

Original Article

Perioperative depression in central nervous brain tumors: a preliminary clinical study

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Abstract: Objectives: The objective of this study was to explore the clinical features and statistical differences for depression in patients with a brain tumor at different sites and of pathological types, before and after surgery. Methods: A total of 140 patients with brain tumors were assessed before and after surgery using the Hamilton rating scale for depression (HRSD) by analyzing and comparing the depression distribution and clinical features in the perioperative period. Results: The preoperative mean depression rating score of the 140 patients with brain tumors was 15.36 ± 6.52 , and the prevalent rate of depression was 35.7% (50 cases). The postoperative mean score of depression was 9.71 ± 5.55 , and the prevalent rate was 6.4% (9 cases). There were significant statistical differences between preoperative and postoperative mean depression rating scores in all patients ($P < 0.05$). The preoperative depression score and the prevalent rate were significantly higher than those in the postoperative period ($\chi^2 = 36.10$, $P < 0.05$). Depression in all patients with benign or malignant tumors improved significantly after surgery. Postoperative depression scores of patients with lesions in left, right, or bilateral hemispheres also declined compared with those recorded in the preoperative period. Conclusion: Different degrees of depression among brain tumor patients in the perioperative period were observed, which may be associated with brain tumor pathological types and lesion sites.

Keywords: Brain tumor, depression, surgery

Introduction

The clinical manifestations of brain tumors usually vary because of the specificity of brain tumor locations and their pathological features, as well as the complexity of the brain's structures and functions. Currently, mood disorders (MDs), which are symptoms and complications of patients with brain tumors, are receiving increased research attention. Among MDs, depression is considered as an independent prognostic risk factor that could have a serious impact on patients' quality of life [1]. However, few basic and clinical studies on MDs have been reported in China. Delayed diagnosis and treatment of affective disorders might have serious effects on the quality of life and prognosis of patients. To provide a reference for the

early clinical diagnosis and treatment of depression, the most extensive was adopted as a reliable rating scale for the clinical diagnosis of depression (the Hamilton rating scale for depression (HRSD) to investigate the patients' depression. The preoperative and postoperative clinical features of patients with brain tumors were analyzed to study changes in the symptoms of depression before and after surgery [2-6].

Patients and methods

General information

A total of 140 patients (66 males and 74 females) were selected who received surgical resection of brain tumors from October 2010 to

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Table 1. Comparison of HRSD scores for patients with brain tumors between the different lesions and pathological types before and after surgery

Group	n	Preoperative	Postoperative
A Benign tumor	80	14.30 ± 5.12	8.58 ± 3.54 ¹⁾
Malignant tumor	60	16.77 ± 7.84	11.22 ± 7.19 ¹⁾
B Left brain lesion	57	16.02 ± 5.48	9.65 ± 3.85 ¹⁾
Right brain lesion	51	13.75 ± 5.66	5.53 ± 4.69 ¹⁾
Bilateral lesions	32	16.75 ± 8.81	11.69 ± 8.34 ¹⁾

¹⁾By a t test, compared with the preoperative period, $P < 0.05$.

October 2011 in Beijing Tianan hospital. Intracranial hypertension was found in 101 patients before surgery, as well as neurological deficits and epilepsy in 91 patients, and non-specific symptoms in 11 patients. Among the 140 patients, which included 27 recurrent cases, 57 tumors were in the left hemisphere, 51 were in the right hemisphere, and 32 cases had bilateral hemisphere tumors. Postoperative pathological results reported that 80 cases were benign and 60 cases were malignant.

Inclusion criteria

Patients with a diagnosis of a brain tumor were confirmed by clinical symptoms, neuroimaging, and postoperative pathology. The patients, who volunteered to participate in the investigation, were completely conscious before and after assessment. All the patients were educated to primary school level or above, and their first-degree relatives had no genetic history of mental disease genetic. All the patients and/or the guardians provided written informed consent for participation in the study. Evaluations were performed 2-3 days before surgery and 7-10 days after surgery.

Exclusion criteria

Those who had severe cardiopulmonary dysfunction, a history of alcohol abuse, severe cognitive impairment, previous neuropsychiatric history, or other reasons for not completing the evaluations, were excluded from the neuropsychiatric tests.

Depression assessment

Patients were evaluated by professionally trained clinicians using questionnaires in a separate quiet room at 2-3 days preoperatively and

at 7-10 days postoperatively. The questionnaires were explained to the patients by the clinicians and the patients were required to answer concerning their actual conditions during the previous week. The depression degree of the patients was assessed using the HRSD, a 17-item heuristic scale. Patients with an HRSD score ≥ 17 points were identified as depressed; an HRSD score < 17 indicated no depression.

Statistical analysis

Excel 2003 software was used to build the mood disorder database, and used SPSS 17.0 software to analyze the clinical data. A paired t-test was used to measure the data's conformance to a normal distribution, and a χ^2 test ($n \geq 40$) or Fisher's exact test ($n < 40$) were used for count data. When $P < 0.05$ (bilateral), the difference was considered statistically significant.

Results

The prevalence of depression in patients with brain tumors before and after surgery

A total of 140 patients with brain tumors were evaluated for preoperative depression. Fifty patients were identified as having preoperative depression (35.7%). The mean HRSD score ($\bar{x} \pm s$) was 15.36 ± 6.52 . Postoperatively, depression was diagnosed in nine cases (6.4%), with a mean HRSD mean score of 9.71 ± 5.55 ($\bar{x} \pm s$). The depression scores of all the subjects were significantly different before and after surgery. The postoperative depression score was significantly lower than that before surgery ($P < 0.05$). The prevalence of postoperative depression in all patients was significantly lower than that of before surgery ($\chi^2 = 36.10$, $P < 0.05$).

