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Original Research Article

Perioperative Complications in Pediatric Anesthesia in a Resource-Limited Country: Experience at the University Hospital of Conakry, Guinea

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Abstract: ***Objective*****:** To assess the incidence and nature of perioperative complications in pediatric anesthesia at the University Hospital Center (CHU) of Conakry. ***Material and Methods*****:** This was a prospective, descriptive study conducted over a period of eight (8) months, from June 1, 2024, to January 31, 2025, at the CHU of Conakry. Included were children under 18 years of age who underwent elective or emergency surgical procedures and experienced intraoperative or postoperative complications within 15 days of surgery, with obtained consent. ***Results*****:** Out of 452 surgical procedures, 124 intraoperative complications (27.4%) and 176 postoperative complications (38.9%) were recorded. The mean age of the children was 6 ± 5 years, with the majority classified as ASA I (71.68%) and a sex ratio of 1.22. Visceral surgery was the most common (79.65%), followed by orthopedics (10.62%), neurosurgery (4.42%), otolaryngology and urology (2.66% each). Procedures were elective in 65.5% of cases. Appendicitis (25.66%), peritonitis (16.81%), and intestinal obstruction (9.73%) were the main indications. The most frequent complications were infectious (45.65%), hemorrhagic (36.96%), and cardiovascular (17.39%). ***Conclusion*****:** This study highlights the need to improve perioperative safety in pediatric anesthesia, particularly in resource-limited countries. Optimizing anesthetic and surgical practices is essential to reduce pediatric morbidity and mortality and to improve postoperative outcomes.

Keywords: Pediatric anesthesia, Perioperative complications, Morbidity and mortality, CHU Conakry.

INTRODUCTION

Pediatric anesthesia represents a major challenge within healthcare systems, particularly in resource-limited countries, where logistical constraints, lack of appropriate equipment, and a shortage of qualified personnel can significantly increase the risk of perioperative complications (Walker IA *et al*, 2008; Enright A *et al*, 2012).

Children possess unique physiological characteristics such as immature respiratory, cardiovascular, and metabolic systems which make them more vulnerable to adverse events during the perioperative period (Coté CJ *et al.*, 2019). In high-income countries, technological advancements and the optimization of anesthetic protocols have led to a significant reduction in pediatric anesthesia-related morbidity and mortality (Habre W *et al*, 2017).

In contrast, in low-resource settings, the rate of perioperative complications remains concerning, with anesthesia-related mortality reported to be up to 100 to 200 times higher than in developed countries (Dubowitz G *et al*, 2010; Walker IA *et al*, 2008). The most commonly reported complications include hypoxia, hemodynamic instability, infectious complications, and hemorrhage (Newton MW *et al*, 2006). Thorough risk assessment, multidisciplinary management, and enhanced monitoring are essential to improving outcomes in this vulnerable population.

The objective of this study was to assess the incidence and nature of perioperative complications in pediatric anesthesia at the University Hospital Center (CHU) of Conakry.

MATERIAL AND METHODS

This was a prospective, descriptive study conducted over a period of eight (8) months, from June 1, 2024, to January 31, 2025, at the University Hospital Center (CHU) of Conakry. The study was carried out

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jointly in the pediatric surgery and anesthesia–intensive care departments.

Inclusion and Exclusion Criteria

We included children under the age of 18 who underwent surgical procedures under general anesthesia and experienced one or more complications during the perioperative period, defined as the time from anesthesia induction to the 15th postoperative day. Inclusion was conditional upon obtaining informed consent from the parents or legal guardians.

We excluded patients with missing or incomplete medical records, and cases where consent was either refused or withdrawn by the parents or legal guardians.

Operational Definitions :

- Perioperative period: the time frame extending from the induction of anesthesia to the 15th postoperative day.
- Perioperative complications: any adverse event occurring during this period, including but not limited to respiratory, cardiovascular, infectious, hemorrhagic, or metabolic complications.

Variables Studied

- The main variables analyzed were:
- Sociodemographic: age, sex, weight;
- Clinical and anesthetic: ASA classification, type of anesthesia, duration of surgery, surgical context (elective or emergency);
- Surgical: type and nature of the procedure;
- Outcome-related: occurrence of intraoperative or postoperative complications, length of hospital stay, and final outcome (recovery, prolonged complications, or death).

Data Collection

Data were collected using a standardized survey form. Postoperative monitoring was carried out in the recovery units and inpatient wards, with regular follow-up until the 15th postoperative day.

Data Entry and Analysis

Data entry was performed using Microsoft Word (Office 2016), and statistical analysis was carried out with Epi Info 7.2.5 software.

- Quantitative variables were expressed as means ± standard deviations.
- Qualitative variables were presented as frequencies and percentages.

Ethical Considerations

Ethical approval for the study was obtained from the CHU Conakry ethics committee. Informed consent was obtained from the parents or legal guardians of all participants prior to inclusion. Data confidentiality and anonymity were strictly maintained throughout the data collection and analysis process.

