



Multimodal pre-surgical planning and robotic-assistance in cranial neurosurgery: first clinical experience and preliminary results

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Introduction

Multimodal pre-surgical planning using semi-automatic and manual segmentation of individual patient anatomy is a first step of treatment of neurosurgical patients. Combination of this data with highly precise robotic-assistance system can lead to increased effectiveness, accuracy and safety of the procedure which can be confirmed by intra-operative data.

Methods

Dedicated neurosurgical robotic-assistance device (ROSA, Medtech, France) was used in 14 cases. Among them was 7 stereotactic biopsies, 4 cortical displasia, 1 DBS and 1 sEEG. In all cases we perform immediate post-operative CT scans;5 from 7 biopsies was performed under intraoperative control by small craniotomy and ultrasound imaging. Presurgical planning was done using OsiriX and ROSA planning station in all biopsy cases and in sEEG case; rest of the cases was planned using ROSA planning station.

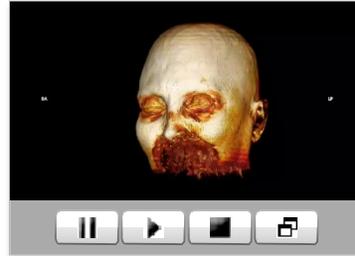
Conclusions

Modern neurosurgical interventions require high mechanical accuracy and sophisticated pre-surgical planning. Combination of different neuro-imaging modalities processed with 3D visualization software and robotic-assistance during surgical manipulation may be a cornerstone of the individual treatment of neurosurgical patients. This can lead to increased patient safety, low complications rate and time-effective procedures. Furthermore all the processed data can be stored and used for future simulation training of young trainees Because of multimodal and multistage nature of planning this procedures require a close collaboration between neurosurgeons, radiologists and IT team.

Results

Our preliminary data suggests that pre-operative planning can dramatically increase efficiency and safety of the procedure. All possible mistakes during the planning will interfere the course of treatment and all steps must be cross-checked during the procedure.

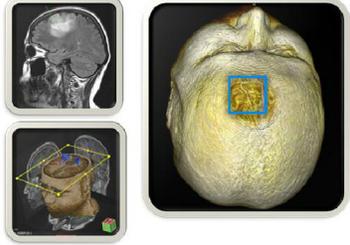
References



Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of multimodal pre surgical planning, 2) Discuss, in small groups, the role of robotic surgical assistance., 3) Identify an effective way to perform the pre surgical planning using different approaches. "

Multimodal planning using different tools



CE MRI, DTI tractography and surface segmentation can be used in combination for multimodal presurgical planning

Intraoperative view of the robotic-assisted brain biopsy using the ultrasound guidance and fluorescent labeling (5-ALA)



During the first robotic-assisted brain biopsy we used ultrasound guidance combined with 5-ALA fluorescence

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