

Section: Intraoperative Bildgebung

ID: 64

Abstract-Title:

POST RADIATION BRAIN RIGIDITY REDUCES BRAIN SHIFT: A DESCRIPTIVE STUDY USING INTRAOPERATIVE MRI AND IMAGE ANALYSIS

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Abstract-Text:

Purpose:

Intraoperative brain shift changes the anatomic settings so severely, that neuronavigational systems are increasingly inaccurate and insufficient with the length of the operation. Due to this phenomenon especially in large intracranial tumors reregistration, using intraoperative ultrasound or MRI, is required for validation. Using intraoperative MRI and consecutive reregistration in our neurosurgical department routinely, we observed, that this might not account for recurrent tumors, which had previously undergone radiation. This would confirm the intraoperative feeling neurosurgeons have with the surgical treatment of recurrent intracranial tumors

The goal of this study was to compare the brain shift in patients with and without prior cranial radiation therapy and to analyze if reregistration might not be as obligatory in patients post cranial radiation.

Method:

Our MRI operating suite is equipped with a 1.5 Tesla short bore MRI scanner and a state of the art neuronavigational system which are directly linked for automatic reregistration. In our study we looked retrospectively at the intraoperative image data of the patients operated on supratentorial gliomas and meningiomas. These we evaluated for the intraoperative brain shift: with the image segmentation of the tumors and their resection cavities, their 3D reconstruction and image fusion techniques we looked at the intraoperative MRIs of patients operated following prior surgery and radiotherapy and of patients with newly diagnosed tumors. Surrounding structures and the tumor itself were used for correlation. The analysis was stratified for the tumor location because of the different degrees of brain shift depending on the brain lobe involved and for the age because of the increasing physiological rigidity with the years of age.

Results:

As anticipated, intraoperative brain shift is strongest with primarily operated patients. Brain rigidity seems to decrease brain shift in radiated patients even in areas where a pronounced tendency for shifting has been documented, and also following the resection of bulky tumors (Fig. 1). Because of this phenomenon in several cases a reregistration did not seem necessary.

In correspondence with the published data we found a markedly shift in patients being operated the first time (Fig. 2). In these cases even after a partial resection a reregistration is mandatory or the neuronavigation will give the surgeon the wrong guidance.

We account the effect of reduced brain shift to the secondary gliosis caused by the radiation which could lead to an increased rigidity a fixation.

Conclusion:

Time consuming procedures for intraoperative validation of neuronavigational systems are not as necessary in patients post radiotherapy, compared to newly operated patients. In later we could confirm the previously published observations.

Bild 1/JPG

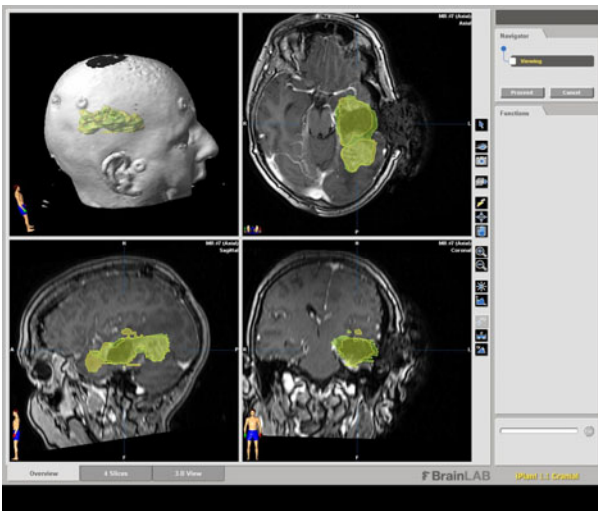


Bild 2/JPG

