sup>. The thoracic region was the most frequent location (71.1%), followed by cervical and lumbar locations<sup>1</sup>.

## CLINICAL PRESENTATION

A 77-year-old female patient from a rural area was admitted as an emergency in our department with complete, flaccid motor paraplegia at the T3 level (SK 50, MRS 4). The complete motor paraplegia had developed approximately two weeks earlier, on a background of a slowly progressive bilateral lower-limb motor deficit for about three years. Physical examination also revealed diffuse crural paresthesias, superficial hypesthesia with a sensory level at T3 on the right and T2 on the left, brisk abdominal and lower-limb deep tendon reflexes, and a bilateral Babinski sign.

Her medical history indicated that the patient suffered from stage 3 NYHA hypertension and chronic ischaemic heart disease.

Contrast-enhanced thoracic spinal MRI revealed a giant IDEM spinal tumor (T1–T3) (Figures 1–3).

**Keywords**  
elderly meningioma,  
surgery,  
complication



Corresponding author:  
**Daniel Balasa**

Clinical Emergency County Hospital,  
Constanța, Romania

balasadaniel100@yahoo.com

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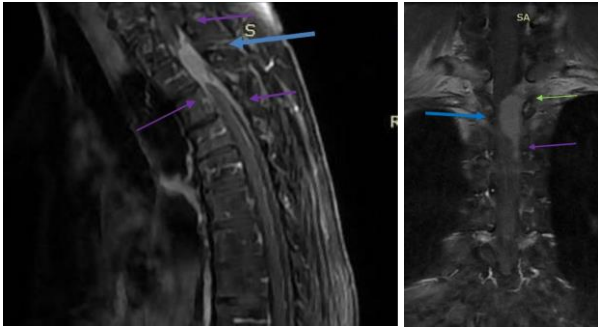
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**Figures 1 and 2.** Preoperative sagittal (Figure 1) and coronal (Figure 2) T1-weighted MRI with gadolinium: hyperintense, huge IDEM spinal tumor T1–T3 (blue arrows); dural tail cranial posterior and caudal posterior and anterior (Figure 1) and caudal left (Figure 2) (violet arrows); T1–T2 left foraminal extension (green arrow).

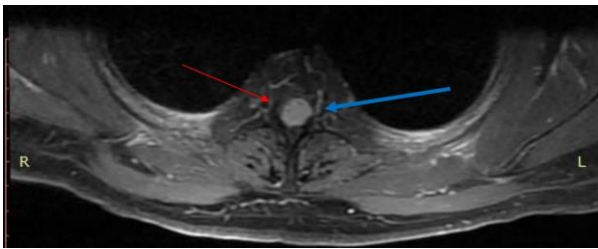


**Figure 3.** Preoperative axial T1-weighted MRI with gadolinium: hyperintense, huge IDEM spinal tumor T1–T3 (blue arrow). In the right part, at the T2–T3 level, anterior and lateral, an extremely thin lamella of spinal cord is compressed by the tumor (red arrow).

Neurosurgical intervention: T12–L4 laminectomy, complete tumor excision using 3.5x Zeiss loupes magnification.

Histopathological examination: syncytial tumor proliferation of cells with eosinophilic cytoplasm and benign nuclei with vesicular chromatin. Frequent psammomatous calcification. No mitoses, necrosis, or nuclear atypia. Conclusion: psammomatous meningioma WHO CNS grade 1 (Figure 4).

