

Intraoperative seizures during redo cranioplasty for sinking skin flap syndrome- Role of BIS™ monitor in detection

Sir,

Sinking skin flap syndrome (SSFS) is an entity known to occur in conjunction with postdecompressive craniectomy with patient manifesting constellation of various neurological symptoms including seizures.^[1] Cranioplasty is the mainstay of treatment by having positive effect on the cerebrospinal fluid dynamics. We present a case of intraoperative clinically evident seizures in a patient of SSFS undergoing redo cranioplasty with prosthetic acrylic bone flap. Seizures were successfully detected by the increased value and spike pattern on the BIS™ monitor (BIS™, Medtronic, Covidien, USA).

A 27-year-old, 70 kg male, closed head injury patient, postcranioplasty status, was scheduled for the redo cranioplasty owing to a gap appearing all around the cranioplasty site which started to sink leading to a depression around the margins of the flap [Figure 1]. The patient deteriorated neurologically with no history of seizures at any point of time. Diagnosed as SSFS, a redo cranioplasty was planned with a prosthetic acrylic flap. The patient accepted in American Society of Anesthesiologists Grade III under general anesthesia. Tablet phenytoin was continued till the morning of surgery. In operation theater, standard monitoring done including BIS™ monitor. Anesthesia induced intravenously with fentanyl 100 µg, thiopentone 300 mg, and airway secured with size 8.0 endotracheal tube following vecuronium 7 mg intravenous (IV). Maintenance with sevoflurane, air and oxygen keeping the minimum alveolar concentration between 1 and 1.2. Intraoperative vitals were stable. While the surgical site was being cleaned and draped, curare cleft appeared on monitor after 15 min with a BIS value of 56. Maintenance

dose of vecuronium was administered. On raising the skin flap with gentle separation of the underlying layer of the subcutaneous tissue, the patient had jerking movements of the entire body mimicking generalized tonic-clonic seizures with the BIS value reaching >70 with spike pattern. A bolus of thiopentone (50 mg IV) and midazolam (2 mg IV) was administered which controlled the seizures and BIS value returned to 56. Maintenance dose of phenytoin 200 mg IV was given as infusion. Repeated doses of vecuronium were required every 10-15 min. There was neither hemodynamic compromise nor desaturation during seizure. However, seizures restarted after 5 min, BIS values increased to 78, and a bolus of propofol 50 mg IV was administered. Seizures continued, propofol infusion (30 µg/kg/min) was started [Figure 2]. Adequate depth of anesthesia was maintained, targeting BIS values between 45 and 50. Arterial blood gas analysis was within normal limits including serum electrolytes and random blood sugar (90 mg/dl). Surgery resumed once the seizures were controlled with propofol infusion (50 µg/kg/min). Postoperatively, the patient shifted to the Intensive Care Unit on ventilator and the arterial blood gas was normal. Postoperative computed tomography scan did not reveal any collection or midline shift. Extubation done the next morning after tapering the propofol infusion and the maintenance dose of phenytoin continued.

Seizure is described as an abnormal electrical activity in the brain which can manifest clinically as convulsion, sometimes with few physical signs, disturbance of the thought, or combination of symptoms. It can occur during focal brain insults most likely in posthead trauma, stroke, brain tumors, and intracranial infections. There are few reports of intraoperative seizures under anesthesia.^[2,3]



Figure 1: Pre operative CT Scan Head revealing Sunken Bony Flap with midline shift

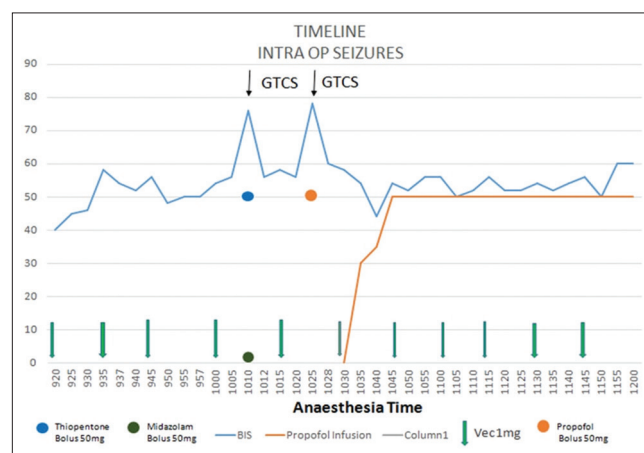


Figure 2: Timeline of BIS index correlating with Seizure and drug administration

During surgery, while raising the flap, underlying gliosis, epidural adhesions, and mechanical injury with the movement of the brain triggered the intraoperative seizures. Howe *et al.* reviewed 400 cases of craniotomy under general anesthesia with continuous electroencephalogram (EEG) and found only 0.5% cases had intraoperative seizures indicating toward its rarity and poor yield of EEG in detecting convulsions.^[3] Literature shows BIS™ monitor being successful in detecting both the clinical and subclinical seizures showing marked fluctuation in the waveform and a varied pattern.^[2] During seizures, signal quality index in our case remained between 80 and 85 ruling out any electrical and signal interference which could have affected the value on BIS monitor.

Clinically evident seizure despite neuromuscular blockade in our case explains the resistance to vecuronium due to chronic phenytoin therapy. Resistance increased in the presence of the neurological deficit like hemiparesis due to upregulation of the extrajunctional receptors making them resistant to nondepolarizing agents.^[4,5] Therefore, the judicious use of neuromuscular monitoring in cases of neurotrauma with hemiparesis will help in titration of the doses of neuromuscular blockers.

To conclude, BIS monitoring cannot substitute formal EEG but in its nonavailability can be utilized as a surrogate device detecting the intraoperative seizures.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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Access this article online	
Website: www.saudija.org	Quick Response Code 
DOI: 10.4103/sja.SJA_44_17	

How to cite this article: Dwivedi D, Bhatnagar V, Kiran S, Ray A. Intraoperative seizures during redo cranioplasty for sinking skin flap syndrome- Role of BIS™ monitor in detection. *Saudi J Anaesth* 2017;11:359-60.

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