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SOCIETY FOR NEUROSCIENCE IN ANESTHESIOLOGY AND CRITICAL CARE

ARTICLE OF THE MONTH

Postoperative Nausea and Vomiting After Craniotomy: An Evidence – based Review of General Consideration, Risk Factors and Management.

Uribe AA, Stoicea N, Echeverria-Villalobos M, Todeschini AB, Esparza Gutierrez A, Folea AR, Bergese SD

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Welcome to another session of Article of the Month, September 2021. After a successful annual meeting, this month we discuss the following article: Postoperative Nausea and Vomiting After Craniotomy: An Evidence – based Review of General Consideration, Risk Factors and Management. Commentary by Dr. Nahemah Hasanaly and Dr.Tumul Chowdhury.

As always, we encourage our readers' input on this topic on the SNACC **Twitter** feed, or on **Facebook**.

- Shilpa Rao MD, Amie Hoefnagel, MD, Oana Maties, MD and Nina Schloemerkemper, MD..

Dr. Nahemah Hasanaly - Biographical sketch
Dr. Nahemah Hasanaly is currently pursuing her fellowship in Neuroanesthesiology at Toronto Western Hospital, University of Toronto, Canada. She completed her anesthesiology residency program under National University of Malaysia in 2016 and had served several state hospitals before embarking towards neuroanesthesiology and trauma subspecialty in Hospital Kuala Lumpur since 2019. Her interests are mainly neuroanesthesiology, airway and regional anesthesia.

Dr.Tumul Chowdhury - Biographical sketch
Dr. Chowdhury is a staff anesthesiologist at Toronto Western Hospital and clinician investigator at University Health Network, Toronto. He is the Vice chair of Neuroanesthesiology Section of Canadian Anesthesiologists' Society. He serves as an assistant editor of Newsletter, SNACC as well as member of Training Engagement Committee and Clinical affair committees, SNACC. His research interests include impact of anesthetics on brain cancer survival/progression, heart and brain interactions, trigeminal cardiac reflex and Ischemic stroke.

Commentary

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Postoperative nausea and vomiting (PONV) is the second most common complication seen after craniotomy. The etiology of PONV can be multifactorial but neurosurgery is an independent risk factor to develop PONV.[1] The effect of emesis can be deleterious after craniotomy due to uncontrolled increased blood pressure from sympathetic stimulation, and the projectile reflex of vomiting increases intraabdominal and intrathoracic pressure which can directly translate to intracranial pressure which increases the risk of post craniotomy bleeding. In addition, there is risk of aspiration from vomiting that can cause impaired in ventilation. It was indeed a pleasure to read this systemic review from the group that had actively published a few articles on PONV in patient undergoing craniotomy particularly on the antiemetic therapy.

Authors have divided the risk factors in to three major categories. The summary of each component of the risk factors are simple and easy to comprehend.

i) Patient related factor

While Apfel score is a good indictor to predict risk of PONV, it would be of more interest to look it from the perspective of a neurosurgical patient e.g. traumatic brain injury, patient with low Glasgow Coma Scale (GCS) or patient with preexisting high intracranial pressure.

ii) Surgery related factor

Neurosurgery is an independent risk factor for PONV. Since the vomiting center and chemoreceptor trigger zone are in the infratentorial region, the incidence of PONV is thought to be higher. However, the evidence is not robust.

It would be interesting to explore the association of certain neurosurgical procedures with increased incidence of PONV. For instance, a study by Venkatraghavan et found that patients who undergone microvascular decompression for trigeminal neuralgia developed postoperative headache with nausea and vomiting. Despite the standard analgesia and antiemetic used (dexamethasone and ondansetron), they found sumatriptan, a 5HT3 agonist were able to reduce post-operative headache as well as nausea and vomiting.[3] Indeed, the pain is another important factor that can contribute to nausea and vomiting. Different surgical procedures may alter management of PONV based on their possible etiologies instead.

iii) Anesthesia related factor

Anesthesia is an integral part of the surgery. The comparison of awake to asleep craniotomy would be equivalent to compare regional anesthesia to general anesthesia in a way of minimal drugs used to achieve anesthesia with minimal side effect by multiple drugs interaction. The principle of anesthetic management for the awake craniotomy has changed over the years. The conduct of anesthesia has changed from a moderately sedated to minimal sedation to the patient throughout the surgery as evaluation of the eloquent area is important. The total intravenous anesthesia (TIVA) with propofol is associated with less PONV incidence. On the other hand, the risk of PONV with inhalational agent are both dose and duration dependent. The duration of surgery less than 2 hours was associated with a higher incidence of PONV while those of surgery more than 6 hours showed no difference incidence of PONV in both balanced inhalational anesthesia and TIVA. Likewise, a study by Uchinami Y. et al. that compare effect of combination low dose sevoflurane of 0.8% and propofol versus propofol alone for laparoscopic gynecology surgery showed that there were no increase incidence of PONV in both group.[4]

However, the balance between antiemetic property of propofol and the smooth and rapid emergence from the anesthesia with the inhalational agents for a craniotomy is still a dilemma for the neuroanesthesiologist. In relation to PONV incidence, it would be also interesting to explore the role of depth of anesthesia in such population; however, due to the lack of well-designed randomized study in this area limit any concrete conclusion.

PONV prophylaxis in craniotomy

It was with a great length of discussion elaborated by the authors on the treatment for PONV from a single to dual

pharmacological therapy as well as nonpharmacological therapy. Dual therapy with either 5HT3 receptor antagonist or NK1 receptor antagonist with steroid has proven in multiple randomized controlled trial to be able to reduce incidence of PONV.

In conclusion, a reduction of the baseline risk can be achieved by modification of the anesthetic management and recommended anti emetic therapy be given. Thus, further randomized trial should be conducted to provide good clinical evidence for multimodal antiemetic algorithm to reduce PONV after craniotomy.

References

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3. L. Venkatraghavan et al. Sumatriptan improves postoperative quality of recovery and reduces postcraniotomy headache after cranial nerve decompression.2016. *British Journal of Anaesthesia*, 117 (1): 73–9

4. Uchinami Y. et al. Incidence of postoperative nausea and vomiting is not increased by combination of low concentration sevoflurane and propofol compared with propofol alone in patients undergoing laparoscopic gynecological surgery.2019 *JA Clinical Reports* 5:70