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Original Research

Prognostic factors in patients treated with surgery for brain metastases: A single-center retrospective analysis of 125 patients



Zhenghao Liu, Bingxi Lei, Meiguang Zheng, Zhongjun Li, Shuaibin Huang, Yuefei Deng*

Department of Neurosurgery, Sun Yat-sen Memorial Hospital, Sun Yat-sen University, Guangzhou, Guangdong, China

HIGHLIGHTS

• The prognosis of brain metastases is poor and unsatisfactory.

• KPS, number of brain metastases, extracranial metastases, treatment pattern were independent prognostic factors.

• Good status preoperative and multimodality therapy improve patient's survival significantly.

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ABSTRACT

Backgroud: Brain metastases are the most common malignant intracranial tumors, however, the prognosis of patients is still poor despite multiple treatment have been applicated. The aim of this study was to analyse parameters influence overall survival from patient, tumor and treatment. Summarized characteristics of long-time (>2 years) survivors furtherly.

Materials and methods: In total, clinical data of 125patients between 2004 and 2015 were collected and the parameters from patients, tumor and treatment were evaluated. Univariate analysis was performed using Kaplan-Meier and Log-rank test, multivariate analysis was performed using Cox proportional hazards regression model, respectively.

Results: Median overall survival time was 14.5 (95% confidence interval were 12.3–16.7) months and median survival time was 34.5 (95% confidence interval were 30.1–38.9) months in long-time survivors, respectively.KPS, RPA, GPA, number of brain metastases, extracranial metastases, treatment pattern and resection method were identified influence survival time significantly by univariate analysis. KPS, number of brain metastases and treatment pattern were independent prognosis factors by multivariate analysis. Long-time survivors obtain higher KPS, complete resection, adjuvant therapy postoperative more commonly.

Conclusion: Higher KPS, GPA I,RPA3.5~4, single brain metastases, adjuvant therapy postoperative and complete resection were significant improve survival time, however, extracranial metastases significant decreased survival time. Patients who have good status and received multimodality therapy involved complete resection can survive longer time more commonly.

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1. Introduction

Brain metastases (BM) are the most common intracranial malignant tumor in adult [1]. The incidence of BM are increasing attributed to prolonged survival time of cancer patients and advanced in medical imaging technology, 20%–40% of cancer

http://dx.doi.org/10.1016/j.ijsu.2017.05.033 1743-9191/© 2017 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. patients will developed BM finally [2,3]. BM mostly derived from lung cancer, breast cancer, melanoma, colorectal cancer, renal cancer et al. [4,5]. Occurrence of BM means cancer patients into advanced stage. Surgery, chemotherapy,radiotherapy, targeted therapy were main treatment method. However, the prognosis of BM were still poor and unsatisfactory. The overall survival of patients was about 3 months without any treatment since diagnosed with BM [6]. Factors or score including Karnofsky Performance Score (KPS), Recursive Partitioning analysis (RPA), Graded Prognostic Assessment (GPA), number of BM,extracranial metastases, treatment pattern might affect the prognosis, in turn, help in



^{*} Corresponding author. Department of Neurosurgery, Sun Yat-sen memorial hospital, Sun Yat-sen University, 107# yanjiang west road, Guangzhou, Guangdong, China.

E-mail address: fly040fy@163.com (Y. Deng).

decision-making and treatment recommendation [7,8]. In this retrospective study, we aim to evaluate prognosis factors or scores of patient, tumor and treatment in BM patients which received surgical treatment, also, summarized characteristics of long-time (>2 years) survivors.

2. Patients and methods

In total, 144 cases of clinical data between April 2004 and December 2015 at our department were collected. Among the data, 125 case of patient's follow-up data were obtained and analysed retrospectively. All of patients were received surgical treatment in our department. Data were collected from case files, medical electronical records, outpatients follow-up and telephone contact. Factors or scores contained age,gender,KPS,presentation,RPA,GPA,course, primary disease, number of BM, largest diameter, location, extracranial metastases, treatment pattern, resection method from three aspects includes patient, tumor and treatment were evaluated. Course was specified as time from the initial neurological symptoms or BM diagnosed (BM diagnosed before primary tumor) to underwent operation. The resection method was determined by the surgeon's description in the surgical records. Complete resection was defined as gross total resection of all brain metastases display in preoperative imaging. Patient's survival was defined as time to death after brain received surgical treatment. Mean age were 53 years (rang27-79years) and 52 years (rang33-79years) in 125 patients and 28 longtime survival patients respectively. Median overall survival were 14.5 months in 125 patients and 34.5 months in 28 long-time survival patients respectively.

