

Results in the operative treatment of elderly patients with spinal meningiomas

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Summary

Objective: With the life expectancy in the industrial nations increasing over the last two decades, the number of patients older than 70 years with spinal tumors and, especially, meningiomas is rising. Our objective is to assess the outcome of surgically treated spinal meningiomas in patients in their eighth or ninth decade of life and to analyze the possible role of some prognostic factors.

Patients and methods: Twenty seven consecutive patients over 70 years of age (mean age, 78.3 years) were operated on for spinal meningiomas between 1995 and 2005 in Bordeaux's Neurosurgery Department. The preoperative neurologic status of the patients was graded with the Solero score, and the general health conditions were staged according to the American Society of Anesthesiology classification. Tumor were removed totally in 26 cases and subtotally removed in one. The follow-up period ranged from 12 to 81 months (mean, 27.1 months).

Results: There was no operative mortality, and morbidity was not significant. Although not significant, neurologic outcome was better in patients with a low preoperative Solero score than those with a high one ($P < 0.01$). Clinical outcome was not influenced by the preoperative general health conditions according to American Society of Anesthesiology classification ($p > 0.07$). Clinical outcome was influenced by the duration of symptoms before surgery ($p < 0.05$). No recurrence was observed during the follow-up period.

Conclusion: Neurologic outcome following surgery was favorable in the vast majority of patients, with no mortality or significant morbidity. Surgery is the only treatment in elderly patients with symptomatic spinal meningiomas, even for those with a poor preoperative neurologic condition. Whenever there is an acceptable risk from an anesthesiological point of view.

Keywords: Age; Elderly; Prognosis; Spinal meningiomas; Spinal tumors; Surgery

Résumé

Résultats du traitement chirurgical des méningiomes rachidiens chez les patients âgés

Objectif: Avec l'espérance de vie croissante dans les pays industrialisés depuis deux décennies, les tumeurs médullaires, en particulier les méningiomes rachidiens, sont de plus en plus observés chez les sujets âgés. Notre objectif est d'évaluer les résultats du traitement chirurgical des méningiomes rachidiens chez les patients à la huitième et neuvième décennie de la vie et d'analyser les facteurs pronostiques.

Patients et méthodes: Vingt sept patients de 70 ans ou plus (âge moyen 78,3ans) ont été opérés de méningiomes rachidiens entre 1995 et 2005 dans les services de neurochirurgie de Bordeaux. L'état fonctionnel était classé selon le Score de Solero. L'état physiologique préopératoire était évalué selon les critères ASA. L'exérèse du méningiome était complète dans 26 cas et incomplète dans un cas. La durée moyenne de suivi était de 27,1 mois (12 - 81 mois).

Résultats: La mortalité était nulle. La morbidité n'était pas significative. Les résultats fonctionnels étaient meilleurs chez le groupe de patients avec un score de Solero préopératoire bas par rapport à celui qui avait un score plus haut avec une différence significative ($p < 0,01$). La classe (ASA) n'a pas eu d'influence sur les résultats fonctionnels en postopératoire ($p > 0,07$). Par contre la durée des symptômes avant la chirurgie a eu une influence sur les résultats fonctionnels ($p < 0,05$). Il n'y avait pas de récurrence pendant la durée de suivi.

Conclusion: Les résultats fonctionnels après la chirurgie étaient favorables dans la majorité des cas. Il n'y avait pas de mortalité. La morbidité n'était pas significative. La chirurgie est le seul traitement des méningiomes rachidiens chez les patients âgés, même pour ceux qui ont un déficit neurologique sévère préopératoire. Toutefois, les risques anesthésiques ne sont pas à négliger.

