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ORIGINAL ARTICLE

A RETROSPECTIVE STUDY OF 26 CASES OF ANAESTHESIA FOR AWAKE CRANIOTOMY

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ABSTRACT:
Background: Awake craniotomy is performed for localization and resection of epileptic focus or for resection of tumours located near the eloquent areas of brain. This study was carried out to record the cases and complications occurred in awake craniotomy in 5 years. **Materials & Methods:** This study was conducted in the department of anesthesia in year 2010-2015. It included 26 cases of awake craniotomy over the period of 5 years. Data pertaining to pre-anaesthetic evaluation, intraoperative management, and post-operative course were collected. The pre-operative data included age, sex, weight, American Society of Anesthesiologists (ASA) physical status, airway status with Mallampati (MP) grade was also noted. Intraoperative data such as anaesthetic technique and duration of surgery was recorded. The intraoperative complications such as bradycardia, tachycardia, hypotension, and hypertension, pain, hypoxia (SpO2 ≤ 90%), tight brain, seizure, cough, and any other complications were recorded. Post-operative data such as nausea, vomiting, seizures, fever, surgical and neurological complications, progression or occurrence of new deficits, histopathological character of lesion, and duration of Intensive Care Unit and hospital stay was also recorded. **Results:** Out of 26 patients, 12 were males and 14 were females. The difference was statistical non significant (P-1) The mean age of male patients was 38±2.4 years and in females was 40±1.6 years. The mean weight in males was 60.24±3.2 Kg and in females was 56.08±1.7 Kg. The difference was statistical non significant (P > 0.05). ASA status 1 was seen in 17 patients and 2 in 9 patients. Right lesions were seen in 15 patients and left lesions were seen in 11 patients. 1 case of recuurent lesions was recorded. The mean duration of surgery was 246±12.6 minutes. ICU stay days were 2.4±1.3 days. Hospital stay days were 8±4 days. Propofol and fentanyl combination was the most commonly used anaesthetic regimen to provide MAC in 20 patients (propofol-fentanyl group). Dexmedetomidine was used for conscious sedation in 6 patients. We reported intra- operative complications such as tachycardia (1) in each group. Hypertension was the most common complication recorded with Propofol and fentanyl group while no cases was seen in dexmedetomidine group. Other complications were desaturation (2), apnea (2), movement (3), tense brain (3), shivering (2) and snoring (1) in propofol-fentanyl group. While hypotension (1), pain (1), seizures (3) and cough was seen in dexmedetomidine group. Total number of intra – operative complications such as desaturation (2), apnea (2), movement (3), tense brain (3), shivering (2) and snoring (1), hypotension (1), pain (1), seizures (3) and 6 cases of cough was seen. **Conclusion:** Conscious sedation is the technique of choice for awake craniotomy. For conscious sedations, Fentanyl, propofol, and dexmedetomidine are important agents used. Case selection should be carefully done. Appropriate use of sedatives or anesthetic agents is key to the success for awake craniotomy.
Key words: Awake craniotomy, Anaesthetic, Conscious sedation

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INTRODUCTION

There is continues debate over the advantages of regional anaesthesia versus general anaesthesia for many forms of surgery, there is an increasing number of indications in intracranial surgery for the patient to be awake during some or all of the operation. This may be a daunting prospect for the neuroanaesthetist who is inexperienced in the technique of awake craniotomy. However, with a sound anatomical knowledge of the nerve blocks and the knowledge to anticipate certain predictable

intraoperative events, this can be an extremely rewarding procedure for the neuroanaesthetist, whilst offering the patient the best possible outcome from the surgery.[1]

Awake craniotomy is performed for localization and resection of epileptic focus or for resection of tumours located near the eloquent areas of brain such as Broca's speech area, Wernicke's speech area or motor strip region. epilepsy surgery and, in particular, temporal lobectomy where the excision occasionally encroaches on the eloquent cortex (motor and speech areas). Tumour or arteriovenous malformation surgery where the lesion abuts or invades the speech, motor, sensory or visual cortex may also involve intraoperative functional testing or cortical mapping, requiring the patient to be awake.[2]

It allows intraoperative neurological testing which facilitates optimal tumour resection and minimizes post-operative neurological dysfunction. Occasionally, avoidance of general anaesthesia is advisable for medical reasons and confidence with the awake craniotomy technique allows local anaesthesia with sedation to be considered as an option. Intraoperative corticography can be used to help define the epileptic focus and to confirm the resection, but is less useful than awake functional testing to define the limits of the resection and avoid postoperative deficits.[3]

There is a growing trend towards preference of awake craniotomy as a procedure, over the last few decades. This technique brings challenges both to the neurosurgeon and anaesthesiologist. The goal of anaesthesia is not only to maintain adequate sedation, analgesia, respiratory and haemodynamic stability but also to provide an awake yet comfortable and co-operative patient for proper neurological testing.[4]

This study was carried out to record the cases and complications occurred in awake craniotomy in 5 years.

