

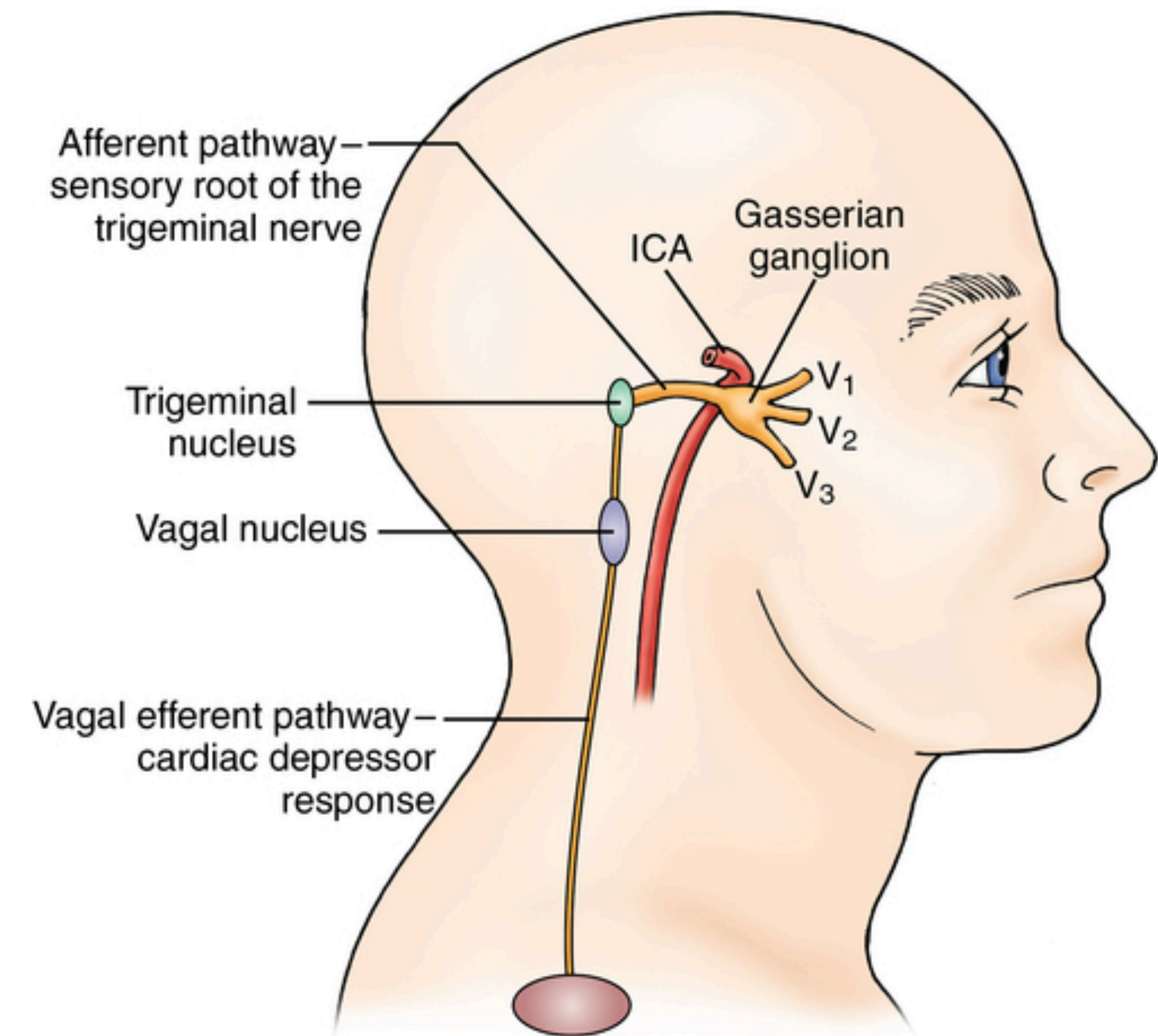
# Intraoperative management of a patient with multiple episodes of asystole during epilepsy surgery due to trigeminal cardiac reflex

Sara Richards MD<sup>1</sup>, Gail Shibata MD<sup>1,2</sup>, Kathryn Rouine-Rapp MD<sup>1</sup>

<sup>1</sup>Department of Anesthesiology and Perioperative Care, <sup>2</sup>Division of Pediatric Anesthesiology

## Introduction

- Trigeminal cardiac reflex (TCR) can lead to a sudden decrease in HR, BP, and arrhythmias.<sup>1</sup> Cardiac arrest is rare.<sup>2</sup>
- Advanced life support interventions of CPR and defibrillation are challenging in patients who undergo neurosurgery due to positioning, exposure, and skull pin fixation.<sup>3</sup>
- We describe the intraoperative management of an 11-year-old boy with medically refractory epilepsy undergoing craniotomy for cortical resection, who had two episodes of asystole during dura penetration due to TCR.