Mots-clés: Age; Chirurgie; Méningiomes rachidiens; Pronostic; Sujet âgé; Tumeurs médullaires

Introduction

Spinal meningiomas are usually slow growing, benign tumors that represent from 25 to over 46% of primary spinal cord tumors [1-6]. They primarily affect females in their fifth or sixth decade of life and are more frequently encountered in the thoracic segment of the spine [3,7-12]. About 60 years ago, Cushing and Eisenhardt defined the total removal of a spinal meningioma as being "one of the most gratifying of all operative procedures" [13]. Since then, several clinical studies have demonstrated that spinal meningiomas have a good prognosis, regardless of the preoperative clinical picture [6,8,10,14]. With the increas-

ing human life expectancy, symptomatic spinal meningiomas have increasingly been observed in elderly patients. We found only one study [15] which spinal meningiomas were observed in elderly patients aged 70 years or more. The available literature provides few descriptions of elderly patients surgically treated for spinal meningiomas, and conducted the present study to evaluate the outcome of a series of 27 consecutive patients in their eighth or ninth decade of life who received surgery for spinal meningioma in the authors' department and to analyze the possible role of some prognostic factors.

Patients and methods

Between January 1995 and December 2005, a total of 72 patients with spinal meningiomas were operated on in the authors' Neurosurgery Department.

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Case N°	Age year	Sex	Duration of Symptoms before Surgery months	ASA	Location	Surgical Removal	Operative Time mn	Morbidity	Score de Solero		Follow-Up Period months	Recovery rate %
									preop	postop		
1	84	M	13	III	C7-T1	Total	100		III	Total recovery	56	100
2	73	F	9	II	T7-T8	Total	150		II	Total recovery	18	100
3	85	F	3	II	T3	Total	120		III	I	13	67
4	74	F	3	I	T2	Total	135		II	Total recovery	19	100
5	73	F	6	II	C6-C7	Total	150		II	Total recovery	37	100
6	87	F	9	III	T8	Total	90		II	Total recovery	49	100
7	72	F	36	II	T6	Total	135		II	Total recovery	66	100
8	78	M	5	III	C3-C4	Total	150		III	I	30	67
9	81	M	6	III	T2	Total	120		III	I	12	67
10	70	F	32	III	T6	Total	120		III	I	15	67
11	82	F	12	III	T1-T2	Total	180		II	Total recovery	17	100
12	84	M	9	III	T7	Total	180		III	Total recovery	26	100
13	87	F	29	I	T3-T4	Total	100		IV	II	18	50
14	85	M	55	III	C3-C4-C5	Total	105		II	Total recovery	27	100
15	75	F	6	II	T10	Total	180		I	Total recovery	15	100
16	80	F	6	III	T10	Total	95		IV	II	12	50
17	76	M	6	III	T1	Total	150	Pulmonary Emboli	III	I	81	67
18	81	F	8	II	T4-T5	Total	80		II	Total recovery	19	100
19	75	F	6	II	T1-T2	Total	150		II	Total recovery	18	100
20	78	F	24	II	T1-T2-T3	Total	120		II	Total recovery	16	100
21	73	F	3	III	T4-T5	Total	240		III	I	39	67
22	70	F	7	III	T1	Total	120	Phlebitis	III	I	21	67
23	81	M	1	III	C2	Total	60		III	Total recovery	30	100
24	76	F	3	III	T8-T9	Subtotal	250		III	I	27	67
25	88	F	12	III	T7-T8	Total	150		III	I	18	67
26	72	F	10	III	T7-T8	Total	105	Pulmonary Emboli	III	I	16	67
27	75	F	24	II	T11-T12	Total	105		III	I	18	67
moyen	78.3		12.7				134.8				27.1	82.8
minimum	70		1				60				12	50
maximum	88		55				250				81	100
Recovery Rate (%) = (Preoperative Solero Score — Postoperative Solero Score /Preoperative Solero Score) X 100												

Tabl. 1: Twenty seven patients affected by spinal meningiomas who underwent surgery in their eighth or ninth decade of life

Twenty seven (37.5%) of these patients (20 women and 7 men) were 70 years or older at the time of operation (mean age, 78.3 years; range, 70–88 years). Twelve of theirs patients was in the ninth decade of life. Patient data are shown in Table 1. The preoperative status of the patients was graded with the Solero score (Table 2): [6] 1 patient rated I, 10 rated II, 14 rated III, and 2 rated IV. General health conditions were staged according to the scheme devised by the American Society of Anesthesiology (ASA): [17–19] Two patients were graded as class I (healthy), 9 as class II (having mild systemic disease but not functional limitation), and 16 as class III (having severe systemic disease and definite functional limitations). The mean duration of symptoms until surgery was 12.7 months (range, 1–55 months). Preoperative localization of the tumor was determined by magnetic resonance imag-

