Sodium Fluorescein Guided Resection of High-Grade Glioma: Safety and Cost Effectiveness

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Introduction

High grade glioma is a very disappointing tumor with high rate of short term recurrence although it is followed by chemotherapy and/or radiotherapy. Also, it is difficult to resect it totally especially in eloquent area. The extent of resection is the corner stone predictor of progression-free survival. Gross total tumor resection offers a better prognosis and a longer life expectancy.

Methods

A retrospective study done on 23 patients suffering from high grade glioma operated upon. The age ranged between 39 and 67 years old with mean age of 52.4 years. Sodium fluorescein was administered intravenously during induction of anesthesia, with a dose 3–4 mg/kg bodyweight. After dural opening the surgical microscope (PENTERO 900, Carl Zeiss Meditec, Germany) equipped with a YELLOW 560 nm filter (YELLOW 560 nm, Carl Zeiss Meditec, Oberkochen, Germany) for visualization of the stained tumor tissue and better identification of the tumor brain interface. 5ml sodium fluorescein ampoule costs 0.3 $, and available in the market. We calculated the cost of surgery till the patient was discharged, including the mean additional cost of the module usage per procedure.

Results

Gross total resection of the contrast-enhancing tumor was achieved in 20 patients (87%). Glioblastoma multiform was pathologically proved in 16 patients. The temporal lobe was the common site to be affected (16 cases), whereas the frontal lobe with the corpus callosum was affected in only 5 cases. New post-operative deficits was found in 4 patients. We have 18 patients with 6 months progression-free (78.3%), which is better than other results in the literature, this lowers the incidence of repeated surgery which saves more expenses. the mean cost of surgery was 2267$ (Table1), including the module usage (200$). There wasn't any allergic reaction or side effect from sodium fluorescein usage.

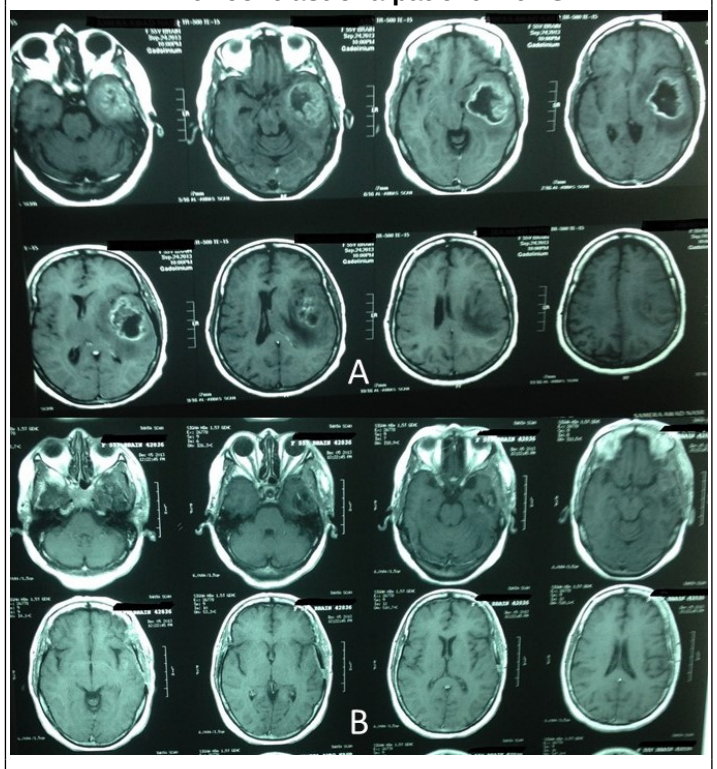
Table 1: Discriptive statistics of our study

Case	Age	Sex	Localization	Lesion	GTR	6 Months Progression free	Cost *	Post-operative Complication
1	61	F	Lt. Temporal	G4	Y	Y	2200	Dysphasia
2	55	M	Rt. Frontal**	G4	Y	Y	2260	CSF bogginess
3	54	F	Lt .Temporal	G4	Y	Y	2260	
4	39	F	Rt. Temporal	G3	Y	Y	2130	
5	47	F	Lt. Frontal	G4	Y	Y	2533	Chest infection
6	55	M	Lt. Temporal	G4	Y	Y	2467	
7	67	M	Rt. Frontal	G4	Y	N	2333	
8	47	F	Lt. Temporal	G4	Y	Y	2200	
9	57	M	Lt. Parietal	G4	N	N	2400	Rt hemiparesis
10	58	M	Lt. Temporal	G4	Y	Y	2260	
11	40	F	Lt. Frontal	G3	N	N	2130	Cognition affection
12	38	F	Rt. Temporal	G3	Y	Y	2130	
13	49	F	Lt. Temporal	G3	N	N	2200	
14	57	F	Lt. Temporal	G4	Y	Y	2333	
15	64	M	Lt. Temporal	G4	Y	N	2533	Chest infection
16	59	M	Lt. Temporal	G4	Y	Y	2260	
17	56	F	Rt. Temporal	G4	Y	Y	2260	
18	45	F	Rt. Frontal	G3	Y	Y	2130	
19	53	F	Rt. Temporal	G4	Y	Y	2200	
20	57	M	Lt. Temporal	G4	Y	Y	2400	Dysphasia
21	47	M	Lt. Occipital	G3	Y	Y	2130	
22	62	M	Rt. Temporal	G4	Y	N	2260	
23	39	M	Rt. Temporal	G3	Y	Y	2130	
Sum	1206						52139	
Mean	52.4						2267	

*The cost is calculated in US dollar
**Frontal lobe involvement included the corpus callosum

GTR,Gross Total Resection; G3 Astrocytoma WHO grade III; G4 Glioblastoma Multiform

MRI with contrast of a patient with GBM



(A) Lt.Tempral GBM Pre operative, (B) the same patient 6 months after surgery

Conclusions

Sodium fluorescein is a safe and cost-effective technique in resection of High-Grade Glioma. This technique helps in identification and visualization of the pathologic tissue and helps in achieving a better tumor gross total resection with minimal neurological deficits, but it has no role in identification of eloquent areas.

Learning Objectives

To show how sodium fluorescein usage in achieving a gross total resection of high grade glioma, is safe and cost effective.

Movie

Movie