Neuroanesthesia For Awake Craniotomy; Initial Experience At KFMC

M Syam, I Omer, O Nofal, A Zafrullah

Citation

M Syam, I Omer, O Nofal, A Zafrullah. *Neuroanesthesia For Awake Craniotomy; Initial Experience At KFMC*. The Internet Journal of Anesthesiology. 2008 Volume 21 Number 2.

Abstract

Awake craniotomy allows accurate localization of the eloquent areas of the brain. This is crucial during brain tumor resection in order to minimize risk of neurological injury. Awake craniotomy is a well-tolerated procedure with low rate of conversion to general anesthesia and low rate of complications. It is also important to recognize the potential problems in the anesthetic management of awake craniotomy.. Vigilant monitoring of the patient with frequent adjustments of the depth of moderate to deep sedation with adequate local anesthesia to ensure patient safety and maximal comfort is crucial Resection of brain tumors may cause neurological sequlae, according to the site and size of the brain tissue removed. Awake craniotomy has been proposed as a surgical approach to satisfy criteria of radical surgery while minimizing eloquent brain damage.The most critical aspect of awake craniotomy is to maintain adequate patient comfort, analgesia, immobility and cooperation during a long surgical operation, at the same time ensuring the safety, control and maintenance of vital functions. Apart from pharmacological, surgical, technical knowledge and skillfulness, the ability to maintain close psycho-emotionalcontact and support with the patient throughout the operation is a fundamental task that the anesthesiologist has to pursue for the operation to be successfully managed.

INTRODUCTION

The main challenge of oncological surgery is the radical removal of a tumor. A general assertion states that the larger the resection the lower the risk of recurrence of the lesion and the higher the chance of the patient's survival. But an extensive tissue excision may favor the occurrence of an unpredictable degree of loss of function, depending on the location of the malignancy. Particularly in neuro-oncology, the neurological sequelae due to tumor excision may cause severe disability compromising the patient's social life. Therefore, the aim to remove the maximum amount of lesion without impairing neurological function, has pushed the physicians and industry to develop sophisticated surgical approaches to be performed in awake and responding patients, so as to evaluate neurological dysfunction before tissue removal.(1) Awake craniotomy dates back to the second half of the 19th century, and at that time, the indication was epilepsy surgery performed under local anesthesia. Subsequently, this surgical practice has been extended also to the resection of tumors involving the functional cortex and finally, in more recent years, the indications have further extended to include the removal of supratentorial tumors, regardless of the involvement of the cortex. (2) Craniotomy in awake patients has evolved and extended its indication as a direct consequence of the following driving forces: the huge improvement of diagnostic tools; the impressive development of intraoperative functional neurosurgical technology; the enhancement of anesthesia monitoring devices, the pharmacokinetic and pharmacodynamic properties of the new anesthetic agents and the modality by which they are delivered to the patients. (1) The main advantage for the awake neurosurgical approach is to facilitate intraoperative electrocorticography and cortical mapping for the accurate identification of brain areas which control motor function and speech. (3) Functional magnetic resonance imaging has produced considerable progresses in non-invasive mapping of brain functional areas, allowing very early tumor stratification. However, its employ during surgery is not feasible on a routine basis and intraoperative testing of language and motor function continues to be the gold standard for a radical surgical resection while minimizing eloquent brain damage. Apart from tumor anatomical location, mandatory prerequisites for awake craniotomy are a fully cooperative patient and optimal collaboration between anesthesia and neurosurgical staff, to realize what is defined as function-controlled neurosurgery. (4,5) Indeed, evolution of general anesthesia in neurosurgery has

permitted adequate control of vital parameters, neurological function and intracranial pressure; at the same time these aspects ensure optimal working conditions for the neurosurgeon; but intraoperative monitoring of functional lesions of the central nervous system is severely inhibited by general anesthesia: some higher cortical brain functions (i.e. speech) cannot be monitored during surgery.

PATIENTS AND METHOD

We explained the procedure to all patients the procedure preoperatively. All patients agreed and they gave their consent in writing..

During operation Routine monitoring of non-invasive blood pressure, electrocardiogram and pulse oximetry were used.

Figure 1

Table-1. cases data [biodata]

Number	Sex	Age/year	Body Weight/Kg	Diagnosis	ASA
1st	M	27	kg 73.6	Lt Parietal Glioma	2
2nd	F	21	kg 75,6	Lt Parietal Glioma	2
3rd	F	45	kg 93.4	Rt.Frontal Glioma	2
4th	F	56	kg 76	Rt.Frontal Glioma	2

We did four awake craniotomies using Propofol at induction and for maintaining sedation (70-80mic/kg/min). Fentanyl was used as well in two cases (third +forth case) for induction and maintenance .Oxygen supplementation was given by face mask in two cases and by nasal canula in two cases. All patients were awakened during surgery, whenever needed for evaluation. Only two patients (50%) developed convulsion ,intraoperativly, and were treated with boluses of Propofol. We did not have any other complication.