3. Statistical analysis

Overall Survival was calculated from the date of received operation of BM until the date of death from any cause or last known follow up date. Overall survival rates were calculated using the Kaplan—Meier method. Differences between survival curves were determined using the Log-rank test. Prognostic factors were evaluated first with univariate analysis and those found significant were tested with multivariate cox proportional hazard model. Statistical analysis was performed with SPSS software for Windows, version 20.0 (SPSS, Chicago, IL, USA). For all analyses, p-values <0.05 were considered as statistically significant.

4. Results

4.1. Characteristics of patients

The baseline characteristics of patients are presented in Table 1. There were 64 (51.2%) males and 61 (48.8%) females of the125 patients in this study. With the mean age of 53 years, 106 (84.8%) were below 65 years old and 19 (15.2%) were beyond 65 years old,respectively.Most of the patients (87.2%) had a high KPS(KPS \geq 70) the time before operation. Short course (\leq 3 months) of central nervous symptoms in most patients (79.2%) before surgical treatment. The presentation between BM and primary tumor in majority of patients (67.2%) were metachronous.

4.2. Characteristics of tumor

Lung cancer and breast cancer are the most common primary tumor of BM(Table 2). Majority of patients (59.2%) had a single BM in our study. The largest diameter of BM in most patients (63.2%) were beyond 3 cm. BM occurred in cerebral (72.8%) more often than other sites. In a larger proportion of patients (61.6%) which extracranial metastases were absent.

Table	1	

Characteristics of patients.

Variables		Number of patients (%)
Age		
	<65	106(84.8%)
	≥65	19(15.2%)
Gender		
	Male	64(51.2%)
	Female	61(48.8%)
KPS		
	90-100	33(26.4%)
	70-80	76(60.8%)
	<70	16(12.8%)
Presentation		
	Synchronous	41(32.8%)
	Metachronous	84(67.2%)
RPA		
	Class I	55(44.0%)
	Class II	52(41.6%)
	Class III	18(14.4%)
GPA		
	0-1	8(6.4%)
	1.5-2.5	79(63.2%)
	3	17(13.6%)
	3.5-4	21(16.8%)
Status		
	Alive	13(10.4%)
	Dead	112(89.6%)
Course		
	≤3m	99(79.2%)
	3~6m	13 (10.4%)
	>6m	13 (10.4%)

Table 2

Characteristics of tumor.

Variables		Number of patients (%)
Primary disease		
	Lung	59(47.2%)
	Breast	19(15.2%)
	Liver	8(6.4%)
	colorectal	7(5.6%)
	Nasopharyngeal	7(5.6%)
	Renral	5(4.0%)
	Others	12(9.6%)
	Unknown	8(6.4%)
Number of brain	metastases	
	1	74(59.2%)
	2-3	26(20.8%)
	>3	25(20.0%)
Largest diameter		
	<3 cm	46(36.8%)
	\geq 3 cm	79(63.2%)
Locations		
	Frontal	20(16.0%)
	Parietal	18(14.4%)
	Temporal	12(9.6%)
	Occipital	6(4.8%)
	Cerebral	35(28.0%)
	Cerebellar	20(16.0%)
	Both Cerebral and cerebellar	14(11.2%)
Extracranial meta	astases	
	Yes	48(38.4%)
	No	77(61.6%)

4.3. Characteristics of treatment

All of the 125 patients in this study were received surgical treatment (Table 3). BM were completely and partially resected in 96 (76.8%) and 29 (23.2%) patients, respectively. Adjuvant treatment including chemotherapy or radiotherapy were carry out in 59 (47.2%) patients after surgical treatment.

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