

Awake Craniotomy



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Awake Craniotomy

Awake Craniotomy is an operation performed same as a conventional craniotomy but the patient remains awake during the procedure

During surgery, neurosurgeon performs cortical mapping to identify vital areas, that should not be disturbed while removing the tumour



Indication

- Awake craniotomy can be used in a variety of brain tumours near eloquent cortex (e.g. gliomas, glioblastomas, metastasis) epilepsy surgery, deep brain stimulation (DBS) surgery, neuro-endoscopic procedures, ventriculostomy & excision of small lesions
- Less commonly, for the management of mycotic aneurysms and A-V malformations near critical brain areas



Colombian Journal of Anesthesiology

Revista Colombiana de Anestesiología

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 Wolters Kluwer

Awake craniotomy: indications, benefits, and techniques

Colombian Journal of Anesthesiology. 46(2S):46–51, APR 2018

DOI: 10.1097/CJ9.0000000000000045, Issn Print: 2256-2087

Publication Date: 2018/04/01

Kaiying Zhang; Adrian W. Gelb

Contraindications

Absolute contraindication:

- Patient refusal/Uncooperative/Low GCS
- Mental retardation
- Profound dysphasia/language problem
- Anticipated difficult intubation
- Highly vascular lesions
- Low occipital lobe lesions
- Obstructive sleep apnea
- Children <10 years
- Inability to lay still for any length of

Relative contraindication:

- Low tolerance to pain
- Chronic cough/wheezing
- Obese patients
- Uncontrolled seizures



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Essay REV COLOMB ANESTESIOLOG. 2015;43(S1):22-28

Anesthesia for awake craniotomy: An update[☆]



Jason Chui*

Assistant Professor, Department of Anesthesia and Perioperative Medicine, University of Western Ontario, Ontario, Canada

Current evidence for awake craniotomy

- Major benefits: Max. tumour resection with minimising the neurological damage
 - Recent cohort studies of 575 patients, has compared the gross total resection rate and postoperative neurological deficits between awake craniotomy & GA and found awake craniotomy had higher gross total resection rate in the eloquent area (37% vs 14%), fewer permanent neurological deficit (4.6% vs 16%) and fewer new-onset postoperative neurological deficits (3.3% vs 58%)
 - However, these benefits were not consistently demonstrated by other studies, particularly for the prevention of neurological deficits
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OXFORD
ACADEMIC

NEUROSURGERY
THE REGISTER OF THE NEUROSURGICAL MEME

Neurosurgery, Volume 68, Issue 5, 1 May 2011, Pages 1192–1199

Awake Craniotomy vs Surgery Under General Anaesthesia for Resection of Supratentorial Lesions

Oumar Sacko, MD Valérie Lauwers-Cances, MD David Brauge, MD Musa Sesay, MD Adam Brenner, MD Franck-Emmanuel Roux, MD, PhD

Current evidence for awake craniotomy

- Evidences for earlier hospital discharges are more consistent

Additional benefits includes:

- Shorter ICU/ hospital stay
- Less resource utilisation, and
- High patient satisfaction

J Neurosurg Anesthesiol 2013;25:240-247

The Journal of the Society for
Neuroscience in Anesthesiology and Critical Care

JOURNAL OF Neurosurgical Anesthesiology

Awake Craniotomy for Brain Tumor Resection: The Rule Rather Than the Exception?

*Tyler Brown, BS, Ashish H. Shah, BS, Amade Bregy, MD, PhD, Nirav H. Shah, MD,
Michael Thambuswamy, MD, Eric Barbarite, Thomas Fuhrman, MD,
and Ricardo J. Komotar, MD*

Preoperative management

- Careful patient selection is the major components of success
- Well- motivated and mature patients are the best candidates for awake craniotomy
- Preoperative psychological preparation and rapport building are the important components of preoperative preparation
- This include realistic description of procedure, expected discomforts, level of cooperation desired, tasks that must be performed & possibility of adverse events
- A well- conducted preoperative consultation usually can alleviate the patient's anxiety and improve cooperation during the awake craniotomy

