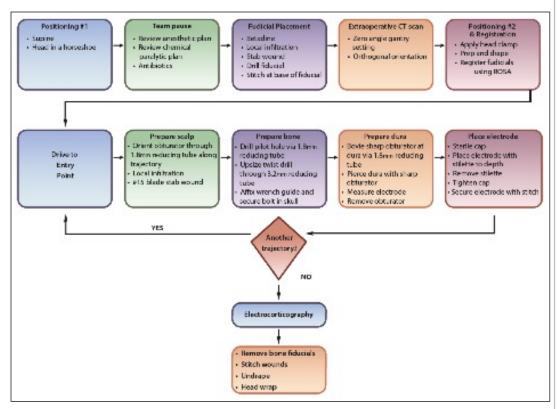


Stereotactic Laser Ablation and Stereoelectroencephalography in Infants and Toddlers: Case Series and Technical Nuances Patrick J Karas MD; Jeffrey Steven Raskin MD; Virendra Rajendrakumar Desai MD; Howard L. Weiner MD; Sandi Lam MD MBA; Daniel Curry MD Baylor College of Medicine; Texas Children's Hospital



Introduction

Stereoelectroencephalography (sEEG) followed by stereotactic laser ablation (SLA) is an innovative, minimally invasive strategy to treat refractory epilepsy developed at Texas Children's Hospital (TCH). This approach is superior with deep targets where there would be high surgical access corridor-associated morbidity. Skull bolts maintain the precise trajectory of intracranial depth electrodes and laser catheters; thus, the incompletely ossified cranium of young children poses a significant challenge for this technique. This manuscript represents the first safety assessment of this surgical technique in infants and toddlers undergoing SLA for epilepsy; this also represents the largest SLA series ever reported in this young population.



Methods

A retrospective chart review was performed for patients <36 months old undergoing sEEG or SLA at TCH from 2013-2016. Demographics, medical history, and surgical outcomes were recorded. Perioperative events and technical nuances of SLA surgery for effective execution and for complication avoidance in these children were noted.

Results

Fifteen children, 9 males and 6 females, with an average age at first surgery of 23 months underwent 26 procedures for diagnoses including hypothalamic hamartoma (n=11), focal cortical dysplasia (n=2), and tuberous sclerosis complex (n=2). Cranial fixation strategies included 6/26 (23%) in Sugita headframe, 15/26 (58%) in Mayfield CRW frame, and 5/26 (19%) horseshoe headholder. There was only one perioperative complication out of 33 electrode and 29 laser ablations (1.6%): a clinically insignificant intracranial tract hemorrhage with no resultant intervention. Hypothalamic hamartoma pathology was retreated subsequently in 6/11 (55%) cases and a third stage in 1/11 (9%).

Learning Objectives

1) Proof of concept for effective stereoelectroencephalography in infants and toddlers.

2) Stereotactic technique in infants and toddlers.

3) Proof of concept for minimally invasive laser ablation in infants and toddlers for treatment of epilepsy.

References

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Conclusions

We demonstrate safety of our nuanced cranial fixation methods for sEEG and SLA as applied to children less than 3 years of age, who have incompletely ossified and thin skull bone. More than half of hypothalamic hamartoma patients had subsequent SLA surgery in staged fashion, underscoring the iterative approach to this minimally invasive surgery technique.