ing. About this, distribution along the spinal axis, five was cervical, 22 thoracic and 1 in cervicothoracic junction. All the operations were performed with the aid of the operating microscope *via* a posterior approach. The average duration of surgery was 134 minutes (range, 60–250 minutes). There were neither anesthesiological nor surgical complications. Tumors were totally removed in 26 cases and subtotally removed in one. The common location was intradural in all case. Anterior-posterior distribution of the meningiomas and dural attachment were anterior or anterolateral eleven times, posterolateral 11 times, anterior 2 times, posterior 2 times, and lateral in one case. Histologic examination demonstrated benign meningiomas in all cases. The most common type was meningothelial (62.9%), followed by psammomatous (14.8%), transitional (11.1%) and fibroblastic meningiomas (3.7%). Two meningiomas (7.4%) were atypical but with no sign of malignancy. All patients attended postoperative follow-up

review 3 and 12 months after operation and long-term follow-up review from 12 to 81 months post surgery, with a mean of 27.1 months.

Classification	Symptoms and Signs
Grade I	- Pain only (local, radicular) - Pain and/or pyramidal signs - Pain and/or slight radicular and/or funicular motorsensory deficits
Grade II	- Slight motor deficit: walk with aid - Slight motor deficit and/or radicular and/or funicular sensory deficits - Slight motor deficit and/or sphincter disturbances
Grade III	- Severe motor deficit: flexion-extension against gravity sensory deficits - Severe motor deficit, sensory motor deficits, and/or sphincter disturbances
Grade IV	- Very severe motor deficit: flexion-extension without gravity, paraplegia - Sensory deficits - Sphincter deficits

Tabl. 2: Classification of neurological disability according to Solero score

Results

Clinical results are summarized in Table 1. There was no operative mortality. Two patients experienced a pulmonary emboli and one a phlebitis which resolved after with conventional medical treatment.

Postoperative Outcome

At the time of discharge, most of the patients appeared improved in comparison with their preoperative neurologic status. At 12-month follow-up observation, all patients were neurologically improved. The Solero score increased, registering I to IV before surgery and from total recovery to I after surgery, with recovery rates of 50 to 100% (mean 82.3%). Twelve months after surgery, all patients were still alive.

Prognostic Factors

Statistical analysis was performed using Epi Info[®] software. The Fisher exact test were used to assess the prognostic value of preoperative features. Multivariate analysis was performed with logistic regression. The level of significance was set at 0.05. The preoperative ASA classification did not affect clinical outcome. However, the duration of symptoms before surgery affected clinical outcome ($p < 0.05$). Neurologic outcome was better in patients with a low preoperative Solero score (*i.e.*, I, II) than those with a higher preoperative Solero score (*i.e.*, III, IV), although significantly ($p < 0.01$). There was no recurrence during the follow-up period.

Discussion

With the life expectancy in the industrial nations increasing over the last two decades, the number of patients older than 70 years with spinal tumors and, especially, meningiomas is rising [2]. Morandi [15] has observed thirty cases spinal meningiomas in elderly patients aged 70 years or more. The frequency of favorable neurologic outcome following surgical removal of spinal meningiomas is reported to range from 60 to 98% [1,3,6-8,10,12-14]. Generally, predictors of a poor outcome after surgery include an advanced age, serious neurologic deficits, long duration from onset of symptoms to diagnosis, and subto-