Figure 2

Table- 2. The details of anesthesia technique used in each case

Patient	Induction	Maintenance	Drugs Used	Use of airway	Scalp Block	Intraop. Complication
1st	Propofol 150 mg	Propofol 70-80 mic/kg/min	Decadron,Mannitol, Ranitidine	Nil	Xylocaine 1% with Epinephrine 1:100 000 20cc + Marcaine.25% 20cc at pin and incision site	Nil
2nd	Propofol 150 mg	Propofol 60-70 mic/kg/min	Decadron,Mannitol, Ranitidine	Nil		Convulsion (electrical stimulation)
3rd	Propofol 150mg + Fentanyl 50 mcgs	Propofol 50-100 mic/kg/min + Fentanyl boluses 50 mic(300 mic	Decadron,Phenytoin, Midazolam	Nasal airway		Convulsion electrical stimulation)
4th	Propofol 150mg + Fentanyl 50 mcgs	Propofol 30-60 mic/kg/min + Fentanyl boluses 20-30mic (1150mic	Decadron,Phenytoin,Mannitol	Nil	Xylocain1%with Epinephrine 1:100 000 +Marcaine o.5% 40 cc	Nil

DISCUSSION

The published neurosurgical literature remains unclear on the correlation between the extent of surgical resection and survival. Resection of 89% or more of tumor volume was necessary to improve survival after surgery. In addition, there was a significant survival advantage in patients with resections of 98% or more of tumor . The rationale for awake craniotomy in tumor resection is that it allows for brain mapping, which facilitates maximum resection and minimizes the risk of postoperative neurological deficits .Continuous assessment of neurological function has also facilitated the excision of tumors that might otherwise be considered inoperable.

Confusion, decreased level of consciousness and communication difficulties (e.g., profound dysphasia or language barrier) and extreme anxiety are some contraindications to awake craniotomy. Routine monitoring of non-invasive blood pressure, electrocardiogram and pulse oximetry are essential. it is no longer routine to have an arterial blood pressure monitoring for the patient undergoing an awake craniotomy .A combination of propofol (continuous or target controlled infusion) and fentanyl or remifentanil is most commonly used.

Dexmedetomidine has been shown to provide sedation and analgesia without significant respiratory depression .Hypotension and bradycardia are common side effects.

ASLEEP-AWAKE-ASLEEP TECHNIQUE

- Deep anesthesia can be achieved without compromising the patient’s safety.
- The patient is fully awakened for intraoperative neurological evaluation.

This technique is suitable for patients who are not able to tolerate craniotomy

- with sedation alone, especially the longer procedures. This technique has been
- used in pediatric patients. The laryngeal mask airway (LMA) is now most commonly used during the “asleep” phase of this technique. Patients can either be breathing spontaneously or mechanically ventilated.

POSSIBLE COMPLICATION

- seizures
- nausea and vomiting,
- decreased level of consciousness,
- Loss of patient cooperation.
- Respiratory depression and airway obstruction,
- hypercapnia and brain swelling,
- Hypoxia,
- Homodynamic instability (hypertension),
- Transient neurological deficit,
- Deep venous thrombosis, urinary tract infection and pneumonia,

References

1. Hans P, Bonhomme V. Anaesthetic management for neurosurgery in awake patients. Minerva Anestesiol 2007;73:507-12.
2. Blanshard HJ, Chung F, Manninen PH. Awake craniotomy for removal of intracranial tumour: consideration of early discharge. Anesth Analg 2001;92:89-4.
3. Manninen PH, Balki M, Lukitto K. Patient satisfaction with awake craniotomy for tumour surgery: a comparison of remifentanil and fentanyl in conjunction with propofol. Anesth Analg 2006;102:237-2.
4. Berkenstadt H, Ram Z. Monitored Anaesthesia Care in awake craniotomy for brain tumour surgery. Isr Med Assoc J 2001;3:297-0.
5. Picht T, Kombos T, Gramm HJ. Multimodal protocol for awake craniotomy in language cortex tumour surgery. Acta Neurochir (Wien) 2006;148:127-38
6. Taylor MD, Bernstein M.J Neurosurg Awake craniotomy with brain mapping 1999;90:35-41.
7. MeyerFB, Bates LM, Goerss SJ, Friedman Awake craniotomy for aggressive resection of primary gliomas located in eloquent brain.JA,Mayo Clin Proc 2001;76:677-87
8. Anaesthetic Management of Awake Craniotomy—Jee-Jian See et al May 2007, Vol. 36 No. 5/
9. Sarang A, Dinsmore J. Anaesthesia for awake craniotomyBr J Anaesth2003;90:161-5

Author Information

M. Syam, M.B.; Ch. B M.S. (Anesth.); CJBA
Anesthesia Department, KFMC, Riyadh, KSA

I. Omer, M.D; M.S; Ph.D. (Anesthesia)
Anesthesia Department, KFMC, Riyadh, KSA

O. Nofal, MBBCH, MS of (Anesthesia), MD of Anesthesia
Anesthesia Department, KFMC, Riyadh, KSA

AMB Zafrullah, B. S.(PAT);DA(LOND);F.F.A.R.C.S.I.(DUB)
Anesthesia Department, KFMC, Riyadh, KSA