

Neoplasm

Central neurocytoma: 9 case series and review

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Abstract

Background: Reviewing the literature on central neurocytoma revealed that functional outcomes traditionally have been assessed by KPS. However, KPS is not sufficiently sensitive to assess functional outcomes compared with the Barthel Index and the Functional Independence Measure (the FIMTM instrument). Discussion of other functional assessments and various aspects of central neurocytomas has never been documented clearly.

Methods: Nine case series of primary central neurocytomas received total or STR at our hospital. The clinical features, neuroradiologic findings, histopathologic features, and functional outcomes were listed and analyzed. Moreover, the functional outcomes were assessed using KPS, Barthel Index, and FIMTM instrument. The follow-up period ranged from 8 to 33 months after surgery.

Results: Patients with increased GFAP positivity or MIB-1 index greater than 3% did not have the worst scores in functional assessments. The functional outcomes of the cases presented here, including KPS, Barthel Index, and FIMTM instrument, were listed in Table 4. Most patients achieved good functional outcomes. The average KPS, Barthel Index, and FIMTM instrument were 86.25 ± 14.08 (range, 60-100), 86.88 ± 17.31 (range, 50-100), and 111 ± 17.02 (range, 78-126), respectively.

Conclusion: Most of the patients in this investigation achieved good ability to independently perform daily activity. Whether the high score of functional outcome was correlated with benign tumor course or 5-year survival rate remains uncertain. We recommend regular follow-up for detecting tumor growth or recurrence, although central neurocytomas are always benign.

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Keywords:

Central neurocytoma; Karnofsky Performance Scale; Barthel Index; Functional Independence Measure

1. Introduction

Central neurocytomas are rare brain neoplasm. These neurocytomas were first described by Hassoun et al [9]. Central neurocytomas occur mainly in young adults [8] and generally have an intraventricular location [10]. The

incidence of central neurocytomas ranged from 0.1% to 0.5% of the central nervous system tumors [15,21]. Sexual distribution was similar in males and females with a ratio of 1.02:1 [10]. Good prognosis was documented in some articles according to survival time and rate [10,15,26]. However, central neurocytomas seem to have higher recurrent rate during long-term follow-up, even though the patients received complete resection [28]. The concept that central neurocytomas are benign is not entirely correct and is questioned. Functional outcomes discussed in previous literature on central neurocytomas were mainly assessed using KPS [14,15,17]. Few other functional outcome scales were used in central neurocytomas. This study surveyed functional outcomes using

Abbreviations: CT, computed tomography; DRS, Disability Rating Scale; GFAP, glial fibrillary acidic protein; KPS, Karnofsky Performance Scale; MRI, magnetic resonance imaging; NSE, neuron-specific enolase; STR, subtotal resection; TR, total resection.

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3 different assessment scales and discussed the relationship among the clinical features, neuroradiologic findings, treatment, histopathologic features, and functional assessment scores.

2. Summary of case and methods

Nine case series of primary central neurocytomas that received TR or STR at our hospital were collected from October 2003 to December 2005. The patients who had recurrence or incomplete resection of tumor also received irradiation therapy as an adjuvant therapy. The case numbers of TR, STR, TR plus radiotherapy, and STR plus radiotherapy were 3, 1, 1, and 4, respectively. The sample contained 6 males and 3 females. The age of the 9 patients at time of surgery ranged from 19 to 39 years (average, 29 years); the average age of the male group at the time of surgery was 31.7 years, whereas that of the female group was 23.7 years (Table 1).

Clinical features, neuroradiologic findings, histopathologic features, and scores of functional assessments were summarized as below. The clinical features that included symptom duration and initial tumor location are listed in Table 1. The neuroradiologic findings of tumors that included density on CT, intensity on MRI, and feeding artery on angiographic reports are documented in Table 2. The presentation of NSE, synaptophysin, GFAP, and MIB-1 index were described in the histopathologic reports (Table 3). Functional outcomes of central neurocytomas were assessed using KPS, Barthel Index, and Functional Independence Measure (FIM™ instrument. Copyright © 1997 Uniform Data System for Medical Rehabilitation [UDSMR]. All rights reserved. Used with permission of UDSMR, 270 Northpointe Parkway, Suite 300, Amherst, NY 14228)

Table 1
Summary of 9 cases of central neurocytomas

Case no.	Age (y), sex at diagnosis	Duration of symptoms	Initial symptoms	Locations	Treatment
1	39, M	1 mo	Right leg numbness	LV	TR
2	27, F	1-2 y	Headache	RV	TR + RT (5400 cGy)
3	25, F	1-2 y	Headache	LV	TR
4	26, M	Several hours	Headache	RV	STR + RT (2050 cGy)
5	29, M	2 mo	Vomiting	RV	STR + RT (4400 cGy) ^a
6	37, M	1-2 mo	Right side weakness	LV	STR + RT (5040 cGy)
7	27, M	2 wk	Headache	LV	STR + RT (5200 cGy)
8	19, F	1 mo	Headache	RV	STR
9	32, M	1 wk	Headache	LV	TR

M indicates male; F, female; LV, left lateral ventricle; RV, right lateral ventricle; RT, radiotherapy.

^a Case 5 received additional radiotherapy with uncertain dose at another hospital.

Table 2
Summary of initial neuroimaging findings of the 9 cases

Case no.	CT	MRI	Feeding artery (arteriography study)
1	Not obtained ^a	np	Unremarkable
2	np	T1 (isointensity) T2 (isohyperintensity) Enhanced (+)	Posterior choroidal
3	Isodense Calcifications (+)	np	Pericallosal
4	Isohyperdense Calcifications (+) Enhanced (+)	np	Unremarkable
5	np	T1 (isointensity) T2 (isohyperintensity)	Pericallosal
6	Isohyperdense Calcifications (+)	T1 (isohypointensity) T2 (hyperintensity) Enhanced (+)	np
7	Isodense Enhanced (+) Calcifications (+)	np	np
8	Isohyperdense Calcifications (+)	T1 (hypointensity) T2 (hyperintensity) Enhanced (+)	Anterior choroidal and posterior choroidal
9	np	T1 (isointensity) T2 (hyperintensity)	Lateral lenticulostriate and posterior choroidal

np indicates not performed.

^a Not obtained because brain CT was performed at another hospital.

(Table 4). Case 8 died owing to complications, specifically bleeding from the tracheostomy wound, 2 months after STR. Thus, no current functional measurement was obtained for this patient.

3. Discussion

3.1. Clinical presentation

Initial symptoms (Table 1) of the 9 patients included headache, vomiting, limb numbness, or weakness.

Table 3
Immunohistochemical staining of the 9 cases

Case no.	Synaptophysin	NSE	GFAP	MIB-1 (%)
1	1+	1+	1+	np
2	1+	3+	–	5
3	–	3+	–	9
4	1+	3+	–	np
5	–	3+	–	np
6	–	1+	–	np
7	–	1+	1+	2
8	3+	np	–	3
9	2+	3+	–	np

np indicates not performed; –, less than 10%; 1+, 10% to 25%; 2+, 26% to 50%; 3+, 51% to 100%.

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