

# Three Decades of Single-Center Experience with Spinal Meningioma Surgery

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## Abstract

Around 25% of all intradural spinal tumors are well-characterized spinal meningioma, which are typically intradural extra medullary tumours. The purpose of this study was to compare the postoperative functional outcomes of spinal meningioma patients who had undergone surgery over two time periods. A historic cohort (HC;) of patients with spinal meningiomas who were admitted to our department between 1990 and 2020 was enrolled and divided. Treatment from 1990 to 2007) and a current group. Up to five years in the past, the clinical data, surgical reports and radiological reports of patients were analysed. The McCormick Scale (mMCS) was used to measure neurological function before and after surgery. The Charlson Comorbidity Index (CCI) was utilized to assess the impact of comorbidities on both the preoperative state and the outcome of the surgery. Results: 300 people were our patients. There were twice as many patients in the CC (n = 144) who were under 50 years of age (p 0.001) than there were in the HC (n = 156). (n = 204) The thoracic spine was the most common location for tumours. The middle follow-up was 38.1 months ( $\pm 30.3$  standard deviation). An earlier improvement in the mMCS was significantly associated with a symptom duration of less than 12 months prior to surgery (p = 0.045). Patients in the CC had a shorter duration and their neurological function was significantly better at the first and last follow-ups than in the HC. The findings of our study suggested that surgical management and postoperative rehabilitation have had a significant impact on spinal meningioma patients' long-term neurological outcomes over the past few decades. Patients' neurological recovery after surgery improved as a result of a quicker diagnosis and earlier surgical treatment. Our findings demonstrated that spinal meningioma surgery should be performed within a year of the onset of symptoms to improve recovery.

**Keywords:** Spinal meningioma • Meningioma • Spine • Surgery

## Introduction

Tumors of the spinal meninges are uncommon (incidence: 25–30% of all intradural extramedullary spinal tumors originate from the meninges of the spinal cord and affect 2–3/100,000 people annually. Although they can develop anywhere along the spine, the thoracic region is the most common location. The sixth through eighth decade of life is when the incidence is at its highest. Spinal meningiomas have a female-to-male ratio of 1:4, whereas cranial meningiomas have a male-to-female ratio of 1:2. Females account for 75–90% of all cases. The majority of meningiomas are benign tumors that grow slowly. Depending on the tumor's spinal level, the clinical symptoms include pain, sensory deficits, motor weakness and vegetative dysfunction. These symptoms are not specific. Due to the position of the spinal cord, surgical treatment may be challenging, particularly for ventrally located spinal meningiomas. The gold standard for treating symptomatic tumors is still microsurgery. The postoperative result of spinal meningiomas is great as a general rule and even patients with poor preoperative neurological status can recuperate totally. Recent advancements in high-resolution magnetic resonance imaging (MRI), intraoperative ultrasound devices, microscopes, ultrasonic aspirators, surgical methods and the length of time needed for surgery are all possible explanations for the improved postoperative outcome. As a result, over a 31-year period, we conducted a retrospective analysis of surgically treated spinal meningiomas to identify potential conditions and factors that influenced outcomes.

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## Description

In this study, thoracic spinal meningiomas were found more frequently in the HC and CC than in the cervical region and lumbar meningiomas were only found in a small number of patients. Previous research supported these findings. Meningiomas were divided into subcategories based on their dorsal and ventral positions in relation to the spinal cord; Past research was supported by our findings, particularly on the location of tumors. Meningiomas that are located ventrally are associated with a worse prognosis. This observation was only confirmed at the first follow-up, indicating that our patients were capable of long-term recovery even if the tumor was located ventrally. In addition, we were able to confirm that spinal meningiomas were better treated and diagnosed earlier. It is difficult to confirm ventral spinal meningiomas because they lack specific symptoms or develop nonspecific symptoms like sensory disorders early on.

As a result, symptoms last for a long time before the right diagnosis and treatment are found and the spinal cord is permanently damaged. This could be why we did not observe a better functional outcome in the first seven months after surgery for ventrally located spinal meningiomas. 79% (122 cases in the HC and 115 cases in the CC) of all cases in our study had Simpson grade II resections, while 12.3% (19 cases in the HC and 18 cases in the CC) had Simpson grade I resections. This was in line with the established rates of complete tumor removal, which range from 82% to 98%. Massive calcification was observed in half of the spinal meningiomas that had not been resected; this could make sense of a subtotal expulsion and the suggested higher gamble for irreversible harm and inconveniences on the off chance that a total resection is upheld.

Total tumor resection with minimal spinal cord manipulation is the goal of surgical treatment for spinal meningiomas. Laminoplasty was performed most frequently in the CC, whereas laminectomy was preferred in the majority of cases in the HC. Interestingly, due to the surgical treatment of the spinal meningioma, we did not observe secondary stabilization during the inpatient stay or follow-up. According to the modified Japanese Orthopaedic Association scale and the Nurick scale, laminoplasty is recommended as

the standard treatment for spinal pathologies because it is associated with a shorter hospital stay and postoperative improvement. In our clinic, this is also the current standard approach. Individual choice in regards to confinement of the pathology is significant on the grounds that laminoplasty normally can be directed in growths that can be extirpated without facetectomy. Laminectomy was performed, however, in cases of advanced osteoporosis and when reinsertion of the vertebral arch and fixation with miniplates and screws were insufficiently safe. Patients overall outcomes remained satisfactory despite changes in surgical technique over time (more laminoplasty than laminectomy). The neurological outcome prior to surgery did not differ between the two groups. However, the CC had significantly better postoperative mMCS at first and final follow-up than the HC ( $p = 0.01$ ). However, complete neurological recovery after surgery and rehabilitation was detected even in patients with severe preoperative neurological deficits in both cohorts equally. One reason for this was that an earlier diagnosis and shorter symptom duration led to a significant improvement in the postoperative neurological outcome compared to symptom duration  $>12$  months ( $p = 0.045$ ). As a result, surgery should be carried out regardless to facilitate postoperative recovery and stop further deterioration.

Meningiotheliomatous, psammomatous, transitional and fibroblastic meningiomas were found to be the most common histological features of spinal meningiomas in both cohorts, as confirmed by our research. In addition, we discovered secretory, metaplastic and endotheliomatous meningiomas despite our relatively small sample size. As previously mentioned with regard to the functional outcome, cancer worsened the prognosis. Four patients had tumor recurrence. Accordingly, the recurrence rates of spinal meningiomas with arachnoid scarring and en plaque were significantly higher. These reports were confirmed by our analyses, necessitating a re-examination of spinal surgery procedures [1-5].

## Conclusion

Our study's retrospective design carried the risk of incomplete data and additional limitation and selection bias as well as inherent bias. In spite of the fact that our review evaluated a huge companion over a significant stretch of time, it just addressed consequences of a solitary place and was not populace based. During the extended study period, various surgical procedures were

modified. Different neurosurgeons treated the patients, which may have added to the confusion. Additionally, the lower MRI image quality during the initial phase of this study must be taken into consideration because it may have affected the data's quality. In order to validate our findings and examine additional predictors of patient outcome, prospective multicentre studies are urgently required. In order to find postoperative complications or instabilities that require preventive stabilization, our clinic plans to conduct additional analyses following the removal of spinal tumours. These analyses will include examining the current radiological findings.

## Acknowledgement

None.

## Conflict of Interest

None.

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