

Cambridge University Press

978-1-107-06977-0 — Essentials of Anesthesia for Infants and Neonates

Edited by Mary Ellen McCann , Edited in association with Christine Greco , Kai Matthes

Frontmatter

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Preface

The mortality of infants in the United States during the last 100 years has decreased from approximately 100 infants for every 1000 births to about 7 infants for every 1000 births. Most of the decline in infant mortality has been due to improvements in medical care, sanitation, improved standards of living, and better nutrition. But relatively speaking, infancy is still the time of highest mortality during childhood. In some studies, almost 10 percent of children will undergo an anesthetic in the first year of life. The leading cause of neonatal death is prematurity, accounting for 30 percent of all deaths in the first month of life. The leading cause of infant death is congenital cardiac disease, with about 25 percent of neonatal deaths attributed to heart defects.

There are great concerns within the pediatric anesthesia community about effects of anesthetic exposure during infancy on long-term neurologic development in humans. Many juvenile animal studies have shown that exposure to a wide variety of general anesthetics and sedatives at a young age lead to widespread neuroapoptosis and brain cell death. In addition, when these exposed animals are allowed to reach maturity, they demonstrate learning difficulties. Several human studies have shown an association between anesthetic exposure before the age of four years and later neurocognitive deficits. It is not clear that general anesthetic exposure causes learning disabilities or is just a marker for other possible causes, such as the effects of the surgery itself or the underlying reasons that these young children require surgery.

There is ongoing research in humans to try to determine whether general anesthesia is neurotoxic. The epidemiologic studies have been confounded by the effects of surgery and presurgical pathology on the neurodevelopment of babies. Prospective studies examining the effects of general anesthesia on human development have shown that there are great hemodynamic differences between general anesthesia compared with awake regional anesthesia in young infants. Physiologically there are great differences in infants compared to older children and adults, which may not always be intuitive to anesthesiologists who do not routinely care for very young infants. It is very possible that aspects of general anesthesia other than neurotoxicity may predispose young infants to later learning disabilities. Other factors might include overwarming the infants, hypocapnia and hypotension under anesthesia, and hypo- or hyperglycemia. Over the last ten years there has been lots of research that has demonstrated the importance of hemodynamic and other physiologic variables in the care of newborns in critical care nurseries and the operating room.

This textbook focuses on the practical aspects of anesthesia care for our youngest patients. Interwoven through the chapters is information about the development and changing physiology of infants and how this should impact anesthetic practice. The chapters are written by nationally recognized experts in their topics who focus on state-of-the-art, evidence-based practice.