J Neurosurg Anesthesiol. 2012 Jul;24(3):209-16. doi: 10.1097/ANA

Eligibility Criteria and Psychological Profiles in Patient Candidates for Awake Craniotomy: A Pilot Study

Barbara Santini, PhD, Andrea Talacchi, MD,* Francesca Casagrande, MD,†
Marilena Casartelli, MD,† Silvia Savazzi, PhD,‡ Francesco Procaccio, MD,†
and Massimo Gerosa, MD**

Intraoperative management

3 major anaesthetic challenges for awake craniotomy:

1. Provision of a rapid and smooth transition of the anaesthetic depth according to the different surgical stages
2. Maintenance of stable cerebral hemodynamic and cardiopulmonary function
3. Crisis management for an awake patient with an open cranium

The requirement regarding the depth of anaesthesia varies markedly at the different stages of surgery

Over-sedation lead to apnea, hypoxemia, hypercapnia & cerebral swelling, whereas under-sedation may result in agitation, arterial hypertension & tachycardia

MINERVA ANESTESIOLOGICA

A Journal on Anesthesiology, Resuscitation, Analgesia and Intensive Care

Official Journal of the Italian Society of Anesthesiology, Analgesia, Resuscitation and Intensive Care

Management of anesthesia in awake craniotomy

Minerva Anestesiol 2008;74:393-408.

E. PICCIONI ¹, M. FANZIO ²

Intraoperative management

- Common anaesthetic goals for all neurosurgical patients, such as the avoidance of hypercapnia/hypoxemia, adequate CPP & brain relaxation, may not be easily achieved in awake craniotomy patients with uncontrolled airways
 - Adequate local anaesthesia can usually be achieved by using scalp block
 - Arterial line is commonly used; but other invasive monitoring, e.g. CVP is not routinely required
 - Comfortable positioning is mandatory because extremely limited movements will be possible after the head-pinning
 - Draping should always allow easy access to the patient's face and airway
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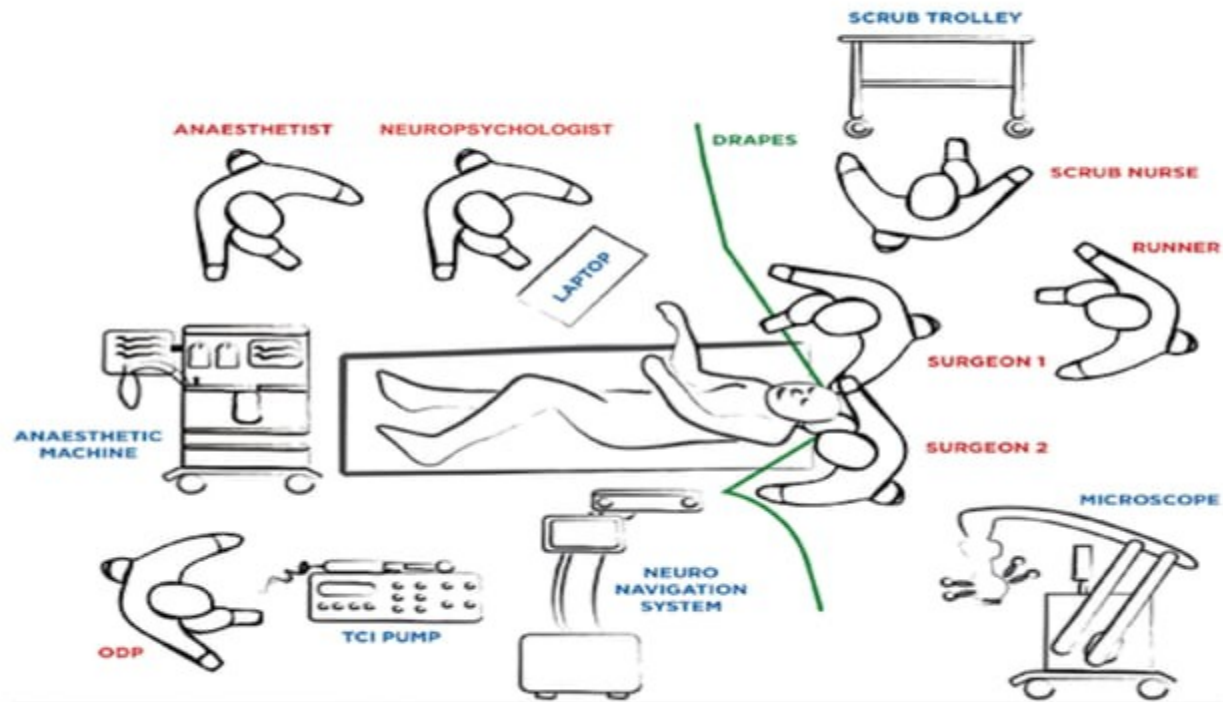
Publication Date: 2018/04/01

