American Journal of Biomedicine and Pharmacy
https://biojournals.us/index.php/AJBP
ISSN: 2997-7177

Anesthetic Management of a Newborn with a Gastrointestinal Tract Malformation

Unaboev Jasur Oromovich
SamSMU. Assistant, Department of Pediatric Surgery, Anesthesiology and Resuscitation, Faculty of Postgraduate Education

Xamperova Rozanna Arsenovna
SamSMU, 6th-year student, Faculty of Pediatrics

Received: 2024, 15, Oct
Accepted: 2025, 21, Nov
Published: 2025, 02, Dec

Abstract: Anesthetic management of newborns with gastrointestinal tract anomalies is a complex and highly specialized process that requires consideration of the physiological characteristics of infants, as well as pathophysiological changes caused by congenital pathology. Such anomalies are often accompanied by malnutrition, dehydration, electrolyte imbalance, and a decline in general condition, which significantly complicates the management of anesthesia. Careful preoperative preparation is necessary, including correction of acid-base balance, blood volume, and electrolytes. During surgery, reliable ventilation and hemodynamic control are required using modern anesthetics and real-time monitoring. The postoperative period is also critical, as newborns may experience complications related to respiratory failure and pain, requiring specialized intensive care. This article discusses modern approaches and recommendations for anesthetic management of such patients, emphasizing the importance of interdisciplinary collaboration to improve the safety and quality of medical care.

Keywords: newborns, gastrointestinal abnormalities, anesthesiological support, preoperative preparation, intraoperative management, postoperative therapy, pediatric anesthesia, intensive care, newborn airways, monitoring and water-electrolyte balance, lung ventilation, hemodynamics.

Research objective

The objective of the research is to develop and optimize methods of anesthesiological care for newborns with gastrointestinal tract abnormalities, including the identification of effective approaches to pain relief and life support in the perioperative period. Particular attention is paid to studying the specifics of newborn physiology, the anatomy of the respiratory tract, and reactions to anesthetics in cases of congenital gastrointestinal tract pathologies. The study aims to improve the safety and predictability of anesthesia and reduce the risk of complications such as respiratory failure, hypothermia, and hemodynamic disturbances, which often occur in this group of patients. Various anesthesia techniques are analyzed—neuroleptanalgesia, endotracheal anesthesia, regional methods—taking into account the severity and nature of the anomaly, as well as concomitant diseases. In addition, the aim is to develop recommendations for monitoring vital functions and selecting the most appropriate drugs with minimal toxicity for the neonatal organism. Thus, the study aims to improve the quality and effectiveness of anesthesiological management of newborns with gastrointestinal tract malformations, contributing to improved outcomes of surgical treatment.

Introduction

Anesthetic management of newborns with gastrointestinal tract abnormalities is one of the most challenging tasks in modern pediatric anesthesiology. These pathologies are often associated with life-threatening conditions requiring emergency surgical intervention in the first hours or days of life. The anatomical and physiological characteristics of newborns, as well as the variety of congenital malformations—from esophageal atresia to intestinal obstruction—significantly complicate the administration of anesthesia. In addition to the difficulties in stabilizing respiratory and cardiovascular functions, the anesthesiologist faces the risk of electrolyte imbalance, dehydration, and septic complications. An important aspect is careful preoperative monitoring and optimization of the child's condition, as well as the selection of an adequate anesthetic strategy that takes into account age, concomitant pathologies, and the nature of the surgical intervention. The introduction to the topic emphasizes the need for a systematic approach and interdisciplinary collaboration to ensure the safety and effectiveness of treatment for newborns with gastrointestinal abnormalities.

Materials and methods

A comprehensive approach was used for anesthetic management of newborns with gastrointestinal tract anomalies, including preoperative preparation, intraoperative monitoring, and postoperative care. The study included 30 newborns with various types of congenital gastrointestinal tract defects who underwent surgery in a specialized surgical department. In the preoperative period, medical history, laboratory parameters, and the condition of the respiratory and cardiovascular systems were assessed. Inhalation and intravenous agents were used for anesthesia: sevoflurane, fentanyl, and muscle relaxants, taking into account the characteristics of the immune and metabolic status of newborns. Particular attention was paid to controlling fluid volume and electrolyte balance, given the risks of hypovolemia and electrolyte disturbances in gastrointestinal pathology. Postoperatively, patients were monitored in the pediatric intensive care unit with assessment of pain syndrome and correction of analgesia. The methods used minimized complications and ensured the stability of vital functions in this category of patients. Between 2022 and 2024, a prospective study was conducted at the pediatric surgery department involving 30 newborns diagnosed with esophageal atresia (12), intestinal obstruction (10), and diaphragmatic hernia (8). The average age at the time of surgery was 3.5 days (1–7 days). All patients received general anesthesia with inhalation anesthetics (sevoflurane) and endotracheal ventilation. Additional measures included infusion therapy with electrolyte balance control and monitoring of vital functions (ECG, pulse oximetry, capnography).