MATERIALS & METHODS

This study was conducted in the department of anesthesia in year 2010-2015. It included 26 cases of awake craniotomy over the period of 5 years. All subjects were informed regarding the study and written consent was taken. Ethical clearance was obtained from institutional ethical committee. Data pertaining to pre-anaesthetic evaluation, intraoperative management, and post-operative course were collected. The pre-operative data included age, sex, weight, American Society of Anesthesiologists (ASA) physical status, relevant history, existing neurological deficits, associated co-morbidities. Airway status with Mallampati (MP) grade was also noted. Intraoperative data such as anaesthetic technique and duration of surgery was recorded. The intraoperative complications such as bradycardia, tachycardia, hypotension, and hypertension (20% changes in baseline values), pain, hypoxia (SpO2 ≤ 90%), tight brain, seizure, cough, and any other complications were recorded. Post-operative data such as nausea, vomiting, seizures, fever, surgical and neurological complications, progression or occurrence of new deficits, histopathological character of lesion, and duration of Intensive Care Unit and hospital stay was also recorded. Results were tabulated and subjected for correct inferences. P value < 0.05 was considered significant.

RESULTS

Out of 26 patients, 12 were males and 14 were females. The difference was statistical non significant (P-1) (Table I). Table II shows that mean age of male patients was 38±2.4 years and in females was 40±1.6 years. The mean weight in males was 60.24±3.2 Kg and in females was 56.08±1.7 Kg. The difference was statistical non significant (P > 0.05). Table III shows that ASA status 1 was seen in 17 patients and 2 in 9 patients. Right lesions were seen in 15 patients and left lesions were seen in 11 patients. 1 case of recuurent lesions was recorded. The mean duration of surgery was 246±12.6 minutes. ICU stay days were 2.4±1.3 days. Hospital stay days were 8±4 days. Graph I shows that Propofol and fentanyl combination was the most commonly used anaesthetic regimen to provide MAC in 20 patients (propofol-fentanyl group). Dexmedetomidine was used for conscious sedation in 6 patients. We reported intra- operative complications such as tachycardia (1) in each group. Hypertension was the most common complication recorded with Propofol and fentanyl group while no cases was seen in dexmedetomidine group. Other complications were desaturation (2), apnea (2), movement (3), tense brain (3), shivering (2) and snoring (1) in propofol-fentanyl group. While hypotension (1), pain (1), seizures (3) and cough was seen in dexmedetomidine group. Graph II shows total number of intra – operative complications such as desaturation (2), apnea (2), movement (3), tense brain (3), shivering (2) and snoring (1), hypotension (1), pain (1), seizures (3) and 6 cases of cough was seen.

Table I Distribution of patients

Total examined - 26			
Gender	**Male**	**Female**	**P value**
Number	12	14	1

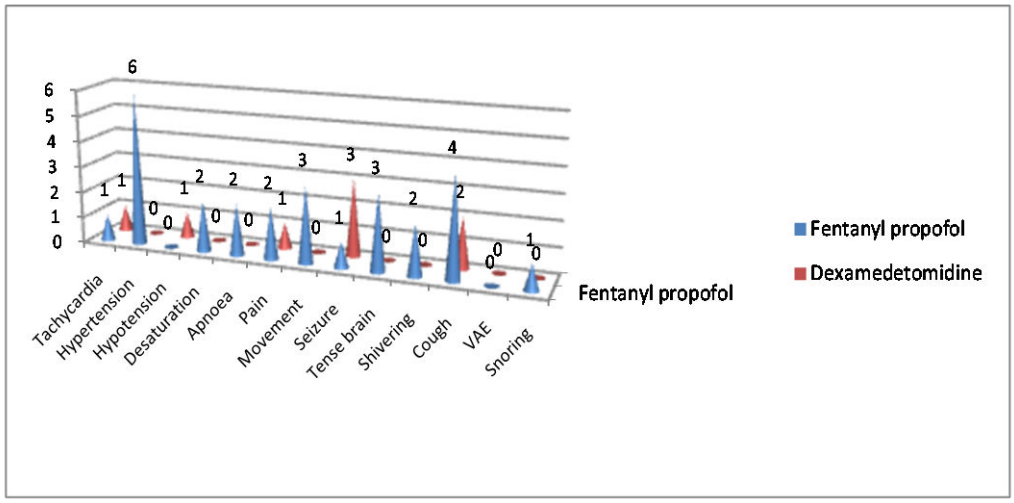
Table II Mean age and weight of patients

Gender	Male	Female	P value
Age (mean)	38±2.4 years	40±1.6 years	0.5
Weight (mean)	60.24±3.2 Kg	56.08±1.7 Kg	0.1