Kaiying Zhang; Adrian W. Gelb

Patient positioning

- Main goal is patient comfort, access to airway & avoid airway obstruction during sedation
- Usually supine with head slightly rotated to opposite side of lesion, lateral/semi-lateral
- Patient must be visible to the anaesthetist during intra-operative functional testing
- A closed circuit video monitoring has been described which allows the neurosurgeon & neurologist to see and hear the patient during the testing
- During the stimulation of the posterior speech center the patient is asked for "naming objects" demonstrated (carried out many times by neuroanesthesiologist)





Choice of anaesthetic techniques

- Anaesthesiologists have their own favoured techniques including LA, conscious sedation and sleep-awake-sleep techniques
- None of these techniques has any demonstrated superiority over another

Current Opinion in Anesthesiology

Anesthesia for awake craniotomy

Alexander Kulikov; Andrey Lubnin

DOI: 10.097/ACD.0000000000000525, PMID: 29934535

ISSN Print: 0952-7903

Publication Date: 2018/07/09

Local anaesthesia of scalp

- Includes regional scalp block, bilateral 6 nerve blocks
- Supra-trochlear, Supraorbital, Zygomatico-temporal, Auriculo-temporal
Lesser occipital & Greater occipital nerves
- 40–60 ml of anaesthetic volume is used for infiltration
- Bupivacaine is the most commonly used LA in the literature, however, ropivacaine and levobupivacaine appear to be safer about the toxicity.
- The use of adrenaline (5 µg/ml, 1:200,000 dilutions) both minimises acute rises in plasma concentration and maximises the duration of block.

J Neurosurg Anesthesiol 2010;22:187–194

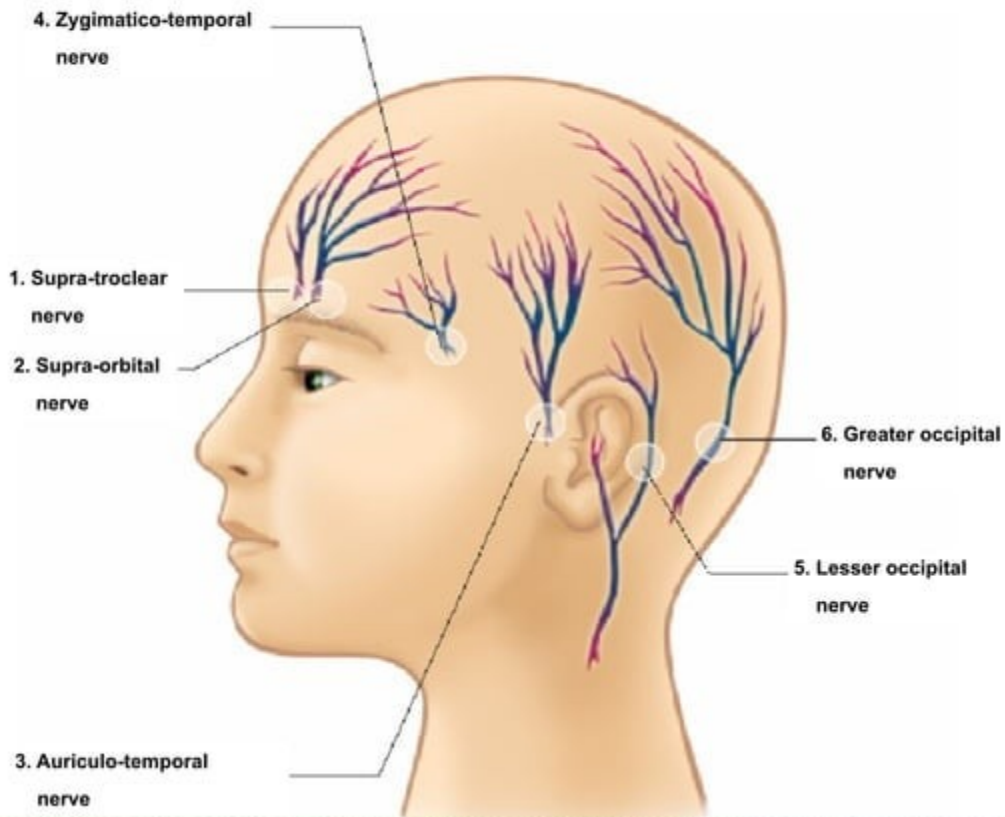
The Journal of the Society for
Neuroscience in Anesthesiology and Critical Care