RESULTS

Out of a total of 452 surgical procedures, we recorded 124 intraoperative complications, representing a frequency of 27.4%. In the postoperative period, 176 complications were noted, corresponding to a frequency of 38.9%.

Male patients were slightly more represented than females, with a sex ratio of 1.22. The mean age of the children was 6 ± 5 years, with the most frequent age group being 6 to 10 years. The majority of children were classified as ASA I (71.68%).

Regarding the type of surgery, the majority of patients underwent visceral surgery, which accounted for 79.65% of the total, with 360 cases. Orthopedic surgery represented 10.62%, with 48 interventions. Neurosurgical and otolaryngology procedures were less frequent, representing 4.42% and 2.66% respectively, with 20 and 12 cases. Urological/renal surgeries also accounted for 2.66%, with 12 interventions **(Table I).**

Scheduled surgeries accounted for 65.5% of the cases. Among surgical indications, appendicitis was the most common, observed in 25.66% of cases, followed by peritonitis (16.81%) and intestinal obstruction (9.73%).

The most frequent intraoperative complications were cardiovascular instability, affecting 38.71% of the children, followed by severe hypoxia, observed in 22.58% of cases **(Figure 1).**

Postoperative complications were mainly infectious in origin, representing 45.65% of cases, with a high prevalence of wound suppuration, which accounted for 90.48% of infectious complications. Hemorrhagic complications represented 36.96%, while cardiovascular complications accounted for 17.39%, of which 62.5% were arrhythmias **(Figure 2)**.

Table I: Distribution of Patients by Type of Surgery

Type of surgery	Workforce (N= 452)	Percentage
Neurosurgery	20	4,42
Visceral	360	79,65
Otolaryngology	12	2,66
Orthopedic	48	10,62
Urology	12	2,66
Total	**452**	**100**

