Original Article

Benefits of spinal meningioma resection

Romel Corecha Santos, Ricardo de Amoreira Gepp

Neurosurgery Service at Sarah Network of Rehabilitation Hospitals, Brasília, Federal District, Brazil.

E-mail: *Romel Corecha Santos - romelcorecha@hotmail.com; Ricardo de Amoreira Gepp - ricardogepp@zipmail.com.br

*Corresponding author

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Abstract

Background: Spinal meningiomas account for approximately 40% of intradural extramedullary tumors. As they are usually slow growing, some patients are often diagnosed late in the clinical course when they have developed myelopathy.

Methods: Here, we retrospectively studied a cohort of 51 patients undergoing surgery for spinal meningiomas. The median follow-up period was 45.9 months (range, 1–168 months). Assessment included evaluation of functional outcomes (e.g., comparison of the pre and postoperative status using the modified McCormick Functional Scale) and identification of prognostic factors.

Results: Seventeen patients with grade IV (McCormick Scale) neurological deficits on admission underwent surgical resection; 4 of 5 grade III (McCormick Scale) and 14 patients (Grade IV) improved within 2.11 months (mean time) postoperatively. There was no surgical mortality and the morbidity rate was 16%.

Conclusion: Patients with advanced neurological deficits/myelopathy (Grades III or IV on the McCormick Scale) improved following surgical resection of spinal meningiomas.

Key Words: Meningioma, rehabilitation, spinal canal, surgery

INTRODUCTION

Spinal meningiomas account for approximately 40% of intradural extramedullary tumors; in fact, 90% are intradural, 5% are extradural, and 5% are both intradural/extradural. Of interest, 68% are located in the lateral spinal canal, whereas 17% are posterior and 15% are anterior. The typical ratio of female/male patients is 4:1.[8]

As these are usually slow growing tumors, some patients are diagnosed late in the clinical course with significant myelopathy. Using the McCormick Rating Scale system, this study retrospectively evaluated a prospective cohort of 51 patients with spinal meningiomas, many of whom had McCormick Grade III/IV deficit, who benefited from spinal surgical intervention.
radiological (preoperative magnetic resonance) factors were assessed. In addition, patients were neurologically assessed preoperatively and postoperatively using the McCormick Functional Scale [Table 1]. This study was approved by the Hospital Ethics Committee under an exemption of patient informed consent.

**Statistical analysis**

Statistical analyses were performed using the IBM-SPSS software, version 21.0. Differences between categorical variables related to the McCormick scale assessments pre and postoperatively were analyzed using the McNemar–Bowker test. Significance was assigned as a \( P \) value of less than 0.001. The observation time for the improvement of the neurological state was analyzed using the Kaplan–Meir method.

**RESULTS**

**Clinical symptoms**

Patients were symptomatic for an average of 20 months (range 3–120 months) preoperatively; 5 were classified as grade III (McCormick Scale, 9.8%) and 17 as grade IV (McCormick Scale, 33.3%). Neurological deficits reflected significant myelopathy in many of these patients: sphincter alteration in 23 patients, ataxia 12 patients, weakness 37 patients, sensory deficit 37 patients, and pain 25 patients [Table 2].

**Surgical access and degree of resection**

Surgery for 23 (47.1%) patients included a laminectomy, whereas 19 patients (37.3%) underwent laminotomies. Twenty-three (45.1%) patients had Simpson Grade 2 [Table 3] resection whereas 21 patients had grade 1.

**Functional outcome**

Fourteen patients considered McCormick Grade IV improved with surgery as did 4 of the 5 patients considered Grade III (\( P < 0.001 \)). The mean time of the first functional improvement was 2.11 months (range, 1–9 months).

**DISCUSSION**

In this retrospective study of 51 patients with spinal meningiomas, many patients showed severe...
myelopathy (McCormick III: 5 patients; McCormick IV: 14 patients), and many improved after surgery [Table 4]. Some studies also showed similar benefits of surgery as in the study by Sacko et al., where patients over 70 years of age with advanced neurological deficit (grades III and IV) improved despite their Grade III (92%) or Grade IV (96%) preoperative status. In this study, our patients improved within the first 3 postoperative months (mean interval, 2.11 months) [Figure 1], a finding also reported by Sacko et al. In a study by Riad et al., among patients with grades II and III deficits (none grade IV), functional improvement was observed after 1 year in 87% of the patients. Furthermore, 67% of the patients with original sphincter changes showed complete resolution of their deficits at 2 postoperative years.

Several other studies have also shown various degrees of neurological improvement after spinal meningiomas were resected for patients with preoperative Grade II–IV status [Table 5].

**CONCLUSION**

Here, we performed a retrospective cohort study of 51 patients undergoing surgery for spinal meningiomas, many of whom were severely myelopathic in McCormick Grades III and IV. Even in those who were markedly impaired prior to surgery exhibited partial or total functional recovery following tumor resection.

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Table 4: McCormick Grade: Admission versus follow-upa,b

| Grade 0 | Grade I | Grade II | Grade III | Grade IV | Total |
|---------|---------|----------|-----------|---------|-------|
| MacCormick admission |
| Grade 0 | 3 (100%) | - | - | - | 3 (100%) |
| Grade I | 6 (50%) | 10 (72%) | - | - | 1 (8%) |
| Grade II | 3 (21%) | 10 (72%) | - | - | 1 (7%) |
| Grade III | 1 (20%) | 2 (40%) | 1 (20%) | 1 (20%) | 5 (100%) |
| Grade IV | 1 (6%) | 5 (31%) | 5 (31%) | 3 (19%) | 2 (13%) |
| Total | 14 (28%) | 22 (44%) | 6 (12%) | 4 (8%) | 4 (8%) |

a McNemar-Bowker test, P<0.001. b In a case not possible to assess the McCormick following.

Table 5: Functional outcomes after surgery for spinal meningiomas

| Authors and Year | Improved | Stable | Deteriorated |
|------------------|----------|--------|--------------|
| Levy, et al., 1982 | 83       | 17     | 0            |
| Solero, et al., 1989 | 53       | 37     | 10           |
| King, et al., 1998 | 95       | 1      | 4            |
| Gezen, et al., 2000 | 83       | 14     | 3            |
| Cohen-Gadol, et al., 2003 | 57       | 39     | 4            |
| Gottfried, et al., 2003 | 92       | 0      | 8            |
| Setzer, et al., 2007 | 71.3     | 22.5   | 5            |
| Sacko, et al., 2009 | 91       | 9      | 0            |

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Conflicts of interest
There are no conflicts of interest.

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