Conscious sedation for epilepsy surgery

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Despite advancement in medical treatment of epilepsy, quite a large number of patients remain intractable to drug therapy or its side-effects are unacceptable. In such situations, surgical management is looked upon as an alternative, especially when epileptic focus can be localized. Conscious sedation for seizure surgery is indicated, when the pathology is in close proximity to eloquent cortical areas (motor, language or memory) of the brain. General anesthesia can suppress seizure foci. Conscious sedation provides intra-operative functional mapping and neurocognitive testing of the eloquent cortical areas, as well as resection of ictal focus, by avoiding anesthetic related suppression of seizure focus.

An 18-year-old male, weighing 50 kg, presented with multiple episodes of seizures (1-2 episode/month) since 7 years of age, in the form of generalized tonic-clonic movements and loss of consciousness. His magnetic resonance imaging (MRI) showed a well-defined lesion, hypointense on T1 and hyperintense on T2, with suppressed fluid-attenuated inversion recovery study in the left anterior temporal region. Functional MRI revealed involvement of the speech area. Video electroencephalography showed ictal origin from left anterior temporal region. He was diagnosed as left temporal dysembryoplastic neuroepithelial tumor with seizures and was treated with clobazam and phenytoin. Left temporo-parietal awake craniotomy with excision of lesion under electro-corticographic (ECoG) guidance was planned. The anesthetic and surgical procedures were explained to the patient, with emphasis on the co-operation during the surgical exercise and evaluation.

During the procedure, monitoring included: Electrocardiogram, SpO2, capnogram, input/output, invasive blood pressure, central venous pressure and ECoG. Patient was premedicated with ondansetron, glycopyrrolate and fentanyl (1 µg/kg) IV. Scalp block with bupivacaine 0.5%, 15 cc and lignocaine 2%, 15 cc was given 15 min prior to surgery. Patient was positioned appropriately. During head pin insertion, he was sedated with 20 mg of propofol. Oxygen was administered through nasal prongs at 2l/min. Conscious sedation was maintained using infusion of propofol (2 mg/kg/min), fentanyl (0.012 ug/kg/h) and dexmedetomidine (0.02 ug/kg/h) and, titrated according to patient's need and level of sedation.

Mannitol (0.5 g/kg) IV, along with 20 mg of propofol was given during craniotomy. Dura was infiltrated with 1% lignocaine . Propofol infusion was stopped 20 min prior to ECoG. However, fentanyl and dexmedetomidine infusions were continued.

Intra-operative cortical mapping was carried out. The seizure focus was identified and resected, with preservation of functional areas. During tumor excision, patient's cognitive and speech function were tested with visual placards, motor tasks and by constantly talking to patient. One episode of slurring of speech was encountered, for which the surgeon was immediately alerted.

Propofol infusion was restarted after resection of the tumor. Phenytoin (8 mg/kg) IV infusion was started at the beginning of dura closure. Skin incision site was infiltrated with with bupivacaine 0.25%. Hemodynamics were stable throughout and recovery was also immediate and smooth. Duration of the surgery was 5 h.

Conscious sedation or awake sedation for craniotomy is used, when mapping of eloquent areas of brain is required, as it avoids anesthesia related interference, on location of seizure foci.[1] This requires an awake and cooperative patient during selected neurosurgical procedures such as removal of lesions involving Broca's and Wernicke's speech areas or vascular lesions in or near other eloquent areas.[2] Different anesthetic regimens, ranging from sedation to consciuous sedation to general anaesthesia, with an awake intraoperative phase, have been recommended.[3]

Various techniques employed for awake craniotomy are:
1. The asleep-awake-asleep technique (AAA)
2. The asleep-awake technique

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Table 1: Dosing guidelines for awake craniotomy[6]

Drug	Intermittent boluses (ug/kg)		Continuous infusion (ug/kg/min) (maintenance)
	Initial	Supplemental	
Droperidol	15-40	15	
Propofol	300-500	300	25-75
Fentanyl	0.7	0.35	0.01
Sufentanil	0.075	0.035	0.0015
Alfentanil	7.5	3.5	0.5
Remifentanil[7]	0.5-2/min	0.05-0.1/min	0.01-0.04
Dexmedetomidine[7]			0.2-0.5/h

3. Monitored anesthesia care/conscious sedation.

Sarang and Dinsmore[4] retrospectively examined three anesthesia techniques. All these techniques guaranteed reasonable patient comfort and satisfaction, but the deep sedation they produce, can jeopardize the benefits of the functional intra-operative testing.

Short-acting, easily titratable agents are preferred. The combination of propofol and remifentanil is often selected.[5] Background infusion of propofol provides excellent sedation. There is no advantage of remifentanil over longer-acting opioids.

Use of dexmedetomidine, a highly selective α_2 adrenoceptor agonist, for conscious sedation, is popular. Properties include sedation, analgesia and a demonstrable anesthetic sparing effect without respiratory depression. Low-dose infusion of this drug provides sedation that can be easily reversed with verbal stimulation. It does not interfere with intra-operative ECoG, cortical mapping or neurocognitive testing.[8] Side-effects of dexmedetomidine include hypotension and bradycardia.The standard doses of sedation for various drugs is tabulated [Table 1].

Propofol infusion was discontinued 20 min prior to ECoG to avoid suppression of interictal spike activity.[9] The patient was fully conscious during resection, the surgery was uneventful.

We conclude that proper patient selection, winning the confidence of patient during pre-anesthesia checkup , good scalp block and providing psychological support during surgery, are the prerequisites for the success of awake craniotomy.

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