

Brain Tumour Excision by Awake Craniotomy

Colonel M Masudul Haque

Classified Specialist in Anaesthesiology, Department of Anaesthesia, Combined Military Hospital (CMH), Dhaka Cantonment, Dhaka, Bangladesh.

Corresponding Author: E-mail masud661@gmail.com

Abstract

Awake craniotomy poses a unique challenge to anaesthesiologists, and its success is highly dependent on careful patient selection and the experience of the surgical and anaesthesia team. I report the pre-operative preparation and anaesthetic management for resection of an intra-cerebral tumour by awake craniotomy in a 40 years old male patient for the first time done at CMH Dhaka. The challenges of sedation and psychological care throughout the procedure are discussed. I conclude that the procedure can be performed safely.

Keywords: Anaesthesia: Awake Craniotomy, Conscious sedation, Craniotomy, Eloquent cortex. Epilepsy, Brain neoplasms, Peri-operative period

(JBSA 2015; 28(1): 43-45)

During brain tumour resection with intra-operative neuropsychological monitoring in awake patients (awake craniotomy) the anaesthesiologist has an important role in providing optimal psychological care and ensuring minimal discomfort to the patient without using drugs or techniques which make functional monitoring impossible¹. The procedure has been eloquently described by Pasquet as 'vocal anaesthesia'². Awake craniotomy has been performed for resections of tumours and epileptic foci in adults and children down to the age of 11 years^{3,4}. Specific problems may include agitation, restlessness, and lack of co-operation, which may become dangerous during open brain surgery. This paper describes the pre-operative preparation and anaesthetic management for the resection of an intra-cerebral tumour by awake craniotomy in a 40 years old male patient with intra-operative neuropsychological monitoring.

Case Report

A 40 year old, 70 kg male with high-grade Glioblastoma Multiforme (GBM) required resection of tumour in the left temporo-parietal region using intra-operative neuropsychological function monitoring (Awake Craniotomy). The patient had an episode of seizure 01 time, sudden unconsciousness for 01 hour and mild weakness in

right upper limb. He had presented with headache, vomiting. The patient was evaluated by an anaesthesiologist and found to be eligible to undergo the procedure. He was co-operative and showed a high level of endurance and was able to concentrate and perform specific tasks throughout the operation^{8,9}. On the evening before surgery the patient was given tab diazepam 5 mg orally. The pre-operative regimen of dexamethasone and ranitidine was continued up to operation day. In theatre 02 wide bore intravenous access was established and an infusion of Hartman's solution started. A nasal catheter was inserted and oxygen (02 l/min)¹ started. He was a bit tense but co-operated well. The patient was given Scalp Block by infiltration of local anaesthetics (0.5% bupivacaine plain & 2% lignocaine) after detail briefing regarding the procedure, pre-oxygenation by nasal catheter (02 l/min)¹ and pre-medicated with Inj fentanyl 50 µg, Inj phenytoin 200 mg IV slowly and Inj phenobarbitone 1 amp IM stat. After scalp block, sedation with propofol (Preparation: propofol 45 ml + 2% lignocaine 5 ml = 50 ml solution in a syringe pump. Continuous infusion 6-10 ml/hour) was started. To reduce per-operative blood loss and to decrease intracranial pressure the patient was placed in a slight reverse Trendelenburg position^{11,12}. The

craniotomy was started after proper aseptic preparation and the patient co-operated during the mapping procedure and subsequent tumour resection was excellent. During the surgical procedure the patient performed different tasks such as the moving his arm and his leg. The tumour was completely resected macroscopically after 2.5 hour and the procedure finished. He didn't feel pain during skin closure and was comfortable.

Oxygenation was well maintained throughout the procedure and the patient did not hyperventilate (EtCO₂ maintained 30-40 mmHg with oxygen and it was around 36 mmHg at the beginning and 38 mmHg at the end of the procedure). The total amount of propofol given throughout the procedure was 160mg. Postoperatively, he received regular paracetamol and tramadol HCl suppositories on demand. He was discharged in good health without speech impairment or new motor disability on the 10th postoperative day.

