

Introduction

For seizure focus localization, placement of depth electrodes allows for monitoring from deep structures, such as the hippocampus and insular cortex. Multiple techniques exist for placing depth electrodes, including frame-based and endoscopic methods. More recently, robotic-assisted stereotactic systems have been developed to assist with stereotactic procedures, such as biopsies, electrode implantations, and laser ablations. We have implemented the Rosa robotic stereotactic system for placing depth electrodes, which offers the advantage of eliminating the need for a bulky frame and providing more comfortable operating conditions for the surgeon. Here we report the accuracy with which we are able to place hippocampal depth electrodes using the Rosa system.

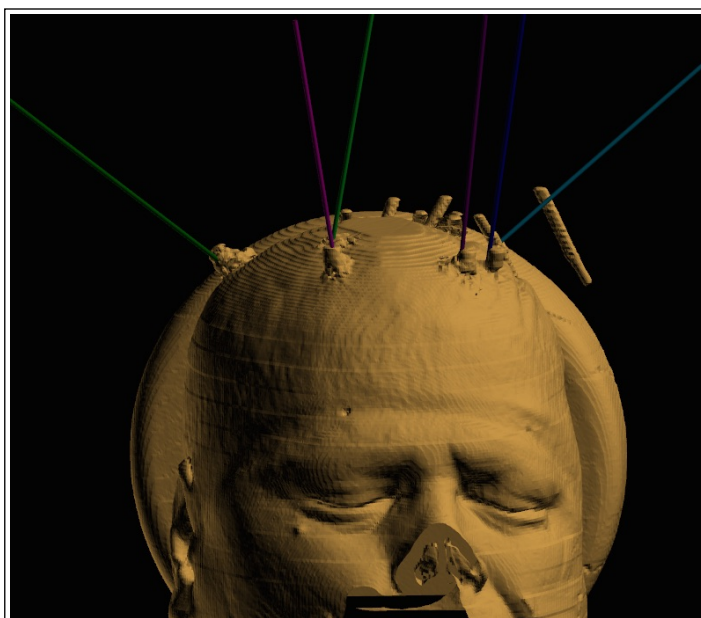


Methods

In a patient undergoing depth electrode placement for invasive epilepsy monitoring, we placed bilateral depth electrodes in the hippocampus using the Rosa system. Postoperative computed tomography (CT) was performed. The actual entry points and targets of the electrodes that were placed were compared to the entry points and targets that were selected preoperatively using the Rosa navigation software. Planned targets served as a corollary to the gold-standard, frame-based methods that have been described.

Results

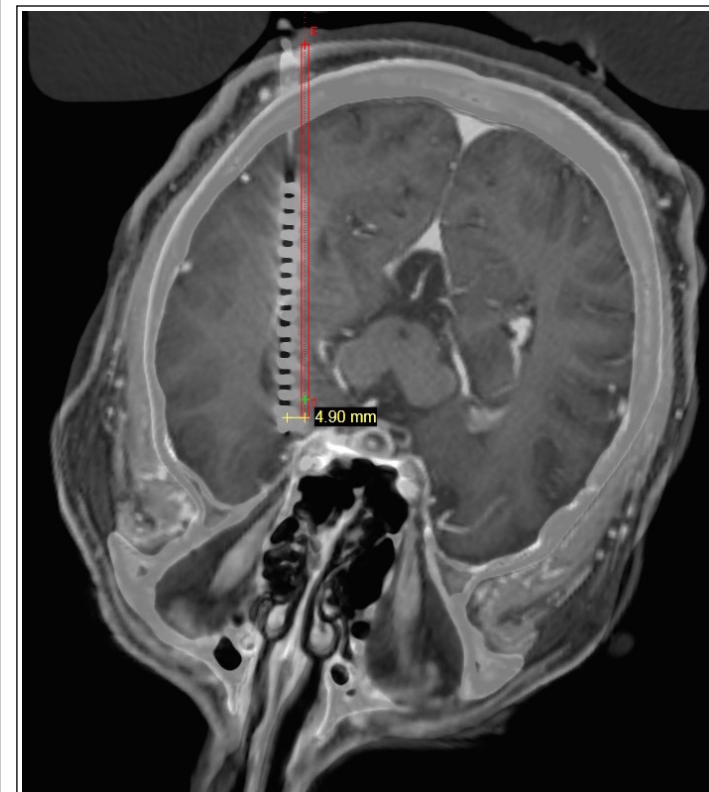
The mean average deviation from the planned entry point was 3.58 \pm 0.68 mm while the mean average deviation from the planned target was 4.40 \pm 2.08 mm. This is comparable to the accuracy that has been achieved using frame based methods.



Electrode Target Location	Deviation from Entry Point (mm)	Deviation from Target Point (mm)
Left Hippocampus	3.70	4.90
Right Hippocampus	3.84	4.34
Mean	3.77	4.62

Conclusions

The Rosa robotic stereotactic system can be used for accurate placement of depth electrodes through the long axis of the hippocampus for seizure localization in temporal lobe epilepsy. This system provides a level of accuracy that is comparable to traditional frame-based methods, with the added benefits of improved operating conditions for the surgeon. The Rosa robotic system is a novel tool that serves as an alternative to traditional frame-based stereotactic methods, and use of this system may lead to improved ease and efficiency of many stereotactic procedures.



References

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