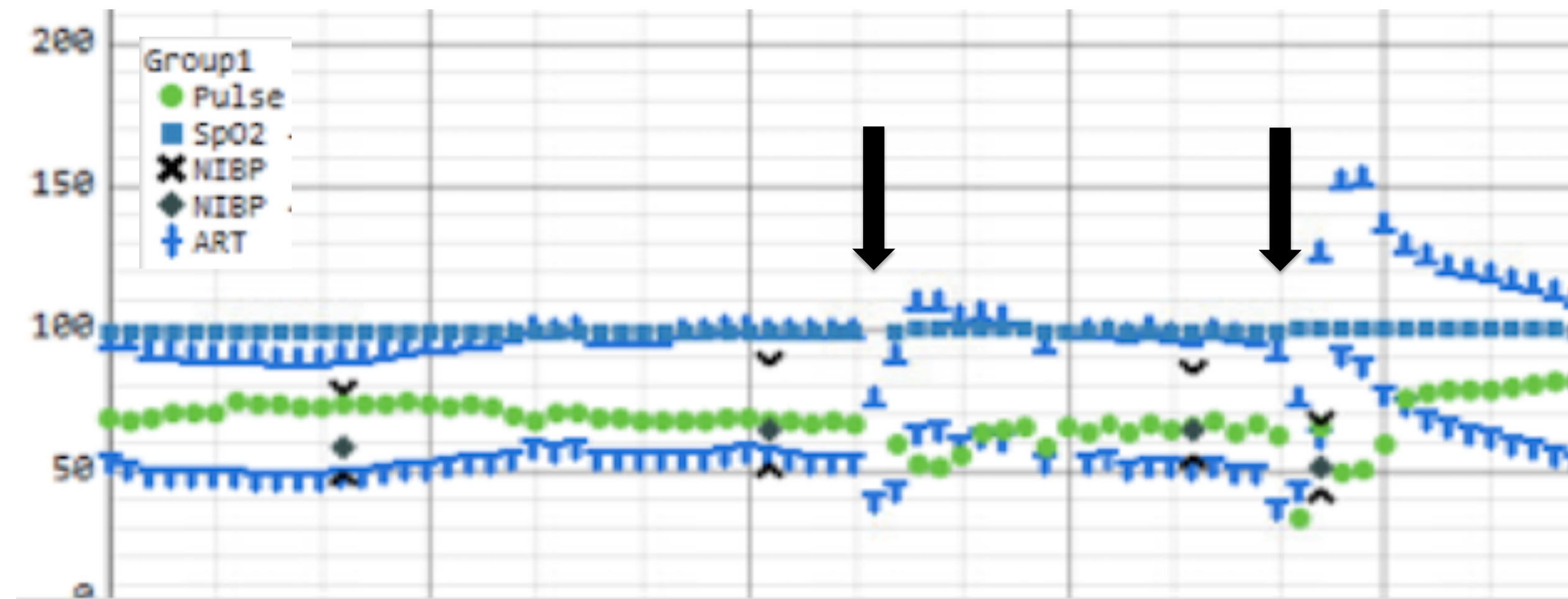


**Figure 1. The sensation of the supratentorial dura mater is supplied by meningeal branches of the trigeminal nerve (V1, V2, and V3). The TCR afferent arc is carried by the trigeminal nucleus which synapses in the medulla with the vagal nucleus. The vagus nerve carries the efferent arc of the TCR to the heart, leading to decreased output of the sinoatrial node, which can cause bradycardia and asystole. (Murray, 2015)<sup>4</sup>**

## Case Report

### First Craniotomy

- Patient was positioned prone with cranium in pins.
- Burr-hole penetration of the dura provoked two bradycardic events leading to asystole.
- Asystole was treated effectively with epinephrine.
- Surgery was aborted.



**Figure 2. Electronic medical record from first craniotomy showing two bradycardic events. Asystole was not fully captured due to short duration with treatment.**

*Given ongoing seizures, a multidisciplinary team formulated a perioperative plan for repeat surgery that was approved by the patient's parents.*

### Outpatient Preoperative Workup

- ECG and TTE normal
- Holter monitoring unremarkable

### Intraoperative Plan

- Treat episodes of intraoperative bradycardia with backup pacing utilizing both transcutaneous and transesophageal atrial pacing (TEAP). If unable to obtain pacing capture with TEAP before surgery begins, place a transvenous pacing electrode catheter.
- Position patient lateral (instead of prone) in case CPR becomes necessary.

### Second Craniotomy

- Patient was positioned laterally with cranium in pins.
- Transcutaneous cardiac pacing pads were placed, but testing resulted in unacceptable body movements while in pins.
- A TEAP probe was inserted using change in ECG P-wave morphology and pacing capture to confirm successful placement.