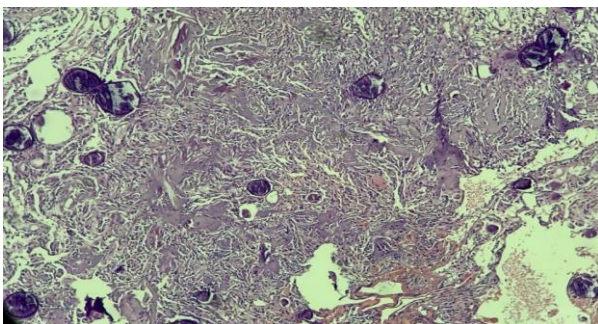


**Figure 4.** Psammomatous meningioma WHO CNS grade 1.

### Surgical management of the tumor and its dural adhesions

- Posteriorly, the tumor and the adherent dura were removed under magnification (Simpson Grade I).
- Posterolaterally, the inner dural surface and tumor adhesions were completely dissected and resected (leaving the outer dural surface, which was not infiltrated by the tumor, intact).
- In the anterior and lateral regions, as well as within the left T1–T2 foramen, the tumor adhesions to the dura mater were aggressively coagulated (Simpson Grade II).

### Intraoperative prevention of iatrogenic myelopathy and iatrogenic spinal cord ischemia

- The tumor was progressively removed under magnification (using bipolar coagulation at minimum intensity) until only a layer as thin as an onion skin remained. Thus, the main objective was accomplished: not to move the tumor at all. Consequently, the thin, transparent section of the spinal cord, measuring a few millimeters and lying adjacent to the tumor, sustained no surgical trauma.
- At the interface between the residual tumor, the residual spinal cord, and the neovascular capillaries, we gently supported the residual tumor using the finest suction tip (1.5 mm diameter), progressively coagulated the neovascular capillaries at a distance from the adjacent spinal cord using bipolar forceps at minimum intensity, and progressively cut the coagulated vessels. Gentle irrigation with warm normal saline was performed after each coagulation (Figure 5).

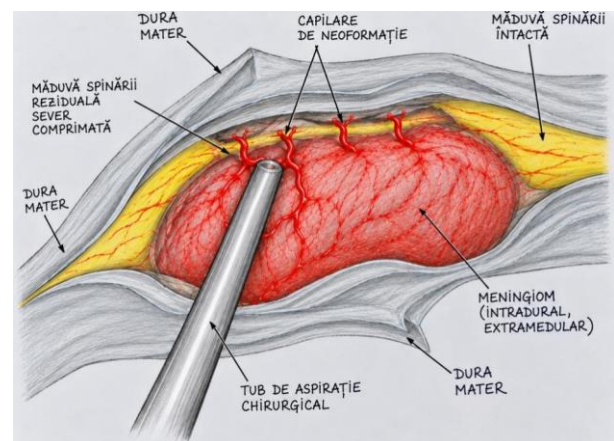


**Figure 5.** Schematic drawing of the microsurgical technique at the interface between the tumor, the residual spinal cord and the neovascular capillaries (labels in Romanian).

### Prevention of CSF fistula

- Watertight continuous suture of the dura mater.
- Four-layer suture of the anatomical planes. We fashioned a vascularized muscle patch from the thoracic paravertebral muscle bed and sutured it at four points to the adjacent structures and the underlying dura mater.
- External drain with a dual purpose (drainage of epidural and deep intramuscular fluids such as blood and potentially CSF, and bacteriological culture and antibiogram from the fragment collected at the wound end of the drain).

### Reduction of CSF production

- Acetazolamide was administered for 7 days, until passive mobilization involving assisting the patient to sit at the edge of the bed.
- Fluid restriction regimen with serum electrolyte (Na, K) monitoring every 2 days.

### Prevention of pressure ulcers and thromboembolism

- Anti-decubitus mattress.
- Anticoagulation (Clexane 0.6 ml SC/day, starting on the first postoperative day, with INR monitoring).
- IV hydration (2000 ml/day) with normal saline and 5% glucose.
- Chest percussion and patient repositioning every 2 hours.

### Complications

Contamination of the surgical wound with *Escherichia coli*, sensitive to ceftazidime. Ceftazidime 2 g/day was administered for 21 days, associated with probiotics 2 times/day (to prevent *Clostridium difficile* enterocolitis).

### Neuroprotection to facilitate motor and sensory neuro-recovery

Cerebrolysin was administered postoperatively for one year as follows:

- Cerebrolysin 30 mg/day IV for 6 months;
- Cerebrolysin 10 mg/day IV for the subsequent 6 months.

