Clinical Neurology and Neurosurgery 134 (2015) 85–90

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

Sphenoid wing meningiomas: Surgical strategies and evaluation of prognostic factors influencing clinical outcomes

Taohui Ouyang[a,1], Na Zhang[b,1], Long Wang[a], Zheng Li[a], Jian Chen[a,*]

[a] Department of Neurosurgery, Tongji Hospital, Huazhong University of Science and Technology, Wuhan, China
[b] Department of Neurology, Tongji Hospital, Huazhong University of Science and Technology, Wuhan, China

ARTICLE INFO

Article history:
Received 14 October 2014
Received in revised form 5 April 2015
Accepted 25 April 2015
Available online 4 May 2015

Keywords:
Meningioma
Microsurgery
Multivariate analysis
Quality of life
Sphenoid wing

ABSTRACT

Objective: To study microsurgical technique and prognostic factors influencing clinical outcomes in a series of 53 patients with sphenoid wing meningiomas (SWMs).
Materials and methods: The clinical materials of 53 patients with sphenoid wing meningiomas treated microsurgically between January 2008 and January 2012 were analyzed retrospectively. Follow-up period ranged from 6 to 62 months (median, 34 months). Clinical outcomes including postoperative quality of life and recurrence rate were evaluated. Univariate and multivariate statistical analysis were performed among factors that might influence postoperative quality of life.
Results: In our group, the mean age of patients was 49 years. Mean tumor size was 3.9 cm. Total tumor resection was achieved in 38 cases (71.7%), subtotal in 10 cases (18.9%) and partial resection in 5 cases (9.4%). Within the follow-up period, ten patients (18.9%) had recurrence and three patients (5.7%) died. In univariate analysis, we found the postoperative Karnofshky Performance Score (KPS) improvement was determined by various factors, including extent of tumor resection, peritumoral edema, tumor blood supply, size, adhesion, encasement and preoperative KPS. However, multivariate analysis showed that complete resection, rich blood supply, adhesion to adjacent structure, encasement of neurovascular were independent predictive factors for worse postoperative KPS.
Conclusions: With the improved requirement of postoperative quality of life in patients, intentional incomplete resection should be considered as an acceptable treatment option. Multivariate analysis confirmed that incomplete resection, poor blood supply, lack of adhesion or encasement of adjacent structure were independent predictive factors for favorable postoperative quality of life. An individual treatment strategy could help improved quality of life.

1. Introduction

Sphenoid wing meningiomas (SWMs) account for approximately 15–20% of intracranial meningiomas [1]. The surgery of SWMs is complicated and difficult due to their invasion of bone and proximity to main arteries and nerves. Compared with other meningiomas, SWMs possess higher mortality, disability rate and recurrence rate [2]. The symptoms of SWMs include headache, impaired vision, protopsis, and limbs weakness. Although there are many studies on microsurgical management of SWMs [2,3], there have been few reports of univariate and multivariate statistical analysis of factors influencing postoperative quality of life. This study focuses on a group of SWMs patients with surgical treatment. Many clinical variables were analyzed through statistical methods.

2. Materials and methods

Between January 2008 and January 2012, a total 67 of patients with SWMs were treated in Wuhan Tongji hospital, China. But 14 patients were lost to follow up and were thus excluded from statistical analysis for the sake of sample homogeneity. 22 male (41.5%) and 31 female (58.5%) patients were included in our study, with an age range of 35–72 years (mean, 49 years). 25 patients (47.2%) had impaired vision and 20 patients (37.7%) had headache. In our group, the preoperative $90 \leq KPS \leq 100$ was in

* Corresponding author at: Department of Neurosurgery, Tongji Hospital, Huazhong University of Science and Technology, Jiefang Avenue No.1095, Wuhan, Hubei 430030, China. fax: +86 02783665220.
E-mail address: husttjchen110@163.com (J. Chen).
[1] These authors contributed equally to this work.

http://dx.doi.org/10.1016/j.clineuro.2015.04.016
0303-8467/

7 patients (13.2%), KPS = 80 in 24 patients (45.2%), KPS = 70 in 14 patients (26.4%), 50 ≤ KPS ≤ 60 in 6 patients (11.3%) and KPS≤40 in 2 patients (3.7%). We enrolled patients with complete clinical data regarding patients' demographics, clinical history, radiographic findings, operative details, anesthetic record and tumor characteristics, and pathological record. Each patient's preoperative and postoperative quality of life was assessed using KPS. The clinical data of 53 patients were reviewed retrospectively.