**Figure 3. Patient positioned laterally in pins for second craniotomy. Transesophageal atrial pacing probe is inserted via the left nare. Transcutaneous pacing pads are visible on the chest, but were not used due to unacceptable body movement.**

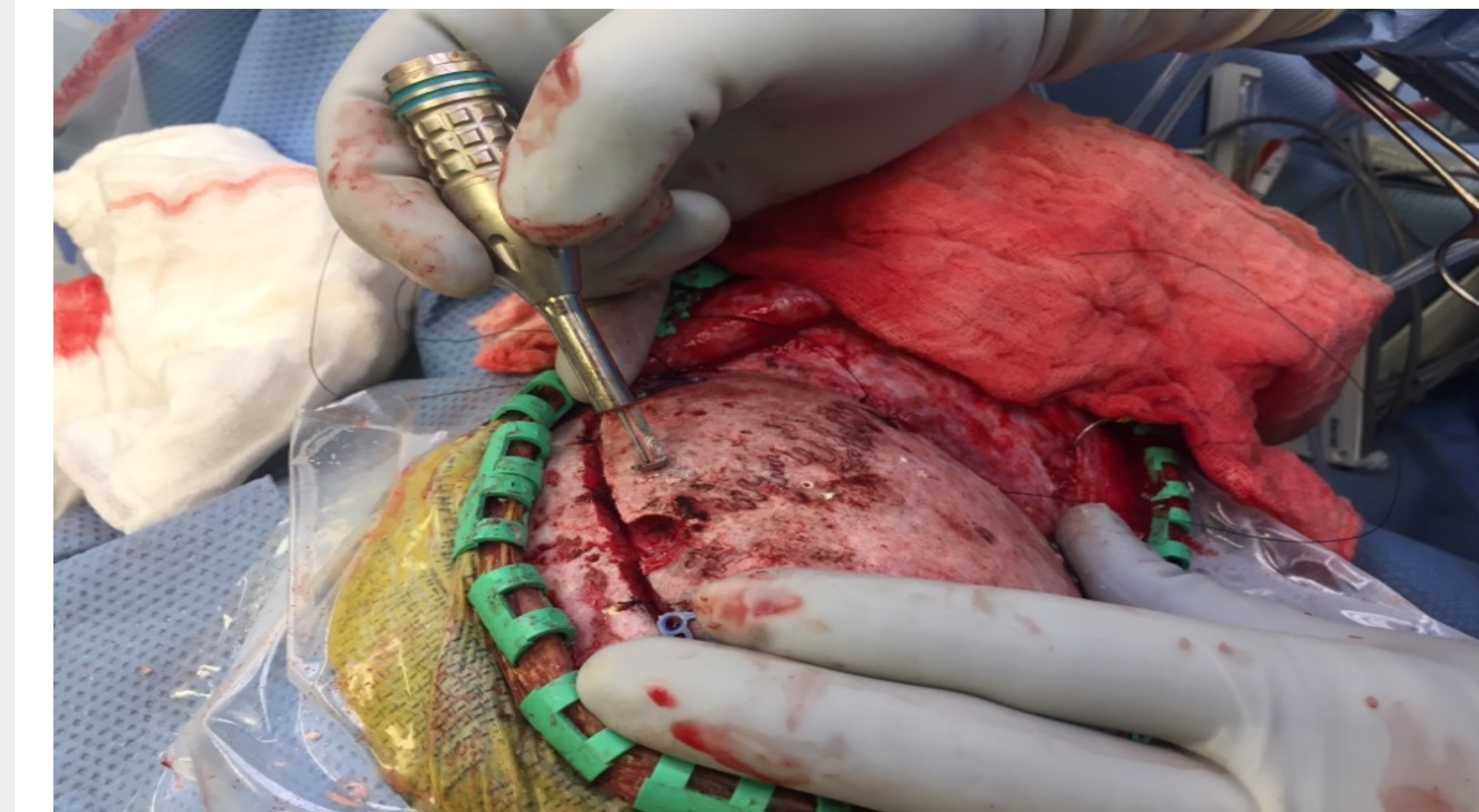
- Intraoperatively the patient had three episodes of bradycardia treated successfully with anticholinergic medication. No episodes of hypotension or asystole. No transesophageal pacing was necessary.
- Surgical resection of the epileptic focus was completed.

### Postop

- At his three-month follow-up, the patient remained seizure-free.

## Discussion

- TEAP is a less invasive alternative to transvenous pacing. During electrophysiologic studies, success of TEAP is 93%.<sup>5</sup>
- Contact between the anterior esophagus and left atrium is necessary for effective atrial stimulation and may limit its use.



**Figure 4. Surgeon pointing to burr hole site of dura penetration that provoked asystole due to TCR.**

## Conclusion

- Elective neurosurgery may be feasible in pediatric patients with life-threatening TCR with careful preoperative planning and alternative intraoperative management such as patient positioning and TEAP.

## References

1. Arasho, B, et al. Neurology India, 2009, 375-380.
2. Spiriev, T, et al. Journal of Medical Case Reports, 2012, 6:372.
3. Chowdhury, T, et al. BioMed Research International, 2015, 10:1155.
4. Murray M, et al. Figure 38-1. In: Faust's Anesthesiology Review. 4th ed. Elsevier, 2015, p. 84.
5. Akin A, et al. Pacing Clin Electrophysiol, 2014, 1002-8.