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Case Report

Anaesthesia for awake craniotomy with the use of dexmedetomidine in combination with propofol infusion and ProSeal laryngeal mask airway

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Abstract

Abstract: Awake craniotomy for resection of tumour in the eloquent cortex aims to maximize tumour resection while sparing important areas of the brain. It poses several challenges to an anaesthesiologist. The goal is to provide adequate sedation, analgesia, and respiratory and haemodynamic control, but also an awake and cooperative patient for neurological testing. Here we report a case of awake craniotomy conducted safely with asleep-awake-asleep technique using dexmedetomidine infusion, scalp block and controlled ventilation with ProSeal laryngeal mask airway.

Keywords: combined anesthetics; craniotomy; dexmedetomidine; laryngeal mask airway.

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Introduction

Awake craniotomy is increasingly been used for resection of tumours located in the eloquent cortex. Intraoperative neurological testing allows optimal tumour resection with minimal postoperative neurological dysfunction.[1] There is growing evidence of improved survival benefit with this technique due to near total removal of tumour.[2] Other advantages are shorter hospitalization time, reduced cost and decreased postoperative complications like nausea and vomiting. The challenge for the anaesthesiologist is to provide adequate sedation, analgesia, and respiratory and haemodynamic control, but also an awake and cooperative patient for neurological testing.[1]

Use of various anaesthetic techniques and various agents has been described. We report a case of awake craniotomy successfully performed using asleep-awake-asleep technique facilitated by use of dexmedetomidine infusion and ProSeal laryngeal mask airway (LMA) for resection of right parietal lobe tumour adjacent to sensory cortex.

Case Report

A 41 years old lady, weighing 50 kilograms, presented with the history of frontal headache since 18 months which was progressive in nature and associated with vomiting. She had two episodes of abnormal movement of left half of body, the last episode being nine months back. She was on Carbamazepine 200 mg orally twice daily. She had no significant co-morbid conditions. Her neurological examination was normal with no neurological deficits. CT of head revealed mass lesion in right parietal lobe adjacent to sensory cortex. Magnetic resonance imaging (MRI) revealed similar findings (Figure 1).

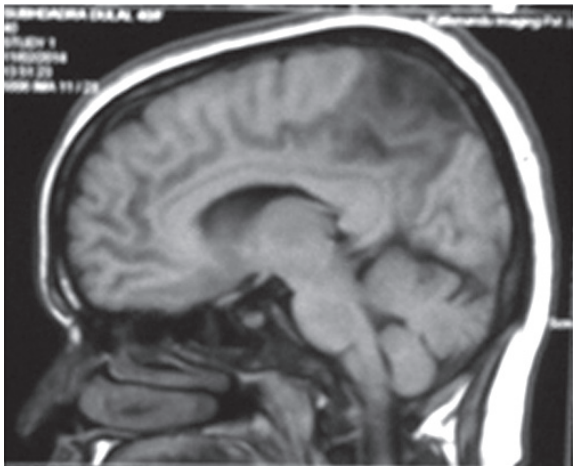

Figure 1: Magnetic resonance imaging of head showing mass lesion

During the pre-anaesthetic evaluation, contraindications for awake craniotomy like obesity, obstructive sleep apnea (OSA), gastro-esophageal reflux disease, altered mental status, communication barrier and extreme anxiety were ruled out. STOP-Bang questionnaire was used as a screening tool for OSA. She had the score of zero. Rapport building was done and the patient was well explained about the intraoperative plan including the neurological testing. Patient was motivated for the planned procedure.

In the operating room, patient was premedicated with Glycopyrrolate 0.2 mg iv and Metoclopramide 10 mg iv. Benzodiazepines were avoided. Right radial artery was cannulated for invasive arterial blood pressure monitoring. Dexmedetomidine 1 μg/kg was administered over 15 minutes followed by maintenance dose of 0.5 μg/kg/hour. Patient was induced with Propofol and Fentanyl 100 μg was administered for analgesia. ProSeal LMA size 4 was inserted and patient was ventilated with volume assisted control mode without the use of muscle relaxant. End tidal carbon dioxide tension ($EtCO_2$) of 30 to 35 mm Hg was targeted (Fig. 2). Propofol infusion at 50-100 μg/kg/minute was administered for maintenance of anaesthesia titrated to maintain bispectral index (BIS) of 50-60. Scalp block was performed using 0.25% Ropivacaine with Adrenaline 5 μg/ml. Seven nerves (supraorbital, supratrochlear, zygomaticotemporal, auriculotemporal, lesser occipital, greater occipital and greater auricular nerve) were blocked in each side using 2ml of the solution for each nerve. Additional 8 ml of solution was used for infiltration at surgical pin insertion site. Paracetamol one gram was administered to supplement intraoperative analgesia. Phenytoin one gram was administered for seizure prophylaxis. 15 minutes prior to planned neurocognitive testing, Propofol and Dexmedetomidine infusion was stopped. ProSeal LMA was removed when the patient was fully conscious. After the successful neurocognitive testing and localization of tumour, propofol and dexmedetomidine infusion was restarted and ProSeal LMA was re-inserted, with the anaesthesiologist standing at the left and towards the lower torso of the patient, without breaching the surgical site sterility. At the end of surgery, propofol and dexmedetomidine infusion was stopped, ProSeal LMA was removed. Patient remained haemodynamically stable during surgery. There was no hypercarbia and brain relaxation was adequate. Patient was fully conscious 10 minutes after removal of LMA, with no neurological deficits. Histopathological examination oligoastrocytoma grade II. Patient was discharged home on third post-operative day.

Discussion

Resection of lesions in eloquent areas of the brain represents a challenge for both surgeons and anaesthesiologists. The lesions are best resected while the patient is awake as an awake patient provides instant neurological feedback as the lesion is resected. Unfortunately, this procedure is not always well tolerated. Lack of cooperation, pain and airway obstruction is the major impediment.[3] Proper patient selection is paramount for the success. Patients with obesity, OSA, gastro-esophageal reflux disease, altered mental status, communication barrier and extreme anxiety should be excluded.[4] STOP-Bang questionnaire

is a validated tool to screen the patients for OSA in surgical patients. Score of 5-8 identifies patients with high probability of moderate/severe OSA.[5] We used it in our patient to rule out OSA.

Combination of opioid and dorperidol was traditionally used for sedation during awake craniotomy.[6] Propofol is frequently used for this purpose.[7] Dexmedetomidine is a highly selective α_2-agonist with sedative, analgesic and anaesthetic-sparing effects.[8] It does not suppress ventilation. Use of it during awake craniotomy has been shown to facilitate rapid emergence and greater control of anaesthetic depth, allowing the use of lower dose of other anaesthetics.[3] So we used this agent in our patient. Patient was pain free during the awake phase and was haemodynamically stable throughout the procedure. Titration of anaesthetic agent was guided by monitoring of BIS.

We used ropivacaine with adrenaline for scalp block as it was shown to be safe and effective.[9] Asleep-awake-asleep technique with the use of total intravenous anaesthesia with ventilation controlled using LMA was associated with fewest complications and no hypercapnia when compared with technique without the use of LMA or when spontaneous ventilation was permitted with the use of LMA.[1] So we controlled the ventilation using LMA. ProSeal LMA provides more effective ventilation than classic LMA during positive pressure ventilation.[10] So we chose ProSeal LMA in our patient.

To conclude, awake craniotomy with asleep-awake-asleep technique, using dexmedetomidine, combined with propofol infusion, scalp block and controlled ventilation with ProSeal LMA can be safe and effective.

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Conflict of interest: none

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