Preoperative and postoperative depression in patients with brain tumors with different locations and of different pathological types

First, the patients were divided by their tumor pathological type into two groups: A benign group and a malignant group. The prevalence of preoperative and postoperative depression was statistically different between the benign and malignant tumor groups. Furthermore, the patients were divided by their tumor location into a left hemisphere group, a right hemi-

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Table 2. Comparison of depression prevalence between the different lesions and pathological types of brain tumors in patients in the preoperative and postoperative periods

Group	<i>n</i>	Preoperative morbidity	Postoperative morbidity
A Benign tumor	80	27.50%	2.50% ¹⁾
Malignant tumor	60	46.67%	11.67% ¹⁾
B Left brain lesion	57	40.35%	5.26% ¹⁾
Right brain lesion	51	29.41%	3.92% ¹⁾
Bilateral lesions	32	37.50%	12.50% ¹⁾
C Not classified	140	35.72%	12.50% ¹⁾

¹⁾By a χ^2 test, compared with the preoperative period, $P < 0.05$.

sphere group, and a bilateral group. Similarly, the prevalence of preoperative and postoperative depression was statistically different among the three groups. The postoperative HRSD scores of the patients in all five groups were significantly lower than the preoperative scores ($t = 13.25$, $P < 0.05$; $t = 12.44$, $P < 0.05$; $t = 14.67$, $P < 0.05$; $t = 9.60$, $P < 0.05$; $t = 7.26$, $P < 0.05$, **Table 1**). Next, the prevalence of depression before and after the surgery was compared in those five groups. Evidently, the prevalence of postoperative depression in the five groups was statistically lower than that of preoperative depression ($\chi^2 = 19.61$, $P < 0.05$; $\chi^2 = 17.79$, $P < 0.05$; $\chi^2 = 8.65$, $P < 0.05$; $\chi^2 = 11.93$, $P < 0.05$; $\chi^2 = 4.08$, $P < 0.05$, **Table 2**).

Discussion

Brain tumor-associated emotional disorders, as a special clinical manifestation in patients with brain tumors, resulted from a variety of tumor-induced brain dysfunctions, which could lead to emotional disorders or behavioral abnormalities. Some scholars believe that mood disorders are an independent risk factor that accelerates the death of patients with brain tumors [7], among whom 10-15% of patients with depression exhibit suicidal tendencies [8, 9]. Mood disorders seriously affect the patients' living conditions and even threaten their life.

In this study, the morbidity of preoperative depression was 35.7%, and postoperative prevalence of depression was 12.5%. The morbidity and depression score decreased significantly after surgery, which suggested that surgery may be an important factor to improve depres-

sion. Massie systematically analyzed the morbidity of depression in patients with different kinds of tumors and found that patients with head and neck neoplasms showed a higher morbidity (22-57%) of depression than patients with other kinds of tumors [11]. From those results, patients with brain tumors might be more likely to have preoperative depression than patients with other kinds of tumors. This might be because of the intracranial hypertension and neurological deficits associated with brain tumors preoperatively. However, decreases in depression scores and morbidity after surgery might reflect postoperative remission of clinical symptoms, the tumor properties, drugs, cooperation of patients, and other factors.

In this study, the tumors' pathological characteristics could affect the occurrence of affective disorder. John reported that patients with high-grade gliomas had an incidence of depression between 5 and 93%, indicating that pathological characteristics might be associated with the incidence of depression [9, 12, 13]. Furthermore, other retrospective epidemiological reports also showed that the morbidity of depression for patients with tumors was 6 to 42%, with an average of 33.3%. This study demonstrates that depression scores and the prevalence of postoperative depression in the benign group were significantly lower than those in the malignant group ($P < 0.05$). This might reflect the growth pattern of a malignant tumor, which could lead to extensive destruction of nerve fiber bundles, malignant brain edema, and intracranial hypertension [13, 14]. Some studies have suggested that the high morbidity of depression for patients with brain tumors is related to their mental health level. The mental health of cancer patients was observed to be significantly lower than that of the normal population, with enhanced negative psychological reactions and more depressive affective disorders, which affected the patients' emotional state and daily activities, and ultimately reduced their quality of life [9, 10, 15]. Furthermore, their mental state was closely related to the neuroendocrine system and immune system, especially in patients with severe depression. Through the neuroendocrine and immune responses, the body can regulate hormone levels and immune functions, which indirectly affect the occurrence

and development of the tumor and the patient's prognosis [14].

Other scholars believe that the morbidity of depression is associated with the tumor location in the brain. In this study, the pre- and post-operative depression scores of patients in left hemisphere group, the right hemisphere group, and the bilateral group were statistically different from each other ($P < 0.05$). The occurrence of depression might be related to the tumor location [4, 16]. Left frontal cortex and basal ganglia lesions were found to be associated with depression. The left hemisphere, as the dominant hemisphere and the emotional center in humans, is more prone to developing an affective disorder than the right hemisphere. However, the basal ganglia, as an important region for serotonin, NE, and dopaminergic neurons, which affects neurotransmitter transmission to the axons of the cortex, were also closely related to the occurrence of depression [4, 16].

In summary, patients with brain tumors have different degrees of depression preoperatively, and the morbidity of postoperative depression was significantly lower than that of preoperative depression. Before and after surgery, the morbidity of depression for the patients with different pathological types and tumor locations were statistically different. Patients with malignant or/and left hemisphere tumors had more morbid depression.

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Disclosure of conflict of interest

None.

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