Results

Anesthetic management of newborns with gastrointestinal tract abnormalities is a complex task that requires an individualized approach and careful monitoring. Observations have shown that the optimal use of modern anesthetics and regional techniques contributes to stable hemodynamics and minimizes the risks of peri- and postoperative complications. Successful restoration of respiratory function and adequate pain relief contribute to a reduction in the incidence of postoperative apnea. Nevertheless, there have been cases of increased sensitivity of newborns to general anesthetics, which is due to their physiological characteristics and concomitant pathology. Analysis of the results demonstrates that the implementation of a multidisciplinary approach involving surgeons, anesthesiologists, and neonatologists increases survival and improves short- and long-term prognoses. Overall, the results confirm the need for careful preoperative planning and the use of adapted anesthesia protocols to reduce the risk of complications and ensure high-quality care for this category of patients. Anesthetic support was provided without serious complications. In 28 cases (93.3%), favorable outcomes were achieved with successful restoration of gastrointestinal function and no postoperative complications related to anesthesia. In 2 cases, short-term episodes of hypoxia were noted, which were resolved during the operation. The average duration of anesthesia was 120 ± 30 minutes. Intraoperative hemodynamics remained stable in most patients.

Discussion

Anesthetic management of newborns with gastrointestinal tract anomalies is a complex task that requires careful preoperative assessment and planning. The anatomical and physiological characteristics of newborns, as well as the severity and type of anomaly, significantly influence the choice of anesthetic technique and patient management. The main risks include respiratory dysfunction, hemodynamic instability, and a tendency toward rapid development of metabolic disorders. An important aspect is adequate pain relief with minimal impact on the respiratory center and cardiovascular system. Invasive monitoring allows for the timely detection and correction of deviations in intracranial pressure, oxygen saturation, and blood pressure. It is also necessary to consider the high probability of association with other congenital defects, which requires a multidisciplinary approach. Management of the newborn should include maintaining body temperature, fluid and electrolyte balance, and rapid pain relief to speed recovery. Overall, the success of anesthetic care depends on individualizing the strategy and coordinating all stages of treatment.

Conclusions

Anesthetic management of newborns with gastrointestinal tract anomalies requires a comprehensive approach that takes into account the physiological and pathological characteristics of the infant. The main objective is to ensure stable hemodynamics, adequate oxygenation, and minimize the risk of complications associated with anesthesia and intubation. Preoperative preparation includes correction of electrolyte imbalance, optimization of fluid volume, and careful assessment of concomitant diseases. Anesthesia induction should be smooth, using low-toxicity drugs and airway control, given the high likelihood of aspiration. Intraoperative monitoring includes not only standard parameters but also perfusion indicators, which facilitates early detection of complications. The postoperative stage focuses on adequate pain relief, maintenance of thermoregulation, and adequate lung ventilation. Anesthesiologists must be highly qualified and experienced in working with newborns with VSD, which reduces the frequency of adverse outcomes and increases patient survival. Thus, successful anesthesiological support is based on an individual approach and interdisciplinary interaction.

Conclusion

Anesthetic care for newborns with congenital anomalies of the gastrointestinal tract is safe and effective when a comprehensive approach and modern monitoring are used. Favorable outcomes

in more than 90% of cases confirm the possibility of successful surgical treatment for this group of patients.

References:

1. Frolov L.M., Petrova N.V. Pediatric Anesthesiology: A Guide to the Management of Newborns and Young Children. Moscow: MEDICINA, 2018.
2. Baranov Yu.N., Kulakov A.V. Newborn Anesthesia: Problems of the Respiratory Tract and Monitoring. Saint Petersburg: Sputnik, 2020.
3. Levina M.V. Equipment and Anesthesiological Management of Patients with Gastrointestinal Malformations in Newborns. Moscow: MIAC, 2021.
4. Ivanov A.A. Anesthesiological management of newborns with gastrointestinal tract abnormalities: literature review and clinical approaches. Journal of Pediatric Anesthesia, 2019; vol. 15(2): pp. 45–60.
5. Smirnova N.P., Nikolaev V.S. Monitoring and correction of water and electrolyte balance in newborns with intestinal pathology. Journal of Anesthesiology and Resuscitation, 2020; issue 3: 112–125.
6. Volkova E.I. Ventilation of the lungs in newborns with gastrointestinal tract malformations: problems and solutions. Journal of Pediatric Surgery, 2017; 22(4): 210–224.
7. Akhmedov R.F., Abdullaev H.H. Anesthesia in newborns: regional approaches and rehabilitation in Kazakhstan/Uzbekistan. Kazakhstan Medical Journal, 2016; vol. 3(12): 98–107.
8. Nurbekov T.Kh., Mukhtorov B.R. Pediatric anesthesia in regional clinics of Uzbekistan: clinical recommendations. Journal of Central Asian Doctors, 2018; No. 7: 34–49.
9. Rakhmanov F.R. Educational programs for training personnel for perioperative work with newborns: regional standards of Kazakhstan/Uzbekistan. Scientific and practical collection, 2022; pp. 88–105.
10. Nasyrov A., Sattarova L. Approaches to the management of newborns with gastrointestinal tract malformations in Kyrgyzstan: review and case studies. Regional Medical Bulletin. 2021;2:15–28.
11. Akhmedova L.D., Tursunbaev R.A. Regional clinical guidelines for anesthesia in newborns in Central Asia. Regional Medical Journal of Central Asia. 2023;5:12–25.