Pediatric Neuroanesthesia

Meghan Williams, SAA, Nova Southeastern University

Abstract

There is a challenging task that an anesthesia provider faces when caring for a pediatric patient during neurosurgery due to the lengthy procedures, demands of surgeon, and maintaining homeostasis. The goal is to inform anesthesia providers in a condensed, accurate manner the considerations, risks, and the route that needs to be taken in order to provide the best anesthetic plan. This review is intended to educate anesthesia providers of the anatomical and physiological differences of the pediatric population and the anesthetic implications that need to be considered to ensure safe and desirable results.

Introduction

Pediatric care alone is a challenging task for any care provider, as a pediatric patient's make up differs greatly than an adult. The biggest concern any anesthesia provider should have before working with pediatrics is to ensure they have knowledge of the anatomy and pathology of a child. The development and maturation of pediatrics is critical during the first years of life, and to titrate our drugs and care around this crucial stage. Pediatric anesthesia is a challenging task for providers, and one must ensure careful consideration into the methods and drugs used. This article will guide providers to ensure safety and adequate maintenance of hemodynamic stability of the pediatric population.

Differences

Pediatrics have unique features that require a strong foundation of the anatomical and physiological differences seen in the multiple systems throughout the body. The most common airway problem in infants and young children is upper airway obstruction (Barash et al. 2013). Due to an infant's tongue being relatively larger than their mouth and the epiglottis having an omega shape, these features pose difficulty in inserting a laryngoscope blade and displacing the tongue in order to intubate. The development of the central nervous system is incomplete at birth and does not fully mature until 1 year of age. Oxygen consumption in the brain of children is 50% greater than in adults. As a result, cerebral blood flow (CBF) differs substantially" (Barash et al. 2013). Due to children having a higher cerebral metabolic rate for oxygen (CMRO2) and increased oxygen consumption leads to them having less of a tolerance for hypoxia.

Discussion

Neurosurgical problems in pediatrics can often be quite difficult and complex. They can be a challenging task for anesthesia providers due to the goal of maintaining hemodynamic stability. Intraoperatively, anesthesia providers must be cautious to avoid any bradycardic events. Children's cardiac output is very sensitive to changes in heart rate. Patients that undergo episodes of prolonged bradycardia can lead to hypotension, asystole, and intraoperative death (Morgan and Mikhail, et al. 2021). It is very important for the anesthesia team to be aware of any changes in heart rate, and if it drops below 60, chest compressions must be started immediately.

Conclusion

Practicing anesthetists should be mindful of all the anatomical and physiological differences in the pediatric population, carefully outweighing the choices in constructing an anesthesia plan, and providing safety for the patient perioperatively. Furthermore, homeostasis and hemodynamic stability should be a priority, and complications must be quickly assessed and treated. A pediatrics prior history coupled with a well-rounded physical and neurological exam will direct the anesthetic plan towards the best possible outcome.

References

Barash, P. G. (2017). Pediatric Anesthesia. In *Clinical Anesthesia* (8/E ed.). Lippincott Williams & Wilkins.

Hines, R. L., & Marschall, K. E. (2012). Pediatric Diseases (Chapter 27). *Handbook for Stoelting's Anesthesia and Co-Existing Disease*. Saunders.

Kalita, N., Goswami, A., & Goswami, P. (2017). Making Pediatric Neuroanesthesia Safer. *Journal of Pediatric Neurosciences*, *12*(4). doi.org/10.4103/jpn.jpn_173_17

Morgan And Mikhail, B. (2021). Pediatric Anesthesia. In *Clinical Anesthesiology* (Chapter 42). (6/E ed.). McGraw Hill.

Soriano, S. G., Eldredge, E. A., & Rockoff, M. A. (2007). Pediatric Neuroanesthesia. *Neuroimaging Clinics of North America*, *17*(2), 259–267.