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Research Article

Awake craniotomy for intracranial lesions: An audit of the anaesthetists' initial experience at the University College Hospital, Ibadan

O.K. Idowu [a], **A.O. Adeleye** [b,*], **S.D. Amanor-Boadu** [c]

[a] *Department of Anaesthesia, University College Hospital, UCH, Ibadan, Nigeria*
[b] *Division of Neurological Surgery, Department of Surgery, College of Medicine, University of Ibadan and University College Hospital, UCH, Ibadan, Nigeria*
[c] *Department of Anaesthesia, College of Medicine, University of Ibadan and University College Hospital, UCH, Ibadan, Nigeria*

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KEYWORDS

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Abstract *Background:* Awake craniotomy (AC) is an attractive 'minimally invasive' anaesthetic technique for intracranial surgical procedures. There is dearth of information on the feasibility of this technique from developing countries.

Material and methods: This is a prospective descriptive study on all the patients who had AC for intracranial surgery over a 2-year period in a developing country. The data regarding their demographics, preoperative, intraoperative and postoperative anaesthetic events and any intraoperative complications were recorded.

Results: There were 18 patients, 11 (61.1%) males, mean age of 47.5 years (SD = 14.71). Propofol and Fentanyl were the sole agents providing conscious sedation during these surgical cases, while 0.25% Plain Bupivacaine and 1% Lidocaine with Adrenaline (1:200,000) were used for operative site anaesthesia. Most of the tumours, 7 (38.9%), were found in the parietal region of the brain; 9 (50.1%) patients had between 5 and 10 mm midline shift on brain MRI/CT Scan; metastatic tumours, 8 (44.4%), were the commonest lesions, and 13 (72.2%) had GCS of 15/15 prior to surgery. Hypertension and tachycardia, 3 cases (16.7%) in each, were the commonest intraoperative complications. All the patients successfully underwent the AC and none was admitted into the Intensive Care Unit postoperatively. At a mean follow-up of six months 10 (55.6%) patients were alive, 6 (33.3%) dead, and 2 (11.0%) of unknown status.

Conclusions: This audit showed AC to be a well-tolerated procedure with low rate of complications in our practice, an encouraging prospect for the feasibility of AC for intracranial surgical procedures in developing countries.

* Corresponding author at: Department of Neurological Surgery, University College Hospital, UCH, Ibadan, Nigeria. Mobile: +234 7038476183.
E-mail address: femdoy@yahoo.com (A.O. Adeleye).

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1. Introduction

Awake craniotomy (AC), initially promoted especially for surgical treatment of epilepsy, has subsequently found to be used for many other indications, including supratentorial tumours, arterio-venous malformation, deep brain stimulation, and mycotic aneurysms near critical regions of the brain [1–3]. The awake craniotomy technique in the dominant hemisphere in particular provides a more favourable outcome regarding postoperative language impairment [4].

The importance of the brain in controlling vital functions in the body makes surgical operation a delicate process especially on a lesion located in functional areas; damaging such parts results in dire consequences. Therefore, surgical operations on functional cortical areas, such as the sensory, motor, language or visual, must be done meticulously without incurring undue neurological deficits postoperatively.

Although most craniotomies are still performed under general anaesthesia (GA) with endotracheal intubation for resection of an epileptogenic lesion close to vital areas of the brain (including those responsible for speech and motor activity), an "awake" craniotomy may be preferred to permit mapping of language, motor, and/or sensory area and electrocorticography (ECoG). During this procedure, there is always a concern about patient acceptability, cooperation and safety [5].

Nevertheless, there is evidence that the technique of AC has ceased being considered only for its traditional roles in epilepsy surgery or lesionectomy in functional brain locations. Recently, awake craniotomy has been described as an approach for removal of all supratentorial convexital tumors, regardless of the involvement of eloquent cortex. This technique had a small complication rate and resulted in a considerable reduction in resource use by minimizing intensive care time and total hospital stay without compromising patient care [6].