JOURNAL OF
Neurosurgical Anesthesiology

"Scalp Block" During Craniotomy:
A Classic Technique Revisited

Irene Osborn, MD and Joseph Sebeo, PhD

Scalp block (bilateral 6 nerve)



Choice of agents for conscious sedation

- Propofol infusion & supplementary opioid is most commonly reported for awake craniotomy
- Addition opioid with propofol is common practice to improve analgesic quality and reduce the hypnotic requirement.
- Comparison of different types of opioids, including fentanyl, alfentanil, or sufentanil, found no significant difference in the operative condition, electrocorticography and stimulation testing. Therefore, all narcotics are regarded as equally good for use during awake craniotomy
- Dexmedetomidine has gained popularity for awake craniotomy due to its minimal effects on respiration and electrocorticography

The Journal of the Society for
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JOURNAL OF Neurosurgical Anesthesiology

Dexmedetomidine sedation during awake craniotomy for seizure resection: effects on electrocorticography

Souter MJ, Rozet I, Ojemann JG, Souter KJ, Holmes MD, Lee L, Lam AM.

J Neurosurg Anesthesiol. 2007;19:38–44.

Choice of agents for conscious sedation



S Q U M J
Sri Chaitanya University Medical Journal

DOI: 10.18295/SQUMJ.2016.16.03.014

CASE REPORT

Combination of Continuous Dexmedetomidine Infusion with Titrated Ultra-Low-Dose Propofol-Fentanyl for an Awake Craniotomy Case report

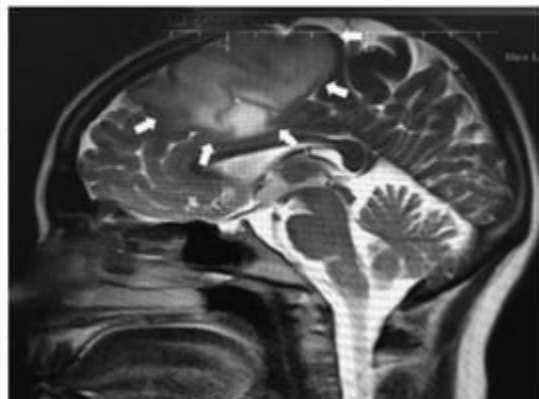
Samaresh Das,¹ Ali Al-Mashani,² Neelam Suri,¹ Neeraj Salhotra,² *Nilay Chatterjee¹

