

Introduction

Intraoperative magnetic resonance imaging is the gold standard among image-guided techniques for glioma surgery. Scant data are available on the role of intraoperative computed tomography (i-CT) in high-grade glioma (HGG) surgery. The aim of this study is to verify the feasibility and usefulness of portable i-CT in surgical resection of HGGs.

Methods

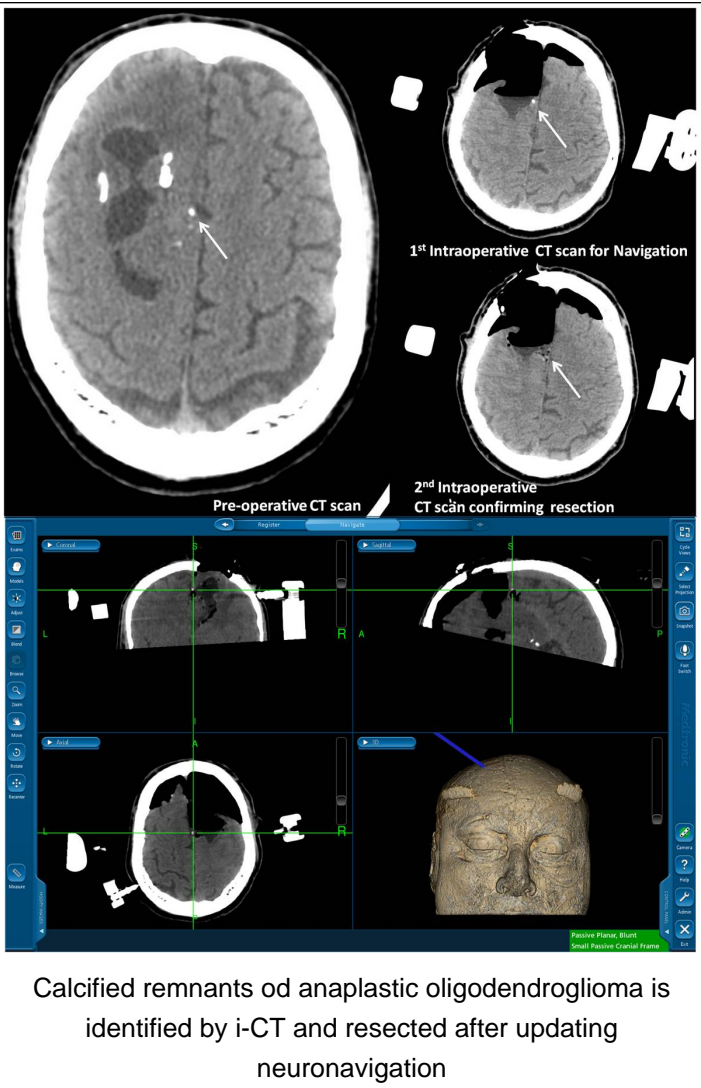
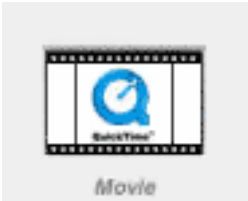
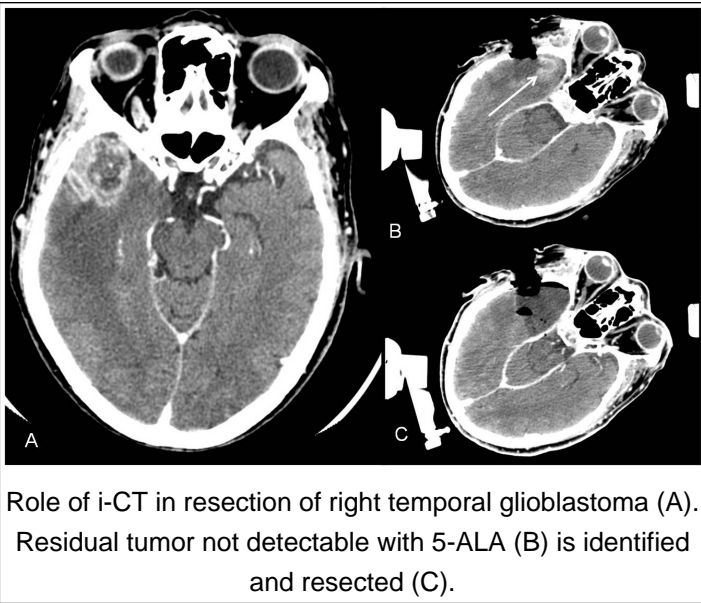
Twenty-five patients (Group A) with HGGs underwent surgery using i-CT and 5-aminolevulinic acid (5-ALA) fluorescence. A second cohort of 25 patients (Group B) underwent 5-ALA fluorescence-guided surgery but without i-CT. We used a portable 8-slice CT scanner and, in both groups, neuronavigation. Extent of tumor resection (ETOR) and pre- and postoperative Karnofsky performance status (KPS) scores were measured; the impact of i-CT on overall survival (OS) and progression-free survival (PFS) was also analyzed.

Results

In 8 patients (32%) in Group A, i-CT revealed residual tumor, and in 4 of them it helped to also resect pathological tissue detached from the main tumor. EOTR in these 8 patients was 97.3%. In Group B, residual tumor was found in 6 patients, whose tumor's mean resection was 98%. The Student t-test did not show statistically significant differences in EOTR in the 2 groups. The KPS score decreased from 67 to 69 after surgery in Group A and from 74 to 77 in Group B (P=0.07 according to the Student t test). Groups A and B did not show statistically significant differences in OS and PFS (P=0.61 and .46, respectively, by the log-rank test).

Conclusions

Despite the lack of statistical significance, i-CT helped to verify EOTR and to update the neuronavigator with real-time images, as well as to identify and resect pathological tissue in multifocal tumors. Portable i-CT can provide useful real-time information during brain surgery and can be easily introduced in neurosurgical theaters in daily practice.



References

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- Lunsford LD, Parrish R, Albright L. Intraoperative imaging with a therapeutic computed tomographic scanner. *Neurosurgery*. 1984;15:559-561.