Confocal laser endomicroscopy for real time histomorphological diagnosis: Our clinical experience with 150 brain and spinal tumor cases.

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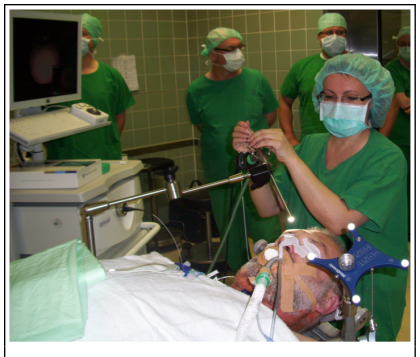
Learning Objectives

Confocal endomicroscopy allows to see on a cellular level. This means that it opens new dimensions regarding optical imaging and the surgeons will be able to operate with much more accuracy then before.

Introduction

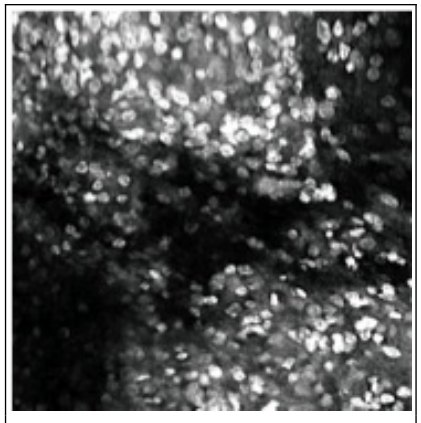
Confocal laser endoscopy (CLE) is a novel technique permitting in vivo histologic imaging with miniaturized endoscopic probes at excellent resolution. Goal was: 1)to analyze the technical aspects of CLE technique 2)to investigate the integration of CLE in the neurosurgical daily workflow in the operation room, 3)to create an easily integration of the CLE technique into the neurosurgical daily routine used endoscopic setting and providing immediate and intraoperativ histopathologic diagnosis of the entire entity on real time, and 4) to evaluate CLE for in vivo diagnosis in different types and models of intracranial and intraspinal neoplasia.



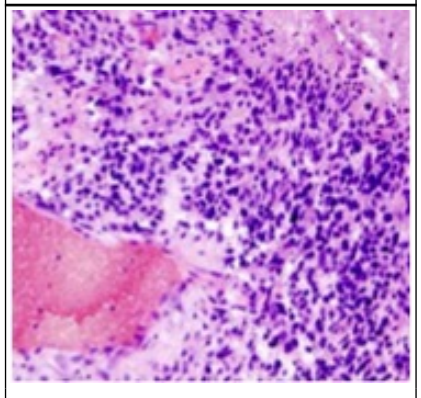
Setup in the OR

Methods

Fresh surgical biopsies of 150 intracranial and intraspinal lesions were examined to test the signal intensity and adequate contrast for CLE imaging after topical application of 0.1ml acriflavine. The lesions examined were different grades of glioma, meningiomas, craniopharyngiomas, different types of intrasellar lesions, acoustic neurinomas, different metastasis, medulloblastomas, epidermoid tumors, spinal and in brain located ependymomas.



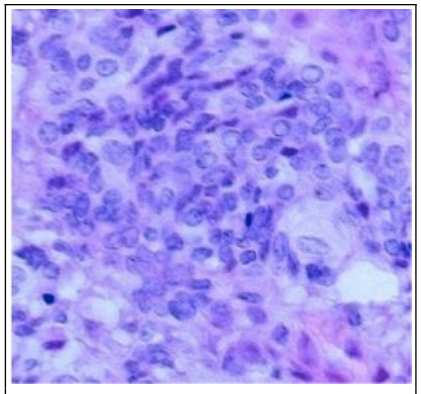
Glioblastoma confocal



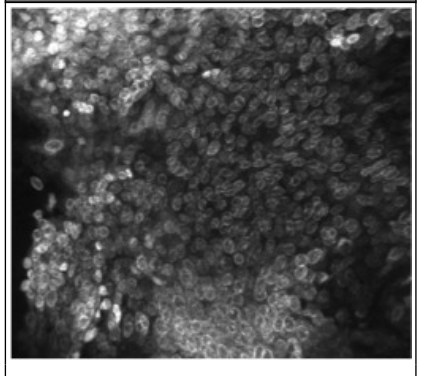
Glioblastoma HE

Results

CLE equipment was easily integrated. We additionally combined the CLE equipment, with the microscopes and endoscopes in a picture in picture modus. The insertion of the CLE optical probe into the working channel of conventional brain endoscopes was easy to performed. CLE yielded high-quality histomorphology of brain and spinal tumors. CLE discrimination of neoplastic tissue was easy to perform based on tissue and cellular architecture.



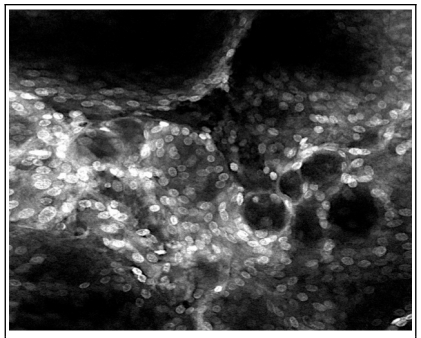
Craniopharyngeoma HE



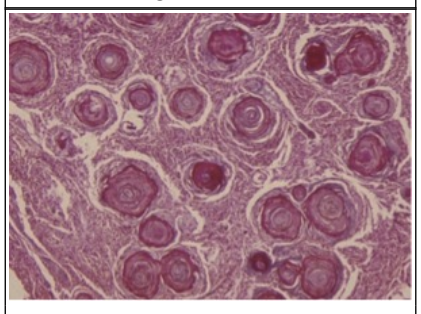
Craniopharyngeoma confocal

Conclusions

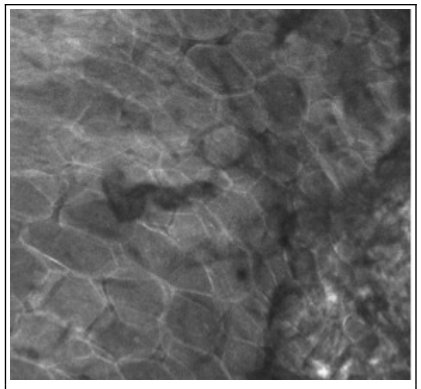
Confocal laser endomicroscopy allows immediate in vivo imaging of normal and neoplastic brain tissue at high resolution. It may become helpful to screen for tumor free margins not only for improving the real time histological definition of the tumor tissue, but also increasing the ability to accurate surgical resection of malignant brain tumors on a cellular level.



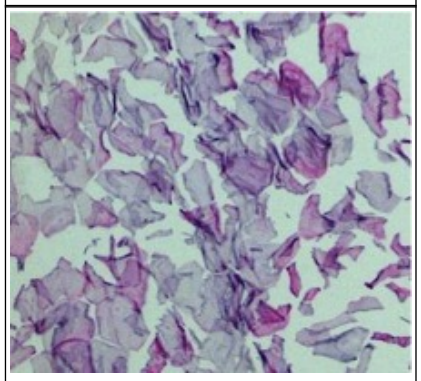
Meningeoma confocal



Meningeoma HE



Epidermoid confocal



Epidermoid HE

Acoustic neurinoma confocal and HE