Discussion

The modern era of awake craniotomies began more than 60 years ago when Penfield and Andre Pasquet started to perform awake craniotomies for epileptic foci excision^{10,12}. Historically, anaesthesia for awake craniotomy was regarded as a high-risk procedure and was only performed when it was absolutely indicated. With the improved understanding of cerebral localization and the availability of new anesthetic agents, the application of awake craniotomy has become much broader and safer than before. The aims of this article are to review the current evidence and application of awake craniotomy and to briefly describe the principles of anesthetic management during this procedure.

The awake craniotomy is an important technique used for brain tumour excision from eloquent cortex, epilepsy surgery, and deep brain stimulation surgery. It has been used, less commonly, in the management of mycotic aneurysms and arteriovenous malformations near critical brain areas⁹.

My decision to use propofol alone was based on my excellent experience with this agent in adults and at the same time un-availability of dexmedetomidine in our country. The reliable pharmacodynamics and predictable pharmacokinetic properties of propofol make it very useful for this setting. However, I found that with intensive psychological

care throughout the procedure I was able to keep the patient only lightly sedated (propofol 6-8 ml/hour as I have described it earlier) and he remained very co-operative. Beside propofol I gave midazolam 2mg iv two times in the peri-operative period. The infiltration with local anaesthetic was sufficient to block pain from the surgical field and the use of opioids was unnecessary.

Conclusions

The application of awake craniotomy has been continually evolving. Attention to every component, including careful patient selection, pre-operative psychological preparation, solid rapport building, ensuring patient comfort in positioning, superb regional anesthesia, the proper choice of anesthetic techniques and agents, preparation and prompt crisis management, and continuous team communication are the keys to successful awake craniotomy. Tight anesthetic control and the meticulous performance of mapping procedures are essential to achieve the highest accuracy of cerebral localization results.

References

1. Varkey GP. Introduction to anesthetic considerations for craniotomy in awake patients. *International Anesthesiology Clinics* 1986; 24: XV-XXI.
2. Pasquet A. Combine regional and general anesthesia for craniotomy and cortical exploration. Part II. Anesthetic considerations. Reprint of a lecture given 1953. *International Anesthesiology Clinics* 1986; 24: 12-20.
3. Girvin JP. Resection of intracranial lesions under local anesthesia. *International Anesthesiology Clinics* 1986; 24: 133-55.
4. Girvin JP. Neurosurgical considerations and general methods for craniotomy under local anesthesia. *International Anesthesiology Clinics* 1986; 24: 89-114.
5. Huber W, Poeck K, Willmes K. The Aachen Aphasia Test. *Advances in Neurology* 1984; 42: 291-303.
6. Reulen HJ, Schmid UD, Ilmberger J, Eisner W, Bise K. Cortical mapping of language and speech functions during surgery for space-occupying lesions under local anesthesia. *Der Nervenarzt* 1997; 68: 813-24.

7. Mavrocordatos P, Bissonnette B, Ravussin P. Effects of neck position and head elevation on intracranial pressure in anaesthetized neurosurgical patients: preliminary results. *Journal of Neurosurgical Anesthesiology* 2000; 12: 101–4.
8. Rolighed Larsen JK, Haure P, Cold GE. Reverse Trendelenburg position reduces intracranial pressure during craniotomy. *Journal of Neurosurgical Anesthesiology* 2002; 14:16–21.
9. Ebel H, Ebel M, Schillinger G, Klimek M, Sobesky J, Klug N. Surgery of intrinsic cerebral neoplasms in eloquent areas under local anesthesia. *Minimal Invasive Neurosurgery* 2000;43: 192–6.
10. Pasquet A. Combine regional and general anesthesia for craniotomy and cortical exploration. Part II. Anesthetic considerations. *Anesthesia and Analgesia* 1954; 33: 156–7.
11. Kolk AM, van Hoof R, Fiedeldij Dop MJ. Preparing children for venepuncture. The effect of an integrated intervention on distress before and during venepuncture. *Child, Care, Health and Development* 2000; 26: 251–60.
12. Bulsara KR, Johnson J, Villavicencio AT. Improvements in brain tumor surgery: the modern history of awake craniotomies *Neurosurg Focus*, 18 (2005), pp. e5.