

Is intensive rehabilitation meaningful to brain tumor patients with neurological impairment?

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Introduction

Brain tumor is one of the major causes of disability. Although advances of therapies led improvement of survival rate of victims, neuro-surgeon, neuro-oncologist and even physiatrist are not so interested in rehabilitation due to still poor survival and high recurrence rate. To evaluate substantial meaning of rehabilitation, we assessed two aspects. One is efficacy of intensive rehabilitation for neurological impairment in patients by comparing with stroke patients, for whom rehabilitation is world widely accepted as basic therapy. Other is perceived worth about rehabilitation by patients and caregivers long-term after period of intensive rehabilitation.

Methods

Patients with neurological impairments after tumor surgery who received intensive rehabilitation under hospitalization during December, 2013-May, 2017 were included. Stroke patients, who also received intensive rehabilitation at same duration by same rehabilitation team under same strategy, were included as control group to evaluate therapeutic efficacy. Retrospectively, scores of functional evaluations which conducted before and after intensive rehabilitation, were analyzed: Fugl-Meyer assessment, Berg balance scale, modified Barthel index, and psychological assessments including mini-mental state examination and Wechsler's intelligence quotient. As for worth-perceiving evaluation for therapy, subjective satisfaction was assessed by telephone-survey on 6 items about functional improvements, intensity of therapy, overall satisfaction, and whether recommend rehabilitation to other patients. Information on long term function and survival status were collected.

Results

Rehabilitation outcomes were collected from 21 benign and 14 malignant brain tumor; and 108 stroke patients. Telephone survey was available in 17 benign and 9 malignant patients. Rehabilitation Resulted in significantly equal improvement in brain tumor patients on every outcome measures compared to stroke regardless of malignancy status (Table 1, Figure 1.). Two patients with benign tumor and nine with malignant had expired. In survivors, over 80% caregivers answered that motor, ADL, and cognition has improved or maintained compared with discharge (Figure 2A). Over 60% caregivers answered that rehabilitation was effective in improving motor, ADL, and cognition. Around 70% answered positively about overall satisfaction, intensity, and recommend rehabilitation

to other patients. (Figure 2B). Impressively, the pattern was similar in malignant (Figure 2C) and in deceased cases (Figure 2D).

Conclusion

In Conclusion, the intensive rehabilitation brought functional improvement in brain tumor patients regardless of malignancy status, and caregivers expressed high satisfaction about rehabilitation. Therefore, intensive rehabilitation in brain tumor patients is worthwhile and medical staffs should draw more attention to provide appropriate rehabilitation therapy for brain tumor patients with neurological impairment.

Table 1. Rehabilitation Outcomes for Patients with Stroke vs. Brain Tumor and Benign vs. Malignant Brain Tumor

	Brain Tumor (n=35)			Stroke (n=108)			<i>p</i> [†] (between groups)
	Baseline	Discharge	<i>p</i> (within groups)	Baseline	Discharge	<i>p</i> (within groups)	
FMA score	34.5 (± 22.2)	49.1 (±17.5)	0.001*	30.1 (±21.6)	41.8 (±21.0)	0.001*	0.737
BBS score	17.0 (±15.9)	35.6 (±17.7)	0.001*	20.7 (±18.0)	35.2 (±17.7)	0.001*	0.929
K-MBI score	36.9 (±18.5)	58.3 (±20.1)	0.001*	38.6 (±21.0)	56.7 (±23.2)	0.001*	0.447
K-MMSE score	17.3 (±10.1)	23.1 (±7.6)	0.001*	16.7 (±8.2)	21.1 (±7.1)	0.001*	0.569
IQ score	67.1 (±18.1)	78.9 (±14.8)	0.001*	69.6 (±18.4)	78.5 (±18.4)	0.001*	0.180

	Benign Brain Tumor (n=21)			Malignant Brain Tumor (n=14)			<i>p</i> [†] (between groups)
	Baseline	Discharge	<i>p</i> (within groups)	Baseline	Discharge	<i>p</i> (within groups)	
FMA score	36.7 ± 22.3	51.1 ±15.4	0.001*	31.1 ± 20.8	45.9 ± 20.7	0.002*	0.434
BBS score	19.1 ± 17.1	38.0 ± 15.7	0.001*	13.9 ± 13.0	32.1 ± 20.1	0.002*	0.210
K-MBI score	37.7 ± 20.2	61.4 ± 21.6	0.001*	35.9 ± 15.6	53.8 ± 18.4	0.016*	0.702
K-MMSE score	15.5 ± 7.3	23.5 ± 5.1	0.001*	19.3 ± 9.8	22.6 ± 7.1	0.001*	0.220
IQ score	63.9 ± 16.1	79.1 ± 12.8	0.001*	71.5 ± 20.7	78.5 ± 17.7	0.002*	0.156

All values are presented a mean±standard deviation.

