

Supramaximal Resection of HGG Based on Navigated FLAIR MR. Clinical Outcome and Survival Analysis
on 50 Patients

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Introduction

Extent of resection (EOR) in high-grade gliomas is an important factor in improving progression-free and overall survival. EOR evaluation is based on comparison between pre- and postoperative contrast enhanced tumor in T1 with gadolinium Magnetic Resonance (MR) sequences; however the presence of infiltrating tumor in the areas surrounding the enhancing nodule has been demonstrated. We tested the efficacy and reliability of a volumetric evaluation based on 3D FLAIR MR images used both for intraoperative navigation and post-operative measurement of EOR.

Methods

50 patients (27 male) with a mean age of 63.8 yrs (range 49-82) have been prospectively included in this study. 3D post-contrast T1 and FLAIR sequences have been used for intraoperative navigation. Using the focus of the microscope as navigation pointer and recording 5-ALA fluorescence, we evaluated the correspondence between intensity of fluorescence and MR images. Volumetric evaluation of EOR has been performed using manual segmentation on 3D FLAIR sequences of pre- and post-operative MR.

Results

Correlation between FLAIR, T1 post-contrast images and intraoperative 5-ALA fluorescence has been evaluated on navigation images. In all cases the correspondence between enhanced tumor and intense fluorescent areas has been documented. Peri-tumoral zones, detectable on 3D FLAIR sequences as hyperintense, appeared with vague fluorescence and have been istologically demonstrated as pathological infiltrating areas in 30 of 34 patients. Volumetric evaluation based on 3D-FLAIR MR documented residual tumor in 33 patients, despite traditional volumetric evaluation based on T1 post-contrast MR showed complete resection in all but 3 cases.

Conclusions

The resection based on 3D FLAIR images is wider than that based on post-contrast T1. The safety of such resection depends on the use of supportive devices as navigated tractography and neuromonitoring. The validity of the method proposed for volumetric evaluation of extent of resection must be supported by survival data.

Learning Objectives

1. To debate the rationale of supramaximal (or supracomplete) resection of HGG
2. To critically evaluate the FLAIR signal in HGG and its volumetric evaluation to determine te EOTR
3. To investigate the neurological risks as well as the potential survival benefits of supracomplete resection of HGG.

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