



Application of Intraoperative Cerebral Angiogram for Implantation of SEEG in Intractable Epilepsy Patients

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Introduction

In 1950 ’s, Talarach and Bancaud introduced the technique of stereotactic implanted EEG (SEEG) electrodes for evaluation of medically refractory epilepsy. Nowadays, SEEG is a well-established and efficient methodology in the diagnosis and treatment of focal epilepsy. The most feared complication is an intra-cerebral hemorrhagic event due to vascular injury during the insertion of depth electrodes. This study investigated the usefulness of Angio CT during implantation of SEEG electrodes.

Methods

In 12 SEEG implanted patients, 146 trajectories were inserted and analyzed. Invasive monitoring procedures using SEEG were indicated by consensus at patient management conference. Goals of implantation were (1) better anatomical delineation of the epileptogenic zone and/or (2) definition or cortical and subcortical eloquent areas.

Fifty electrodes were implanted on the left- and 96 on right-sided. All brain lobes were implanted: frontal (n=47 electrodes), insula (n=16), parietal (n=43), temporal (n=30) and occipital (n=10). Post-implantation electrode images were compared to pre-implantation planned trajectories and with pre-implantation 3D angio-CT images, digitally fused.

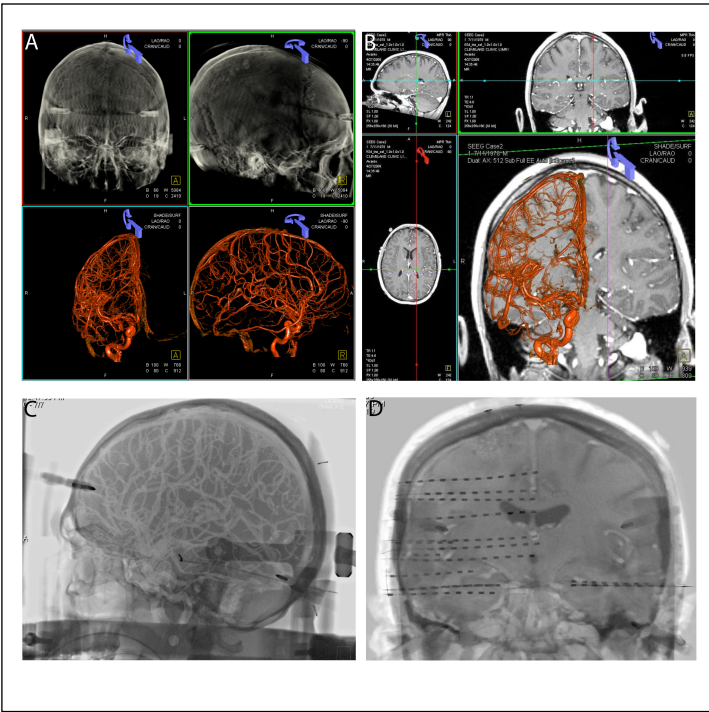


Results

Surgical planning of each trajectory was performed with matching of preoperative contrast enhanced MRI, MRA and non-contrast CT. Intraoperatively each trajectory was approved by matching the intraoperative angio-CT. In case of suspected vascular collision the trajectory was changed. Such a replacement was mandatory for 27 electrodes (18%) according to the additional information gained by the live intraoperative CT angio. The mean accuracy at the entry point was at 0.88 mm ± 0.92 (range 0-2.9 mm) in the remaining electrodes, which were implanted as preoperatively intended. None of the patients developed hemorrhagic complications or other adverse events.

Conclusions

These findings underline the usefulness of intraoperative CT angio. Beyond the preoperative imaging and anatomical landmarks, respecting the detailed vasculature in each individual patient by application of intraoperative CT angio offer a complementary, live and accurate method to reach the most valuable safety.



Learning Objectives

To understand the indications of invasive monitoring in refractory focal epilepsy.

To understand the value of intraoperative angiogram in the prevention of complications in SEEG procedure.