5-ALA Fluorescence-guided Surgical Resection of Glioblastoma in the Elderly

Piero Andrea Oppido MD, PhD; Veronica Villani MD; Carmine Carapella; andrea pace MD
Neurosurgery Dpt., National Cancer Institute Regina Elena, Roma Italy

CNS 2016 ANNUAL MEETING San Diego CALIFORNIA SEPTEMBER 24-28, 2016

Introduction

Malignant glioma in the elderly represents a relevant therapeutic issue and the value of extensive surgical resection remains debated; recent evidence suggests that radical removal is associated with better survival. Several series report that the 5-amino-levulinic acid (5-ALA)-guided resection increases the extension of tumor removal, by improving survival. Furthermore, in advanced age the radiotherapy and chemotherapy are often associated with increased toxicity related to the residual volume tumor.

Methods

The present experience is related to 35 patients affected by glioblastoma(30 newly diagnosed and 5 recurrent tumors). All patients underwent preoperative and early postoperative MRI, showing contrast enhancing lesions. All patients with KPS>70 were selected for fluorescence-guided resection. An oral dose of 20 mg/kg 5-ALA was administered to each patient. By a Zeiss OPMI Pentero operating microscope,the surgical resection was performed. Intraoperative 440nm light was periodically applied during and at end of resection to visualize the 5-ALA fluorescence, in order to detect tumor infiltration or remnants as red tissue (fig. 2B). Only 14 patients, as first line treatment, have been submitted to radiotherapy and chemotherapy; second and in some cases third line treatments were utilized in recurrent cases.

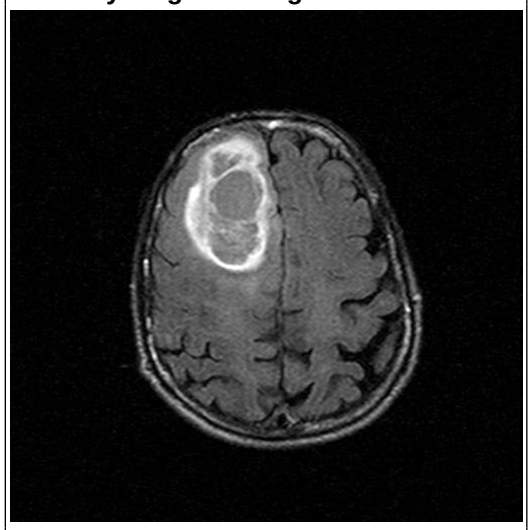
Results

In all patients tumor tissue showed intraoperative red fluorescence with different intensity; mainly in recurrent GBM, fluorescence-guided surgery allowed a better definition of active tumor, with a clear border from perilesional "healthy" brain or radionecrosis. Postoperative KPS improved. Early postoperative MRI confirmed gross total resection without contrast enhancement in 80 % of patients. In the present experience the procedure did not determine any relevant additional neurological deficit, nor toxicity. The patients follow-up ranged from 6 months to 3 years. Considering overall survival of all patients (recurrent GBM included) we obtained a median extension of at least 9.0 months (6 – 28 months).

Conclusions

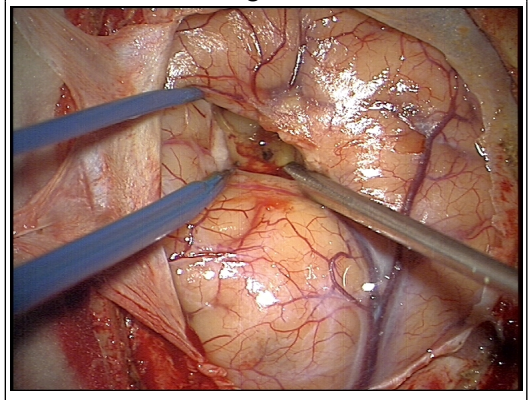
Our experience with the 5-ALA administration was limited to newly diagnosed or recurrent malignant glioma showing contrast enhancement on preoperative MRI. In this group the fluorescence guide was useful to distinguish normal from abnormal tumor tissue. It was helpful to localize the tumor on the cortex and extend resection of infiltrating tumor, specially in recurrence after radiotherapy. There is a straight relationship between tumor aggressiveness and detectable fluorescence. Early postoperative MRI resulted without lesional contrast enhancement when surgical resection was realized distant from eloquent areas.

Newly diagnosed right frontal GBM



preoperative MRI

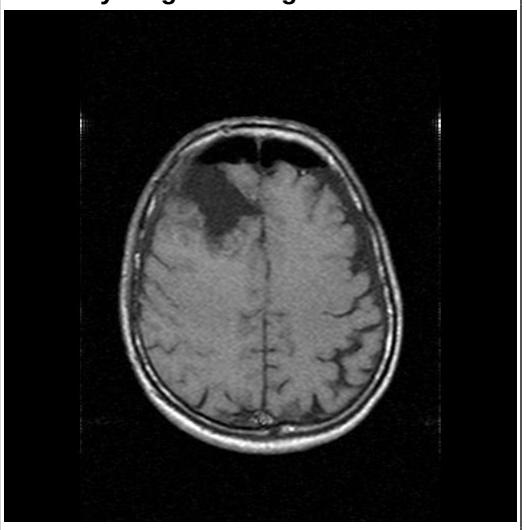
Fig. 2A



tumor view with white light mode

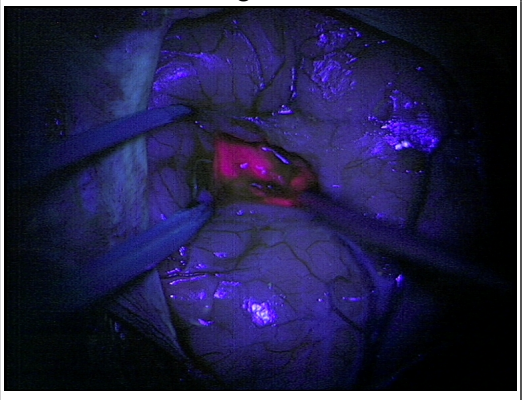
Elderly patients affected by malignant glioma, specially recurrent tumors, are elective for this technique improving the probability of achieving maximal tumor resection.The 5-ALA-guide resection is easy to perform with acceptable safety. It improves tumor detection and allows extended resection of malignant glioma,

Newly diagnosed right frontal GBM



Early postoperative MRI

fig. 2B



tumor 5-ALA fluorescence with 440 nm light

Learning Objectives

5-ALA guided surgical resection improves survival in elderly patients even if only chemotherapy is feasible.

without any futher neurological defict, resulting helpful mainly in the recurrent setting with a consistent effect on overall survival.