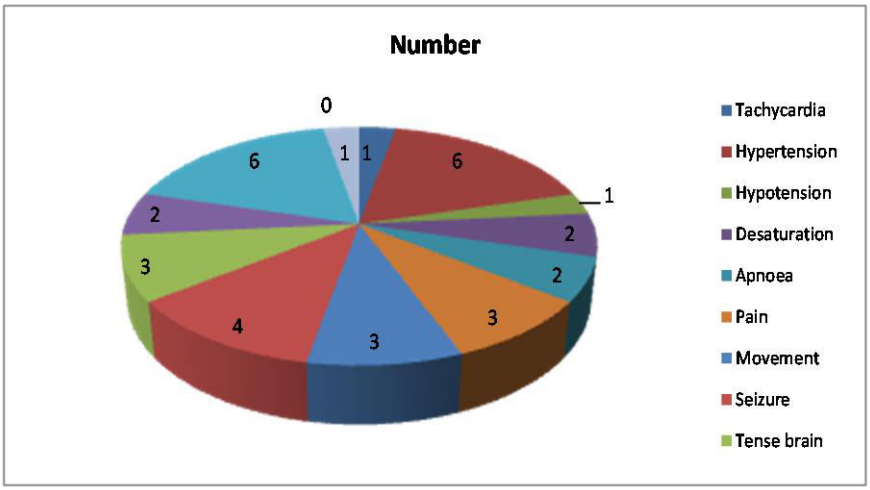
Table III Relevant data

	Number
ASA physical status	
1	17
2	9
Laterality of lesions	
Right	15
Left	11
Recurrent tumour	1
Duration of surgery (min)	246±12.6
ICU stay (days)	2.4±1.3
Hospital stay (days)	8.0±4.0

Graph I Intra-operative complications in both groups



Graph II Intra - operative complications



DISCUSSION

Patients presenting for awake craniotomy are often highly motivated and naturally eager to maximize the chance of cure and minimize the possibility of a postoperative neurological deficit. Those with epilepsy can be offered a reasonable expectation of seizure reduction or abolition and patients with an intracerebral tumour can be offered the best possible margin of resection.[5]

Anaesthesia techniques for awake craniotomy include MAC or Conscious Sedation and Asleep Awake Asleep technique (AAA). In AAA, the airway is secured with laryngeal mask airway (LMA) or endotracheal tube (ETT), and the patients are kept on spontaneous or mechanical ventilation. LMA /ETT is removed and the patient is allowed to wake up for neurological testing. In MAC, the drug may be administered by intermittent bolus, continuous infusion, target-controlled infusion, patient-controlled analgesia or a combination and the patients maintain their airway and take spontaneous breaths. The commonly used anaesthesia regimen for conscious sedation include infusion of propofol with short-acting opioids such as fentanyl or remifentanil.[6]

In present study, propofol-based sedation technique was used in 20 patients. Propofol is a short-acting sedative with easy titratability. It has antiemetic and anticonvulsant effects. It decreases cerebral oxygen consumption and reduces intracranial pressure, and does not interfere with electrocorticography (ECoG) recording if infusion is stopped 15 min before brain mapping. Airway compromise is uncommon in AAA technique but the incidences of hypertension, hypotension, and tachycardia were significantly more as compared to endotracheal anaesthesia technique.

In present study, 12 were males and 14 were females. The mean age of male patients was 38±2.4 years and in females was 40±1.6 years. The mean weight in males was 60.24±3.2 Kg and in females was 56.08±1.7 Kg. Manninen PH[7] in his study found mean age of patients as 34.02 years and weight as 48.2 Kg. We observed that ASA status 1 was seen in 17 patients and 2 in 9 patients. Khalifah[8] also found ASA status 2 in 12 patients. Maximum number of patients had right lesions seen in 15 patients and with left lesions seen in 11 patients. Soriano[9] evaluated awake craniotomy in 5 children and found that 3 had left side lesions. We found that the mean duration of surgery was 246±12.6 minutes. This is in agreement to Herrik IA et al.[10]

ICU stay days were 2.4±1.3 days. Hospital stay days were 8±4 days. Propofol and fentanyl combination was the most commonly used anaesthetic regimen to provide MAC in 20 patients (propofol-fentanyl group). Dexmedetomidine was used for conscious sedation in 6 patients. We observed total number of intra – operative complications such as desaturation (2), apnea (2), movement (3), tense brain (3), shivering (2) and snoring (1), hypotension (1), pain (1), seizures (3) and 6 cases of cough.

CONCLUSION

Conscious sedation is the technique of choice for awake craniotomy. For conscious sedations, Fentanyl, propofol, and dexmedetomidine are important agents used. Case selection should be carefully done. Appropriate use of sedatives or anaesthetic agents are key to the success for awake craniotomy.

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