Abbreviations: FMA, Fugl-Meyer Assessment; BBS, Berg Balance Scale; K-MBI, Korean Version of Modified Barthel Index; K-MMSE, Korean Version of Mini-Mental State Examination; IQ, Intelligence Quotient

**p*<0.05, when comparing each scores of baseline and discharge within same group by Wilcoxon signed rank test.

† compared the difference of each scores (score at discharge – score at admission) between two groups (brain tumor vs. stroke) by Mann-Whitney U test.

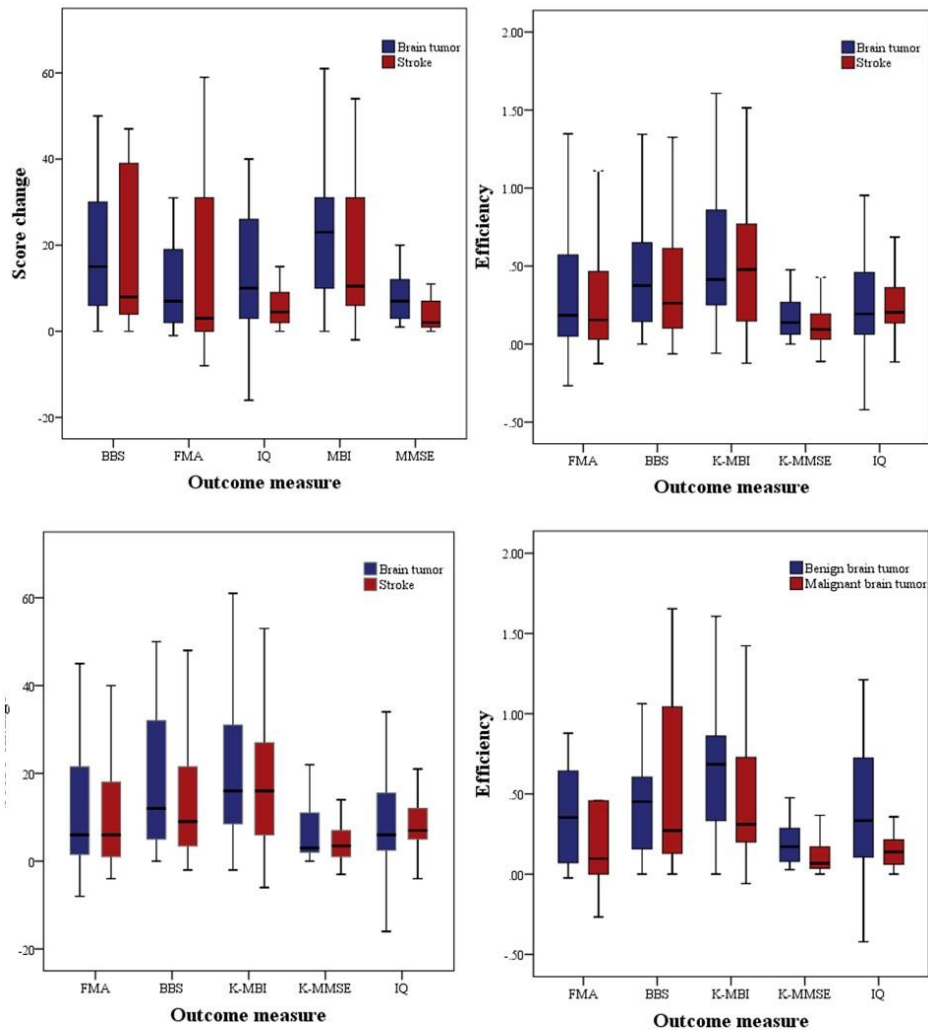
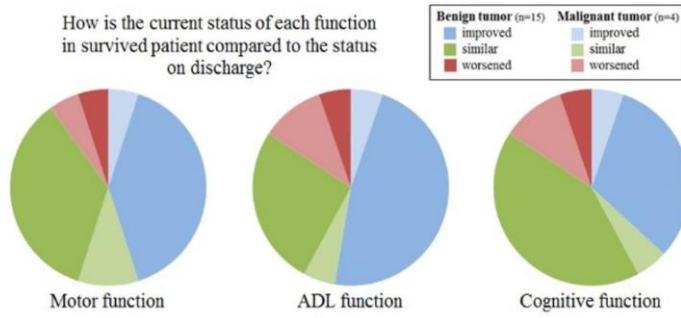
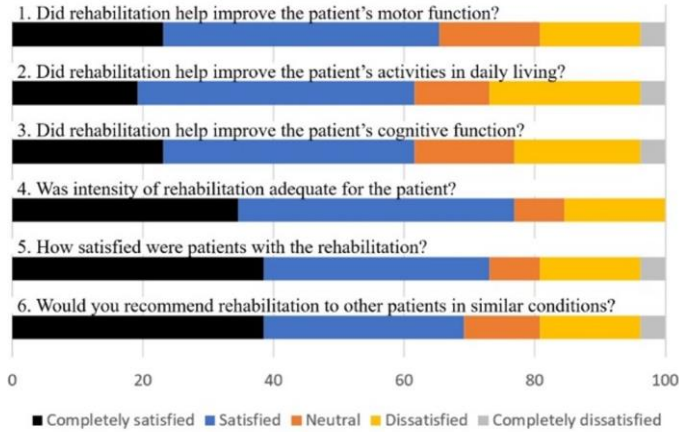


