Turk J Anaesthesiol Reanim 2018; 46(4): 326-7

High Flow Nasal Oxygen Therapy and Transcutaneous Carbon Dioxide Monitoring for Awake Craniotomy

Uyanık Kraniyotomide Yüksek Akımlı Nazal Oksijen Tedavisi ve Transkutanöz Karbondioksit Monitorizasyonu

Cite this article as: Reese A, Deruyter M. High Flow Nasal Oxygen Therapy and Transcutaneous Carbon Dioxide Monitoring for Awake Craniotomy. Turk J Anaesthesiol Reanim 2018; 46(4): 326-7.

ORCID IDs of the authors: A.R. 0000-0003-0611-6509; M.D. 0000-0002-4074-611X.

Dear Editor,

Awake craniotomy is a commonly performed procedure when intracranial pathology lies in close proximity to areas of the brain that provide motor function or speech control. Multiple review articles and case reports have described different techniques and considerations when performing an anaesthetic for awake craniotomy (1). We present an alternative technique for anaesthetic management in a patient with morbid obesity and severe sleep apnea.

A 65 year-old 143 kg male was scheduled for a left frontal craniotomy with awake neurologic testing. MRI revealed a non-enhancing mass in the left frontal lobe involving the pars orbitalis. The patient's history was complicated by prior difficult intubation, hypertension and severe obstructive sleep apnea requiring nightly BiPAP therapy. Airway exam revealed a modified Mallampati score of 3 and thyromental distance of less than 3 finger-breadths and large neck.

Pre-incisional scalp blocks were performed with a 2% lidocaine and 1% ropivicaine equal mixture of 38 cc total volume. The patient was sedated with dexmedetomidine and propofol infusions. Small incremental doses of fentanyl were administered for analgesia with 50 total micrograms given for the case. High flow nasal cannula oxygen (Optiflow® Fisher&Paykel Irvine, CA) therapy was administered through a humidified air/oxygen blender at 60 liters/minute of total flow throughout the case. The fractional inspired oxygen was titrated to maintain the patients oxygen saturation at greater than 90%. Due to the high flow of oxygen through the nasal cannula, carbon dioxide sampling of exhaled gas was projected to be problematic. To address this, a transcutaneous carbon dioxide sensor (Sentec Digital Monitoring System manufactured by Sentec, Therwil, Switzerland) was placed and monitored. Titration of sedation, assessment of airway patency and chin lift maneuvers (two incidences) were guided by transcutaneous carbon dioxide (tCO_2) levels as well. The patient tCO_2 levels ranged from 34-46 mmHg throughout the case (baseline was 40 mmHg). The neurosurgeon noted no difficulty with the approach or resection. On postoperative follow-up the patient was pleased with his anaesthetic care and was discharged on postoperative day 3.

Airway support by means of high flow nasal cannula and information of carbon dioxide levels from transcutaneous monitoring were of value in this instance but limitations exist. Limitations of the technique include the ability to comply with American Society Standards on intra-operative monitoring. While end tidal monitoring of carbon dioxide is ideal, these standards include caveats when the use is "invalidated by the nature of the patient, procedure or equipment" (2). Our description is also limited by our absence of correlation of arterial carbon dioxide levels with that of transcutaneous levels. We would refer the reader to prior publications on this subject (3). While high flow nasal oxygen has been previously described in relation to awake craniotomies (4), the addition of tCO_2 offers a refinement on that technique in high risk patients.

In conclusion obese patients and patients with sleep apnea will continue to challenge the anaesthetisologists. From this report we would like to highlight to the neuroanaesthesia community additional tools that can be utilized in these difficult patient scenarios.

Adam Reese, Marty Deruyter

Department of Anesthesiology, Kansas University Medical Center, Kansas City, USA

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.R., M.D.; Design – A.R., M.D.; Supervision – A.R., M.D.; Materials – A.R., M.D.; Literature Search – A.R., M.D.; Writing Manuscript – A.R., M.D.; Critical Review – A.R., M.D.

Conflict of Interest: Authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – A.R., M.D.; Tasarım – A.R., M.D.; Denetleme – A.R., M.D.; Malzemeler – A.R., M.D.; Literatür Taraması – A.R., M.D.; Yazıyı Yazan – A.R., M.D.; Eleştirel İnceleme – A.R., M.D.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

References

1. Erickson KM, Cole DJ. Anesthetic considerations for awake craniotomy for epilepsy and functional neurosurgery. Anesthesiol Clin 2012; 30: 241-68. [CrossRef]
2. Standards For Basic Anesthetic Monitoring [http://www.asahq.org/quality-and-practice-management/standards-and-guidelines]
3. Aarrestad S, Tollefsen E, Kleiven AL, Qvarfort M, Janssens JP, Skjonsberg OH. Validity of transcutaneous PCO2 in monitoring chronic hypoventilation treated with non-invasive ventilation. Respir Med 2016; 112: 112-8. [CrossRef]
4. McGinlay MC, Kelly CJ, Mullan B. Respiratory Support Using Nasal High Flow Oxygenation During an "Awake Throughout" Craniotomy to Maximize Safety in an Obese Patient With Suspected Obstructive Sleep Apnea. In: Neuro Anaesthetic and Critical Care Society of Great Britain and Irelands Annual Scientific Meeting. Southampton; 2016.

Corresponding Author/Sorumlu Yazar: Adam Reese
E-mail: areese@kumc.edu

DOI: 10.5152/TJAR.2018.67878