

Multimodale intraoperative Bildgebung in Kombination mit funktionellem Monitoring bei Eingriffen in eloquenten Hirnregionen: Integration von Neuronavigation, Ultraschall und Neuromonitoring.

Multimodal intraoperative imaging combined with functional monitoring for surgery in eloquent regions: Integration of neuronavigation, ultrasound and neuromonitoring.

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Purpose

Surgery in eloquent regions of the brain remains a challenge as a consequence of the prominent risk of postoperative deficit. Application of all available anatomical and functional preoperative imaging information, intraoperative navigation and combination of real-time imaging modalities might provide the means of tailored surgery.

Method

A newly developed device enables intraoperative fusion of real-time ultrasound images with the high resolution and the familiar display of the neuronavigation system. Together with these imaging modalities, functional data like fMRI or ECOG as well as marking of phase reversal at the central sulcus can be practically used .

Results

This combined method was especially helpful in tumors and vascular or epileptogenic lesions near eloquent regions. The critical cortical areas and surrounding vessels could be

well displayed on the screen of neuronavigation system, changes due to brain shift were updated by the fusion with intraoperative ultrasound. Up to now there was no occurrence of morbidity after resection of lesions in or next to eloquent regions according to this technical usage. The fusion and integration of anatomical and functional data is simple to adopt and requires only minor additional expenditure of time and equipment.

Conclusion

Integration of the different imaging modalities has contributed to the safety and proficiency of surgery in the eloquent areas. The anatomical, functional or intraoperative potency of the different methods complement one another favourably. A better postoperative result rewards the increased intraoperative effort.