Choice of agents for conscious sedation





Choice of agents for conscious sedation



J Neurosurg Anesthesiol 2017;25:240-247

The Journal of the Society for
Neuroscience in Anesthesiology and Critical Care

JOURNAL OF Neurosurgical Anesthesiology **Awake Craniotomy During Pregnancy**

Ali M. Al Mashani; Azmat Ali; Nilay Chatterjee; Neelam Suri; Samaresh Das

Asleep-awake-asleep technique

Asleep-awake-asleep (AAA) technique consists 3 phases:

- 1 st phase under GA and controlled ventilation
 - 2 nd phase, anaesthetics are discontinued and spontaneous ventilation is allowed to make the patient awake for functional & EP testing
 - 3rd phase, GA is induced in the similar fashion as described in the first phase.
 - A variant approach has been described consists of two-phase technique namely "AA technique" - the 2nd phase the patient remains awake or sedated for the rest of the procedure even after the testing is completed
-

NEURO SURGERY
THE REGISTER OF THE NEUROSURGICAL MEME

The Asleep-Awake-Asleep Anesthetic Technique for Intraoperative Language Mapping

Kate Huncke, M.D., Barbara Van de Wiele, M.D., Itzhak Fried, M.D., Ph.D.,

Eduardo H. Rubinstein, M.D., Ph.D. *Neurosurgery*, Volume 42, Issue 6, 1 June 1998, Pages 1312-1316,

Complications and safety of awake craniotomy

Complication	Incidence	Prevention	Management
Respiratory depression	2–18%	• Preop. evaluation • Titration of anaesthetics • AAA technique	• Lower the level of anaesthetics • Optimize head positioning - Insert LMA or intubate (if needed)
Loss of cooperation	4.2%	• Careful patient selection • Psychological support • Titration of sedation & analgesia	• Optimize the level of anaesthetics • General anaesthesia, if necessary

ANESTHESIA &
ANALGESIA

Anesthetic Complications of Awake Craniotomies for Epilepsy Surgery

Complications and safety of awake craniotomy

Complication	Incidence	Prevention	Management
Seizure	2.1–11.6%	• Ensure adequate levels of anticonvulsants	• Cold saline irrigation of the brain Propofol (10–30 mg boluses) • Midazolam (1–2 mg boluses) – may interfere with ECoG • General supportive measures: Airway protection
Nausea and vomiting	4%	• Preoperative evaluation • Psychological support • Prophylactic anti-emetics • Optimize local anaesthesia	• Anti-emetic administration

Patient satisfaction matters

Important

Drafts (59)

Categories

1. Social (17)

2. Personal (17)

3. Business (17)

4. Personal (17)

5. Business (17)

6. Personal (17)

7. Business (17)

8. Personal (17)

9. Business (17)

To

Dr. Anand Kumar
Dr. Anand Kumar

Department of Anesthesiology, Khosla Hospital, Mumbai

Dear Dr. Das & Chatterjee,

Please accept my heartfelt gratitude and regards for taking my utmost care during my hospitalization at Khosla Hospital in general and anesthetic services. Initially it was frightening to learn that I will be operated for brain tumor surgery without putting me in sleep (awake brain surgery). But a both of you counselled me, explained me the procedure and answered all my queries, I felt confident and agreed for awake brain surgery. The day surgery on 26th of October 2017, I vividly remember the care, compassion and commitment you have shown while I was being operated by Dr. Ali. I took all the care to keep me pain free and to boost up my morale and confidence during the surgery and beyond. I am doing much better now, follow successful awake brain tumor surgery.

Once again, I sincerely thank both of you for your good work. May god bless you all...

Sincerely,

Anand Kumar

Take home message

- The management of awake craniotomy is challenging
 - Success depends on co-ordination between neurologists, neurosurgeons, neuro-anaesthesiologists, neurophysiologists, and competent operating room personnel apart from a co-operative patient
 - With the advent of newer technologies such as intra-operative MRI, infrared cameras (detect functionally active areas of the cortex) as well as image-guided surgery, complex operations can be undertaken easily making awake craniotomy an attractive alternative to GA
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My Sincere Thanks to

Dr Harsh Sapra

Dr Saurab Anand

Dr Neelam Suri

and

organisers of RAJISACON 2018