2.1. Radiologic examination and follow-up

All patients were given computed tomography (CT) and magnetic resonance imaging (MRI) scans preoperatively. 36 patients acquired three-dimensional CT and 46 patients received CTA examination preoperatively. After the discharge from hospital, patients were followed up from 6 to 62 months (median, 34 months). 43 patients received MRI during follow-up. Information about postoperative quality of life and recurrence was collected by telephone interviews or via clinic. The patients were questioned with regard to their ability to work, how they coped with any existing disabilities, and their caregiver burden according to KPS. But our classifications of KPS were a little different. In our classifications the patients that could carry normal work with or without slight symptoms were classified to 90–100. The patients who could grudgingly carry normal work but with some symptoms or signs were classified to 80 and who were unable to carry normal work but could care for themselves were 70. The score 50–60 was given to patients that sometimes could care for themselves but often need help. The score ≤40 was given to patients who could not care for themselves.

2.2. Surgical techniques

The surgical approaches included classic pterional approaches in 36 patients, extended pterional approaches in 12 patients and pterional-orbitozygomatic approachesin 5 patients. The three approaches were mainly chosen according to tumor location, invasion and size. The classic pterional approach was the most commonly used surgical approach. Extended pterion approach was mainly chose for large SWMs with skull base bone invasion or medial SWMs. The pterional-orbitozygomatic approach was mainly used for SWMs with widespread invasion of skull base bone or with orbital bone invasion. After the tumor was exposed, internal carotid artery should be identified. Generally, the base and feeding arteries of tumor were coagulated with bipolar coagulation first. After tumor feeding artery was blocked, the shriveled tumor could be coped with under ensanguine operative field, and en bloc resection of tumor could be achieved. However, sometimes the tumor was too large and pervasive to get its real base confirmed and the major feeding arteries could not be interrupted immediately. In this situation, we preferred to first coagulate tumor capsule and abnormal arteries creeping on it, simultaneously dissecting tumor tissue nearby the base progressively. After tumor debulking was managed in piecemeal removal, the base of tumor could be determined and major feeding artery be blocked. The basal dura was coagulated or incision in our cases. If the tumor involved the cavernous sinus, the extracavernous portion of tumor was removed while preserving anatomical continuity of the neurovascular structures of cavernous sinus. If the tumor invaded into cavernous sinus, the part of tumor inside cavernous sinus was left behind for complete resection was not possible without a significant risk of further neurological deficits. The bulk of intradural extracavernous part of tumor was removed. If optic canal was involved, the fibrous ligament would be opened and bone canal be drilled with continuous irrigation to avoid heat damage to optic apparatus.

2.3. Pathologic studies

According to WHO classification (2007) of tumors of the central nervous system [4], endothelial type was confirmed in 29 cases (54.7%), fibrous (fibroblastic) in 5 cases, transitional in 14 cases, angiomatous in 3 cases, atypical type in 2 cases. The first four groups corresponded to WHO grade I and the last group corresponded to WHO grade II.

2.4. Statistical analysis

Univariate and multivariate statistical analysis were done among factors that might influence postoperative KPS improvement. Statistical analysis was performed with the use of χ^2 test, Fisher's exact test and Logistic regression. SPSS 16.0 statistical software was used to analyze the data and make 0.05 the boundary of statistical significance. Variables with $P < 0.05$ in univariate analysis were then analyzed in a multivariate logistic model.

3. Results

3.1. Symptoms and signs

The clinical symptoms and signs included visual acuity impairment, headache, limbs weakness, hyperspasmia convulsions, protopsis, hemiplegia, psychopathy, dizziness, hearing impairment and vomit in our group. Of these symptoms and signs, visual impairment and headache were main manifestations (Table 1).

3.2. Surgical outcome and complications

Two patient died during the perioperative period and three patients died at the time of follow-up. Gross total resection (Simpson I–II resection) was achieved in 38 of 53 cases (71.7%) and subtotal resection (Simpson III resection) in 10 cases (18.9%) and partial resection (Simpson IV) in 3 cases (9.4%). The mean operative time was 4.85 h (range 2.5–12 h). The estimated blood loss (EBL) was 1439 ml (range from 200 to 2800 ml). The complications were showed in Table 2.

3.3. Univariate analysis on postoperative quality of life

Postoperative quality of life was the most important index in assessing prognosis. The KPS was assessed and recorded in every patient preoperatively and during follow-up. Univariate analyses of different variables were made to search influential factors (Table 3). In the general variables, age and gender were not significant factors influencing postoperative KPS improvement. The preoperative headache and impaired visual acuity were also not significant

Table 1
Symptoms and signs of the 53 patients with sphenoid wing meningiomas.

Symptoms and signs	No. of patients	Percentage (%)
Visual acuity impairment	25	47.2
Headache	20	37.7
Limbs weakness	12	22.6
Hyperspasmia	9	17
Protopsis	6	11.3
Hearing	1	1.9
Dizziness	2	3.7
Vomit	4	7.5
Psychopathy	2	3.7
Hemiplegia	8	15.1