tal removal of tumor[20]. In the present series, all patients were improved by the surgical procedure at 12-month follow-up observation. According to previous clinical studies, the mean age of patients with spinal meningiomas at the time of diagnosis is between 49 and 62 years [3,6-8,10,12,14,15]. Patients with spinal meningiomas diagnosed at an age of 70 years or older are less frequent and account for a maximum of 10% of all patients with spinal meningiomas[6,7,9,12]. The raised incidence of patients aged 70 or more in our series (37.5%) may be explained by the relatively recent study period when compared with previous reports [6,7,9,12]. The clinical features of spinal meningiomas are a combination of signs and symptoms of progressive myelopathy. Regional pain and lower extremity paresthesias are usually the most common presenting symptoms, and sensorimotor deficits are the next most frequent complaints leading to gait difficulty [3,6,12,13,20]. However, this clinical picture is not specific to spinal meningiomas, and the differential diagnosis should consider spinal tumors of all types, syringomyelia, herniated disc, and multiple sclerosis [3,6]. The clinical history usually predates the diagnosis by several months to years [3,10,12,14,21]. Particularly in elderly patients, delayed diagnosis may occur because of symptoms attributed to pre-existing or age-related diseases, such as arteriosclerosis of the central nervous system, Parkinsonism, diabetic neuropathy, osteoarthritis, osteoporosis, or pernicious anemia [7,22,23]. As failure to diagnose a spinal meningioma is a recurring problem, [7,14,23] it was of interest to determine whether the delay between onset of clinical symptoms and operation as well as preoperative neurologic status could affect the outcome. In the series published recently, [15-18] the average delay of diagnosis was 6.5 to 13.4 months. In the Morandi's study, [15] clinical outcome was not influenced by the duration of symptoms before the surgery. However, in the present series, the functional outcome was affected by the duration of symptoms before surgery. In the study of the Roux [12] and Morandi, [15] the preoperative neurologic status affected the clinical outcome such as our study. It's evident, the patients who had a slight deficit will recovered. In the present study, 14 patients (51.8%) had a total recovery with 11 (78.5%) was graded I,II with Solero score and 3 (21.4%) had a severe deficit (grade III). Recently, Klekamp and Samii [10] have shown that since the advent of magnetic resonance imaging, patients harbouring a spinal meningioma were referred earlier and with less severe neurologic deficits than previously. Nevertheless, the authors believe that although modern neuroimaging and microsurgical techniques are helpful, they did not dramatically change the prognosis of these tumors. Indeed, post-operative results appear to be very much the same in series published recently [3,6,8,10,12,14] as in older reports [1,7,13]. In the largest series, operative mortality ranged from 1 to 5.3% [3,6,8,9]. The reservation for spinal surgery in elderly patients may be attributed to expectations of higher intraoperative and perioperative risk and the need for general anesthesia [18,25,26]. However, various operations, such as hip surgery, transurethral prostate resection, heart valve replacement, and coronary artery bypass surgery, are procedures performed routinely in large numbers of elderly patients [26]. Mortality at 30 days after

surgery in the above-mentioned procedures ranged between 2.3 and 9.5%, and deaths were most often caused by pneumonia and sepsis or by deep vein thrombosis and pulmonary embolism [27–30]. The mean age of the patients in these four surgical series was 77 years. In the present series, there was no mortality and morbidity was not significant. The absence of mortality and the low morbidity might be attributed to the small number of patients. However, good neuroanesthesia and excellent pre- and postoperative care by the resident and nursing staff played also a major role. Early mobilization, chest physiotherapy, and careful surveillance for complications such as deep vein thrombosis were all part of the treatment specimen. Finally, the advanced age of the patients did not seem to contraindicate surgery, even in those with the worst general preoperative conditions. Mirimanoff et al [4] have shown that the risk of recurrence after total removal is nil within the first 5 years after surgery and is about 13% 10 years after surgery. In the present series, no recurrence was observed during the average follow-up period (27.1 months), even in the one patients with subtotal removal. Like others, [5,31,32] the authors believe that spinal meningiomas have such a low rate of recurrence because of both their poor tendency for growth (they are mostly psammomatous calcifying tumors, 14.8% in the present series) and their prevalence in an aged population in whom the follow-up period is necessarily short. Unlike some, [4,8,12] the authors do not consider radiotherapy as an adjunctive treatment after subtotal removal, given that these patients may not survive a clinical relapse because of their advanced age.

Conclusion

One or two decades ago, patients over 70 years of age were considered to be “high risk” candidates for intraspinal surgery, particularly because of the presumed high risk of postoperative morbidity and mortality. From the present study, it can be concluded that, following the recommendations for anesthesia in elderly patients, surgery should be offered to very elderly patients with spinal meningiomas, even those with a poor preoperative neurologic condition, because their quality of life can be improved in the vast majority of cases.

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