

Noise during bone drilling – An unaddressed patient concern during awake craniotomy

Awake craniotomy offers the benefit of preserving postoperative neurologic function in lesions of eloquent cortex in patients presenting for neurosurgery.^[1] Gliomas (low grade and high grade), arteriovenous malformations, and mapping extratemporal seizure foci close to eloquent areas in epilepsy surgery are the well-established indications for this procedure. The reported incidence of complications in this procedure is up to 20% with seizures and respiratory distress being the most common ones.^[2] Other challenges such as hypertension, somnolence, agitation, shivering, tight brain, oxygen desaturation, and coughing can also be frequently encountered. The contraindications to awake craniotomy include patient refusal, claustrophobia, morbid obesity, obstructive sleep apnea syndrome, long-term cognitive disorders, and lack of patient co-operation. Clinical assessment of speech and lateralized motor functions, a standard of practice in awake craniotomy, have been supplemented by intraoperative motor cortex mapping using direct cortical stimulation motor evoked potentials (MEP).^[3] Despite a strict inclusion criteria for patient selection to this procedure, there are multiple hurdles involved in the conduct of awake craniotomy. We describe here the successful mitigation of noise perceived by a patient during awake craniotomy and present our technique as a novel method to tide over similar crossroads.

A 40-year-old male patient (the American Society of Anesthesiologists physical status 1) with history of seizures for the previous 10 years and who harbored a low-grade glioma of the right temporoparietal cortex was scheduled to undergo awake craniotomy for resection of the brain tumor. In the operating room, the patient received monitored anesthesia care with intravenous (IV) dexmedetomidine^[4] sedation titrated to a bispectral index (BIS) of 60–80. After a loading dose of IV dexmedetomidine 1 mcg/kg/h over 10 min, the patient received bilateral scalp block using equal volumes of injection 2% lignocaine with 1 in 200,000 adrenaline and injection 0.5% plain bupivacaine. Subsequent application of Mayfield pins for head fixation for the surgical procedure was pain free and without any hemodynamic alterations which heralded a successful scalp block. Sedation was maintained with infusion of IV dexmedetomidine at a maintenance dose of 0.5–0.7 mcg/kg/h, titrated according to BIS values (60–80). The patient remained well sedated until bone drilling for craniotomy during when he complained of

intense noise within the ear. On subsequent questioning, we confirmed that the patient was pain free. To tide over the crisis-situation, we attached the headphones of the patient's own mobile phone and played him some music there from. With this, the patient could better tolerate the noise of the bone drilling, and the subsequent duration of craniotomy. Further, lesionectomy was carried out, with sedation withheld and BIS maintained between 80 and 100 for eloquent motor cortex mapping using guided commands on limb movements; and direct cortical MEP recording with the current strength varying from 2 mA to 10 mA. The duration of the entire surgical procedure was 4 h and no intraoperative complications occurred.

Postoperatively after 24 h, we assessed the patient's satisfaction to the awake craniotomy using the Wessex neurological questionnaire.^[5] We could recognize that the noise of bone drilling was the most distressing intraoperative event the patient faced.

Regional anesthesia using scalp block is the core component in successful conduct of awake craniotomy. The scalp block anesthetizes the sensory distribution of relevant territories of trigeminal nerve and cervical plexus. Noise of temporal bone drilling during craniotomy is directly conducted through the bone. Providing ear plugs to the patient can reduce the perception of operating room noise during procedures under regional anesthesia, whereas this is of little benefit in awake craniotomy. Hence, ear plugs on the external auditory canal offer little benefit in mitigating it. This need be viewed on as a patient concern which is altogether different from the noise pollution that happens in operating room due to equipment such as electrocautery and surgical drills. The patient perception of noise during awake craniotomy and subsequent patient movement due to un-cooperation is a critical concern which can altogether hamper the conduct of the procedure itself. Such patient distresses can be wrongly presumed as pain during procedure. Unless carefully addressed this can result in unnecessary boluses of further sedatives being administered and occasionally conversion to general anesthesia. Asleep-awake-asleep technique^[1,4] is an alternative to prevent patient perception of noise during awake craniotomy, though complications of airway instrumentation in the limited "working space" available is a concern. Preoperative familiarization of patient to the working noise inside the OR can also be

helpful albeit this should not aggravate patient anxiety. Minimizing staff movement inside the OR with display boards indicating “Awake Craniotomy – Discretion Please” is also a measure that enhances patient comfort while awake. We suggest that preoperative focused patient counseling and intraoperative patient listening to relaxing music of his own interest with head phones, as a simple yet novel approach to trouble shoot patient distress during awake craniotomy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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