Figure 1. Comparison of Rehabilitation Outcome

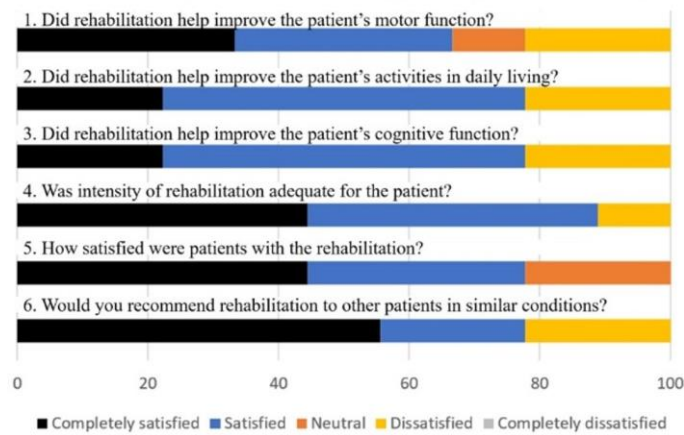
(A) Current status among the survived patients (n=19)



(B) Satisfaction survey on rehabilitation therapy in brain tumor (n=26)



(C) Satisfaction survey on rehabilitation therapy in malignant brain tumor (n=9)



(D) Satisfaction survey on rehabilitation therapy in deceased patients (n=9)

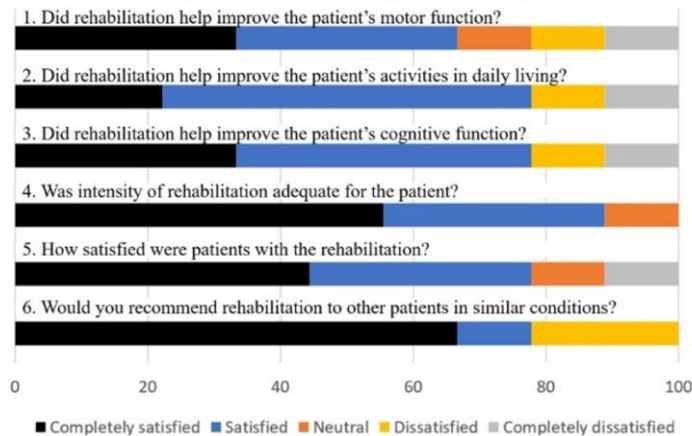


Figure 2. Results of Telephone Survey in Patients with Brain Tumor