### Neuro-rehabilitation

Passive mobilization at the bedside starting on the first postoperative day. After day 7, with the surgical wound healing well—dry and free of CSF fistula—the

patient was gradually mobilized to the edge of the bed and subsequently to a wheelchair.

Total hospitalization: one month. At discharge, the paraplegia had begun to diminish (the patient was able to perform incomplete flexion of the lower legs and thighs). One year postoperatively, the patient was walking with the aid of a walker (ASIA 4/5; SK 70, MRS 3). Sensory disturbances improved, though residual L3-level hypoesthesia and upper thoracic paresthesias persisted, with reduced intensity compared to the preoperative neurological status. Clinical monitoring continued for five years. The patient declined further radiological examinations.

### DISCUSSION

Meningiomas are often benign, slow-growing tumors with a peak age incidence between 40 and 70 years and a male:female ratio of 1:42. Spinal meningiomas represent 12% of all meningiomas and 25–45% of all intradural spinal tumors<sup>1</sup>. The thoracic region was the most frequent location (71.1%), followed by cervical and lumbar locations.

Age: the association between age and unfavorable outcomes was reported in 11 studies. Older age was significantly correlated to unfavorable outcomes in four studies<sup>5</sup>.

Tumor size and spinal cord compression: a larger tumor size was associated with worse outcomes in two out of five studies<sup>5</sup>.

Since spinal meningiomas are benign and slow-growing lesions, the diagnosis is often delayed, and in the elderly the symptoms may be attributed to pre-existing age-related pathologies rather than to a spinal tumor<sup>11</sup>.

The most relevant predictors of unfavorable outcomes were poor preoperative status, longer time from diagnosis to surgery, and surgery of recurrent tumors<sup>5</sup>.

When recognized early, gross total resection is often achievable and associated with favorable neurologic recovery and long-term disease control<sup>4-6</sup>. The degree of postoperative neurological improvement correlates strongly with the magnitude and duration of preoperative cord compression and the severity of deficits at presentation; prolonged compression portends worse motor recovery despite technically successful tumor removal<sup>7</sup>.

The Simpson grading scheme is the one most commonly used in meningioma surgery to describe

the extent of tumor resection and to estimate the likelihood of tumor recurrence. It is still uncertain whether removal of the dura (Simpson grade 1) prevents recurrence<sup>15</sup>. Tumor recurrence may occur many years after surgery. Heon Kim et al. calculated a mean clinical progression-free survival of 17 years for patients who underwent Simpson grade 2 resection, in which the dural attachment is left but coagulated<sup>16</sup>.

A complete resection (Simpson I–III) was achieved in 88.7%<sup>1</sup>. Postoperative complications consisted of CSF leakage and wound healing problems. Three patients died of direct postoperative complications (1.8%)<sup>1</sup>. Clinical outcome showed improvement in 117 patients out of 148 (79.1%) according to the modified Rankin Scale; 24 patients remained stable and 7 patients deteriorated<sup>1</sup>.

The rate of postoperative improvement, stabilization, or worsening of neurological status was calculated from 42 different studies. Most patients either improved (65.2%) or remained unchanged (28.8%)<sup>5</sup>.

Postoperative complications after spinal meningioma surgery<sup>1</sup>: CSF leakage, ELD/EVD needed, postoperative wound infection, sepsis, skin defect needing split skin graft, respiratory insufficiency, pulmonary bleeding, mucous plug, pneumonia, pulmonary embolism, hyperglycemia due to corticosteroid use, difficult to treat (wound) pain, urinary tract infection, worsening of neurological status, increased paresis, Brown-Séquard syndrome, syrinx development, spinal cord edema with hydrocephalus and secondary meningitis, ileus, cardiac decompensation, epileptic seizures, hypertension, hypotension in women, spinal meningiomas occur in 80% in the thoracic region<sup>2,3</sup>.

