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Case Report

# Pediatric awake craniotomy for seizure focus resection with dexmedetomidine sedation—a case report☆

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**Abstract** Resection of lesions near the eloquent cortex of brain necessitates awake craniotomy to reduce the risk of permanent neurologic deficits during surgery. There are limited reports of anesthetic management of awake craniotomy in pediatric patients. This report is on use of dexmedetomidine sedation for awake craniotomy in a 11-year-old child, without any airway adjuncts throughout the procedure. Dexmedetomidine infusion administered at a dosage of 0.2 to 0.7 μg $kg^{-1}$ $h^{-1}$ provided adequate sedation for the entire procedure. There were no untoward incidents or any interference with electrocorticography, intraoperative stimulation, and functional mapping. Adequate preoperative visits and counseling of patient and parents regarding course and nature of events along with well-planned intraoperative management are of utmost importance in a pediatric age group for successful intraoperative awake craniotomy.


Awake craniotomy for resection of lesions near the eloquent cortex of brain is necessary to reduce the risk of permanent neurologic deficits during surgery. The success of the surgery and intraoperative electrical stimulation and functional mapping depends on careful selection of anesthetic plan to allow for safe and smooth transition between the stages not requiring patient participation and those that require full cooperation and alertness. This is more challenging in pediatric population considering the level of anxiety and depth of understanding of the procedure [1]. There are limited reports of anesthetic management of awake craniotomies in pediatric patients, with airway devices being used during asleep phase of the anesthetic plan [1–3]. Our report is on use of dexmedetomidine in awake seizure focus excision in a pediatric patient, without airway adjuncts. Although there is one report on use of dexmedetomidine for entire case in adolescents [4], to date it is not reported in a pediatric age group.

## 1. Case report

Informed consent was obtained from the parents for submission. A 11-year-old boy weighing 44 kg presented with medically refractory complex partial seizures and was on 5 antiepileptic drugs for this. His preoperative magnetic resonance imaging (MRI) showed a high parietal scar in right post central gyrus with gliosis. The scar formation was due to cerebral venous thrombosis and parietal hematoma secondary to pyogenic meningitis at the age of 3 months. Electroencephalogram

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(EEG) revealed right parietal temporal slowing with interictal epileptiform abnormalities and multiple clinical seizures from the same area. Functional MRI showed right-hand motor functions localized to the primary motor cortex, and sensory functional MRI (touch and numerical) showed localization to inferior aspect of the sensory cortex behind the parietal gliotic tissue. After epilepsy management committee meeting and extensive counseling of the patient and family by neurologist, neurosurgeon, neuropsychologist, and neuroanesthesiologist, it was decided that awake right frontoparietal craniotomy and excision of right parietal scar excision were the best option to minimize neurologic deficit. The patient was clinically healthy, and investigations of complete blood count and coagulation profile were within normal limits.

The patient was kept fasting for 8 hours preoperatively and did not receive any premedication. In the operating room, peripheral venous access was secured and monitoring with electrocardiogram, noninvasive blood pressure, axillary temperature, and pulse oximetry was started. Intravenous pantoprazole 40 mg, ondansetron 4 mg, and antibiotic prophylaxis were given. Oxygen supplementation was given through nasal prongs at 3 L/min and end-tidal carbon dioxide ($E_{TCO_2}$) monitoring done via female luer connector attached near nasal prongs. A microphone was attached near the mouth for communication purpose and all devices were secured with adhesive tape (Fig. 1). The adequacy of ventilation was assessed by respiration, $E_{TCO_2}$, and intermittent arterial $pCO_2$. Appropriate size oropharyngeal and nasopharyngeal airways, laryngeal mask airway (LMA), endotracheal tubes, and difficult airway trolley were available by the side of the patient for possible airway manipulation. Propofol, midazolam, and phenytoin were kept ready as well as cold saline in surgical tray to treat the occurrence of any seizures.

Dexmedetomidine infusion was started at 0.7 $\mu g\ kg^{-1}\ h^{-1}$. Fentanyl 50 μg and propofol 60 mg were given, and second peripheral intravenous cannula, arterial line, and urinary catheter were inserted. Scalp nerves were blocked with a mixture of local anesthetics containing bupivacaine 0.25% and lignocaine 1% with adrenaline (1:400,000). A total of 30 mL was required to anesthetize the whole scalp. After 20 minutes, the patient was positioned and Mayfield head clamp was applied after pin site infiltration with lignocaine 1% with adrenaline (1:400,000). After this, dexmedetomidine infusion was maintained between 0.2 and 0.7 $\mu g\ kg^{-1}\ h^{-1}$ throughout the surgery titrated to a Modified Ramsay Sedation Score (RSS) [5] of 2 to 3. Scalp flap and motor cortex were marked using Sonowand Invite (Sonowand, Norway) navigation. Skin incision site was infiltrated with inj. lignocaine 1% with adrenaline (1:400,000). Right frontoparietal paramedian craniotomy was done. Dura was infiltrated before opening with preservative-free lignocaine 2% solution and fentanyl 50 μg intravenous was repeated. Dexmedetomidine infusion was tapered and continued at 0.2 $\mu g\ kg^{-1}\ h^{-1}$ after dural opening.

After detection of seizure discharges by electrocorticography (ECoG), the patient was prepared for cortical mapping and stimulation. Motor cortex, hand, leg, and face areas were mapped. Gliotic area was resected with constant monitoring of motor power and sensation of left upper and lower limbs. The patient was pain-free and cooperated promptly for the functional assessment, and duration of awake (RSS 2) phase was 4 hours 30 minutes. Post–resection ECoG showed no further seizures and the neurologic testing showed a normal result. At dural closure, dexmedetomidine infusion was increased to 0.7 $\mu g\ kg^{-1}\ h^{-1}$, and bolus of fentanyl 50 μg and propofol 50 mg were given (RSS 4). The infusion was stopped during skin closure. The entire procedure lasted for 7 hours, and the patient tolerated it well without any untoward incidents. No significant hemodynamic changes were observed throughout the procedure and respiratory rate maintained between 11 and 18/min. At the end of the procedure, the patient helped himself onto the intensive care bed. He was discharged home on the second postoperative day.

**Fig. 1** The patient positioned comfortably for awake craniotomy with adequate access below drapes. Nasal prongs, $E_{TCO_2}$ connector, and microphone were secured with adhesive tapes.