Awake craniotomy also has additional advantages over the traditional craniotomy with general anaesthesia. The patients have quick functional recovery and ultimately translate into decreased hospital expenses [7,8]. In this study, we present the results of a prospective audit of our initial experience with the perioperative anaesthetic management of the procedure of awake craniotomy in our university teaching hospital in a developing country.

2. Materials and methods

No human subjects were directly involved in this study. The medical records of patients who had intracranial lesions operated neurosurgically using the technique of AC between November 2011 and January 2015 at the University College Hospital, Ibadan, Nigeria were reviewed. All the patients were diagnosed with intra-axial lesions including tumours and haematomas with preoperative imaging studies done before and after the surgery. Discussions concerning each case were held in preoperative clinical meetings and informed consent from each patient or their closest relative was obtained before surgery. The anaesthetic evaluation paid particular attention to the cardiovascular, respiratory, and the renal systems to troubleshoot for any contra-indications. In addition, a pre-anaesthesia visit was paid to each patient a day before surgery on the ward. Anxious patients were pre-medicated with 10 mg oral diazepam the night before surgery. A thorough general physical examination coupled with detailed evaluation for eligibility for AC was done for each patient by the same anaesthetist. Patients were thoroughly evaluated for their fitness for the procedure of AC by both the anaesthetic and surgical teams. Intravenous (IV) fentanyl (1 μg/kg) was given to all the patients at the beginning of the each procedure, while IV Propofol was titrated to sedate them. This was as bolus doses and infusions. They all had scalp field block with a combination of 0.5% plain bupivacaine and 1% lignocaine with adrenaline (1:200,000). The anaesthetic methods used for the awake craniotomy included awake-asleep-awake, asleep-awake-asleep and asleep-awake. This depends largely on each patient's intraoperative response to the techniques. The surgery fell into three phases: craniotomy, tumour resection and closing.

Apart from the fact of the suitability, determined by the neurosurgical and anaesthetic teams, of the cranial lesion for the procedure of AC, the other main inclusion criteria were patient's consent, and the age: apart from one occasion in a 13-year-old, usually only patients aged 15 years and above were included in the study.

In the operation room all patients had anti-emetic prophylaxis, intravenous Ondansetron at 0.15 mg/kg. Prophylactic antimicrobials, anti-convulsants (as required) and corticosteroid (Dexamethasone at 0.1 mg/kg) were given to each patient immediately before surgery.

Patient's positioning on the operating table and comfortability was ensured during AC. The heads were placed in a neutral position that maximally exposed the operation sites in a head ring without obstructing venous return. Head pins for patient positioning are not available in our low-resource practice. All our patients received supplemental oxygen via facial mask during the procedure. All the operations were performed by the same surgical team led by AOA, while all the anaesthetic management was also done by the same teams.

Next, the lead surgeon infiltrated the incision site with local anaesthesia following the knowledge of anatomical courses of the cutaneous nerves in relation to the incision sites (e.g. supraorbital nerve, occipital nerve, etc.). The anaesthetic agents used for the local infiltration were 10 ml to 30 ml of 1% lidocaine with 1:200,000 adrenaline and 0.5% bupivacaine mixed with equal volumes of sterile water. The dura was only infiltrated when pain was felt by the patient.

The data obtained were analysed using a Statistical Package for Social Science software, the SPSS version 20(SPSS Inc, Il, USA) and were presented in tables and figures. Descriptive statistics (frequency and percentage) were done for categorical variables.

3. Results

Awake craniotomy was carried out on 18 selected patients. The patients comprised 11 (61.1%) males and 7(38.9%) females with a mean age of 47.5 years (SD = 14.71), ranging from ages 13 to 66 years. The summary of the demographic data of the group is provided in Table 1. Seven (38.9%) of them were in the American Society of Anesthesiologists (ASA) Class I and II, while 61.1% was ASA class III.

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