Cerebrospinal fluid leak, transitory or permanent neurological impairments, and infections are the most commonly reported complications, while pulmonary embolisms were behind most of the fatalities<sup>1,12,13,14</sup>.

Treatment of postoperative CSF fistula. Management algorithms emphasize an escalation from 2026 Musa et al.<sup>10</sup> conservative measures (positioning, local compression, acetazolamide, antibiotics when indicated) to definitive surgical repair when leaks persist or a wound infection occurs<sup>8,9</sup>.

Ensuring an essential list of neurosurgical consumables (watertight suture materials, basic sealants, closed-suction drains, empirical broad-spectrum antibiotics for wound infection) and prearranged procurement pathways reduces treatment delays. Where sealants are unavailable, careful multilayered closure and use of lumbar CSF diversion (when feasible) are supported alternatives in guidance documents<sup>10</sup>.

Severe complications such as death, coma, iatrogenic spinal cord injury, instability that required fixation, and thromboembolism were relatively rare. Thromboembolism was the most common of the severe complications and the most common cause of perioperative death in patients surgically treated for spinal meningiomas<sup>5</sup>.

In summary, spinal meningioma surgery is a relatively safe procedure with a complication risk of 7.4%<sup>5</sup>. Although most of these complications are mild and resolve conservatively (Ibanez 1, 58.2%), there are also more severe complications requiring invasive treatment (Ibanez 2, 36.3%) or leading to severe impairment and even death (Ibanez 3 and 4, 5.5%). Ibanez grade 1 complications, such as postoperative urinary tract infections or diarrhea, may be underreported due to their relative insignificance. In total, severe complications characterized as Ibanez 3 or 4 occurred in 0.11% of all 16,751 spinal meningioma surgeries regarded in this section. Although rare, thrombosis prevention strategies in target patients could help reduce the risk of Ibanez 4 complications, which mainly consisted of thromboembolic events<sup>17</sup>.

The majority of patients will show improvement of neurological function after tumor removal. Mortality may occur in patients of extreme high age and with severe co-morbidities<sup>1</sup>.

Spinal meningioma surgery was found to be safe and effective. Most patients (78.9%) had good postoperative outcomes, and only a small minority (6%) experienced postoperative worsening. The most relevant and consistent predictors of unfavorable outcomes across studies were poor preoperative status, longer time to surgery, and surgery of recurrent tumors<sup>5</sup>.

The recurrence rate after spinal meningioma surgery is close to 6%, with an average of 5 years from index surgery to recurrence. Half of the studies had follow-up times shorter than the average time to

recurrence and a large number of tumors recurred after eight to ten years<sup>5</sup>.

## CONCLUSIONS

- The patient's surgical treatment was essential to ensure the possibility of her neurological status progressing from disability to basic independence—a mandatory factor for a good postoperative quality of life.
- Surgical intervention was not the only medical strategy for this patient. Each therapeutic strategy, including patient care in the ICU, nursing, neuroprotection, and neurorehabilitation, constituted an indispensable component in achieving a favorable medical outcome, both postoperatively and perioperatively, in the short and medium term and, hopefully, in the long term as well.
- Life-threatening intraoperative and perioperative complications were primarily attributable to pre-existing conditions and potentially compromised preoperative immunity; these were successfully prevented or resolved.
- The patient's advanced age did not constitute a contraindication for surgery; rather, it served as an additional source of motivation for the medical teams involved in the various stages of her treatment.

## Abbreviations

CSF – cerebrospinal fluid;  
IDEM – intradural extramedullary tumors;  
KPS – Karnofsky Performance Score;  
MRS – modified Rankin Scale;  
MRI – magnetic resonance imaging.

## Authors' contributions

All authors contributed to the study conception. Surgical intervention was performed by BD and THA. Anesthesia and intensive care for the patient were provided by BM. Histological examination of the tumor tissue was performed by LS. Material preparation, data collection and analysis were performed by BD and THA. The first draft of the manuscript was written by BD and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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