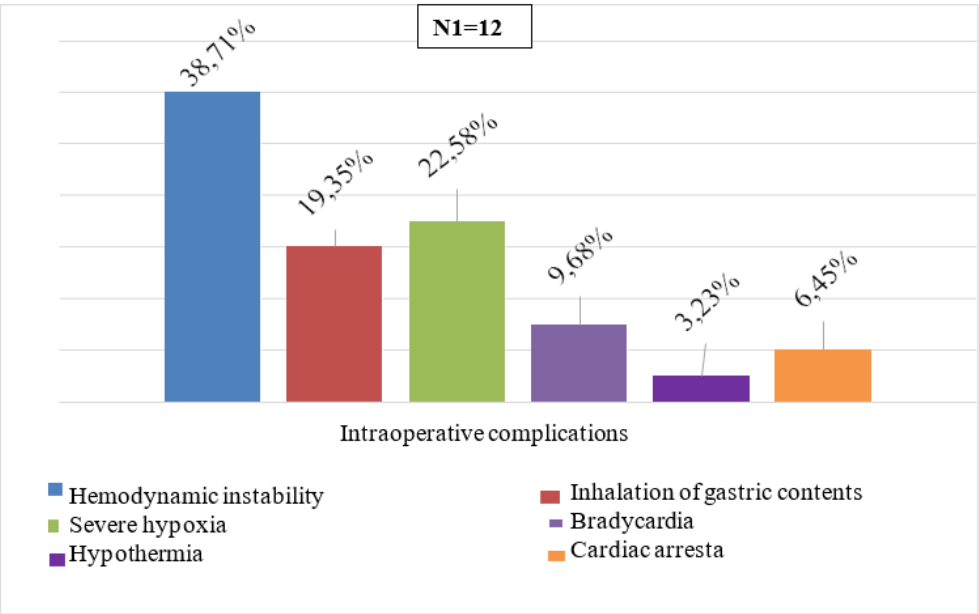

Figure 1: Patient with Intraoperative Complications

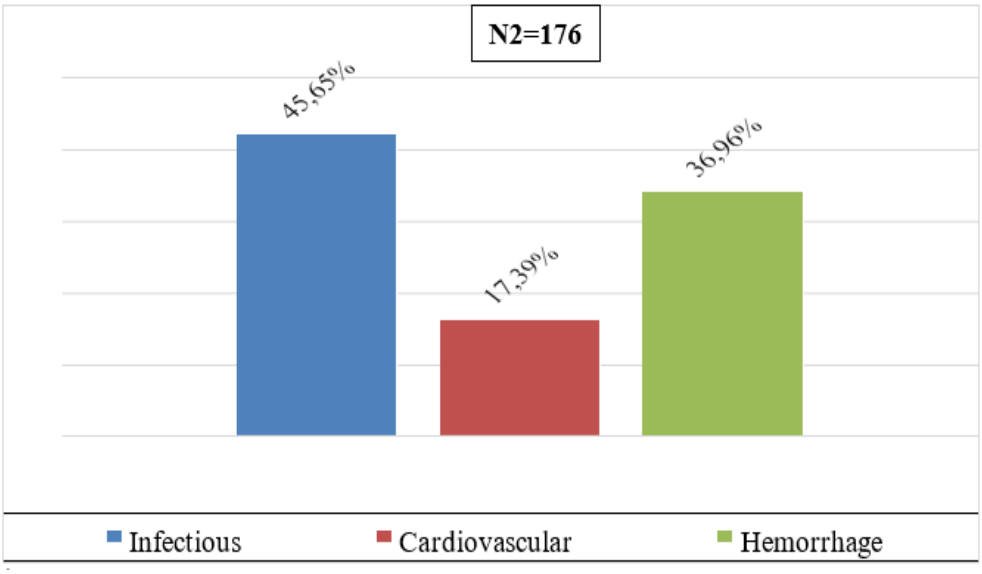

Figure 2: Patient with Post-Operative Complications

DISCUSSION

In this study conducted at the University Hospital Center (CHU) of Conakry, we observed a slight male predominance among the operated children, with a sex ratio of 1.22. This finding is consistent with several African and international studies, notably those by Ameh EA *et al* (2000) and Bickler SW *et al.*, (2002), which reported a higher proportion of boys in pediatric surgical services likely due to the increased incidence of certain surgical conditions in males, such as appendicitis and acute intestinal intussusception.

The mean age of 6 ± 5 years, with a predominance in the 6 to 10-year age group, also reflects trends observed in similar settings, as reported by Newton MW *et al.*, (2006), where the majority of surgical interventions involve school-aged children. The predominance of ASA I patients (71.68%) reflects a population in generally good preoperative health, which is typical in elective pediatric surgery (Coté CJ *et al*, 2019).

Regarding the types of surgery performed, visceral surgeries accounted for nearly 80% of the cases. This high proportion is explained by the prevalence of acute abdominal pathologies, such as appendicitis (25.66%), peritonitis (16.81%), and intestinal obstruction (9.73%), which are leading surgical indications in pediatric care in resource-limited settings (Ologunde R *et al.*, 2014; Sani R *et al*, 2009).

Perioperative complications were observed in 27.4% of patients, with the most frequent being

cardiovascular instability (38.71%) and severe hypoxia (22.58%). These findings are consistent with the multicenter APRICOT study led by Habre W *et al* (2017), which also reported a non-negligible incidence of serious intraoperative complications in pediatric anesthesia, even in European countries. However, in African settings, these figures tend to be higher due to the lack of continuous monitoring, qualified personnel, and appropriate equipment (Walker IA *et al*, 2008).

The frequency of postoperative complications (38.9%) observed in our study is concerning. Infectious complications were the most common (45.65%), largely dominated by wound infections, which represented 90.48% of all infectious complications. This suggests possible deficiencies in perioperative asepsis, antibiotic prophylaxis, or wound care. Such complications are frequently reported in low-resource countries, where operating room and inpatient hygiene conditions are often inadequate (Enright A *et al*, 2012).

Hemorrhagic complications (36.96%) and cardiovascular complications (17.39%), particularly arrhythmias (62.5% of cardiovascular events), underscore the need for better anticipation of anesthetic risks and rigorous hemodynamic monitoring during and after surgery. These events are strongly associated with the lack of standardized protocols and inadequate equipment in pediatric operating rooms (Dubowitz G *et al*, 2010).

Our findings highlight the major challenges related to pediatric anesthesia and surgery in low-resource settings. They emphasize the urgent need to strengthen healthcare systems through staff training, improved hygiene practices, and the implementation of locally adapted protocols.

CONCLUSION

This study conducted at the CHU of Conakry reveals a high frequency of perioperative complications in pediatric anesthesia. Most patients were ASA I and underwent surgery for visceral conditions, notably appendicitis. Over a quarter experienced intraoperative complications, mainly cardiovascular and respiratory in nature. Postoperative complications were even more frequent, predominantly due to surgical site infections.

These results reflect gaps in anesthesia safety, linked to a lack of equipment, protocols, and trained personnel. There is an urgent need to strengthen both technical and human capacities, and to improve aseptic practices. Continuous training, context-appropriate protocols, and rigorous patient monitoring are essential. These measures aim to reduce perioperative morbidity and mortality in pediatric anesthesia in Guinea and other low-resource countries.

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- The conception and design of the study, or acquisition of data, or analysis and interpretation of data.
- Drafting the article or revising it critically for important intellectual content.
- Final approval of the version to be submitted.
- Sound scientific research practice

The Authors Further Confirm That:

- The manuscript, including related data, figures and tables has not been previously published and is not under consideration elsewhere
- No data have been fabricated or manipulated to support our conclusions
- This submission does not represent a part of single study that has been split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (e.g. “salami-publishing”).

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The Authors Declare no Conflict of Interest

“The author/s declare that this submission is in accordance with the principles laid down by the Responsible Research Publication Position Statements as developed at the 2nd World Conference on Research Integrity in Singapore, 2010.”

“All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

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