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Original Research Article

Complication of Anesthesia in Children: A Prospective Observational Study

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Abstract: ***Background:*** Any anaesthetic procedure, either regional or general, has some potential for complications. For this reason, careful preoperative assessment and adequate planning of appropriate anesthetic are the cornerstones in safe pediatric anesthetic practice. But in Bangladesh, we have very limited research-based information regarding the complication of anaesthesia in children. ***Aim of the Study:*** The aim of this study was to assess the complications of anesthesia in children. ***Methods:*** This was a prospective observational study. The study was conducted in Department of Aneaesthesia, ICU & Pain Medicine, Shaheed Suharawardy Medical College and Hospital, Dhaka, Bangladesh during the period from January 2018 to December 2018. In total 62 children, aged between 1 day and 15 years prepared for anesthesia associated surgery were selected as the study subjects. The incidence of intra-operative as well as post- anesthesia recovery room complications was recorded and analyzed. Data were analyzed and by using MS Excel and SPSS version 23.0 program as per necessity. ***Results:*** In this study, in analyzing the complications among the participants we observed that, bronchospam and bradycardia and hypotension were the most common intraoperative complications which were found in 11%, 10% and 8% cases respectively. On the other hand, tachycardia, prolonged unconsciousness and hypoventilation were found as the most common postoperative complications among the participants which were found in 19%, 10% and 8% cases respectively. Besides those complications some cases with restlessness, respiratory arrest, pain, shivering, hypertension, hemorrhage and laryngospasm were found in both the periods. ***Conclusion:*** Anesthesia-related morbidity and mortality can be minimized with early identification and prompt management of any complication. In this current study we observed that, preterm infants are major prone to develop respiratory complications because of using anesthesia.

Keywords: Complications, ASA score, Anesthesia, Children, Subarachnoid block, Intraoperative.

INTRODUCTION

There have various complications for any anaesthetic technique, either regional or general. That's why, careful preoperative assessment as well as adequate planning of an appropriate anesthetic are the cornerstones in safe pediatric anesthetic practice. Major differences in anatomy as well as physiology in the small infant have important consequences in many aspects of anesthesia. The physical disparity between the adult and child diminishes at 10 to 12 years of age although major psychological differences continue till adolescence. Pediatric patients differ in their drug requirements because of their smaller sized body, differences in body composition and handling capacity of drugs. Generally, dosages of drugs or anaesthesia are based on body weight, as it correlates so intimately with

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body-water compartments. Pediatric anesthesia morbidity as well as mortality in the perioperative tenure has been studied by Cohen *et al.,* [1]. By the same author, an incidence of 35% was reported. In another study, complications related to anesthesia in infants as well as children were also reported [2]. A study conducted in Nigeria reported an incidence of 10% adverse events in pediatric surgical emergencies [3]. The purpose of this study was to identify both anesthesia-related and post-anesthesia recovery room complications among pediatric patients, management as well as outcome. As it is a very tuff procedure to perform the application of anesthesia among children, the rate and severity of complications can be different regarding the medication facilities, expertise and places. The French-Language Society of Pediatric Anesthesia published their findings of audits performed approximately 10 years apart, both of which found a very low (<0.1% incidence) of long-term complications [4]. Another audit from the United Kingdom, consisting of more than 10,000 epidural catheters, found similar results [5]. The Pediatric Regional Anesthesia Network collects data on every regional nerve block performed or supervised by an anesthesiologist at more than 20 children's hospitals. The first comprehensive analysis of the "Pediatric Regional Anesthesia Network" database examined almost 15,000 blocks [6], followed by focused analyses of specific block types. [7] In this study, we have considered their valuable findings. The major objectives of this study were to assess the complications of anesthesia in children. All the procedures were performed as per the motto of the study.

METHODOLOGY

This was a prospective observational study which was conducted in Department of Aneaesthesia, ICU & Pain Medicine, Shaheed Suharawardy Medical College and Hospital, Dhaka, Bangladesh during the period from January 2018 to December 2018. In total 62 children, aged between 1 day and 15 years prepared for anesthesia associated surgery were selected as the study subjects. Proper written consents were taken in favor of all the participants before data collection. The whole intervention was conducted in accordance with the principles of human research specified in the Helsinki Declaration [8] and executed in compliance with currently applicable regulations and the provisions of the General Data Protection Regulation (GDPR) [9]. In the data sheet, we included age, sex, ASA scores, premedication indication and type of surgery, induction agents, anesthesia technique and agents used for maintenance of anesthesia, analgesics, "intraoperative and recovery room complications", management along with outcomes. In the recovery rooms, the unconscious cases were nursed in the lateral position. Standard observations included conscious state, respiration, color, pulse rate and blood pressure. According to the exclusion criteria of this study, severely ill patients, older than 16 years' cases and patients with incomplete data were excluded. All the demographic and clinical data of the participants were recorded. A predesigned questioner was used in data collection. All data were processed, analyzed and disseminated by using MS Excel and SPSS version 23.0 program as per necessity.

RESULTS

In this study, among total 62 participants, 55% were male whereas the rest 45% were female. So male participants were dominating in number and the male-female ratio was 1.2:1. In this study, the highest number of participants were from <5 years' age group who were 42%. Besides those, 31% were from 5-10 years and the rest 27% were from 11-15 years' age groups. In majority of the cases (68%), ASA I score was found. Besides this, in 19% and 6% cases ASA II and ASA III scores were found respectively which were noticeable. In about half (48%) of our total patients, general surgery was performed. On the other hand, in 18%, 13%, 10%, 8% and 3% cases ENT, orthopedics, maxillofacial, ophthalmic and cardiothoracic surgery were performed respectively. In this study, among all the participants, in majority (87%), general anaesthesia was used. Besides this in some cases, 'general anesthesia with local infiltration (5%)', 'general anesthesia with caudal block (6%)' and 'subarachnoid block (2%)' was applied. In this study, in analyzing the complications among the participants we observed that, bronchospam and bradycardia and hypotension were the most common intraoperative complications which were found in 11%, 10% and 8% cases respectively. On the other hand, tachycardia, prolonged unconsciousness and hypoventilation were found as the most common postoperative complications among the participants which were found in 19%, 10% and 8% cases respectively. Besides those complications some cases with restlessness, respiratory arrest, pain, shivering, hypertension, hemorrhage and laryngospasm were found in both the periods.

Table 1: ASA score distribution among the participants (N=62)

ASA Score	n	%
ASA I	42	68%
ASA II	12	19%
ASA III	4	7%
ASA IV	2	3%
ASA V	2	3%

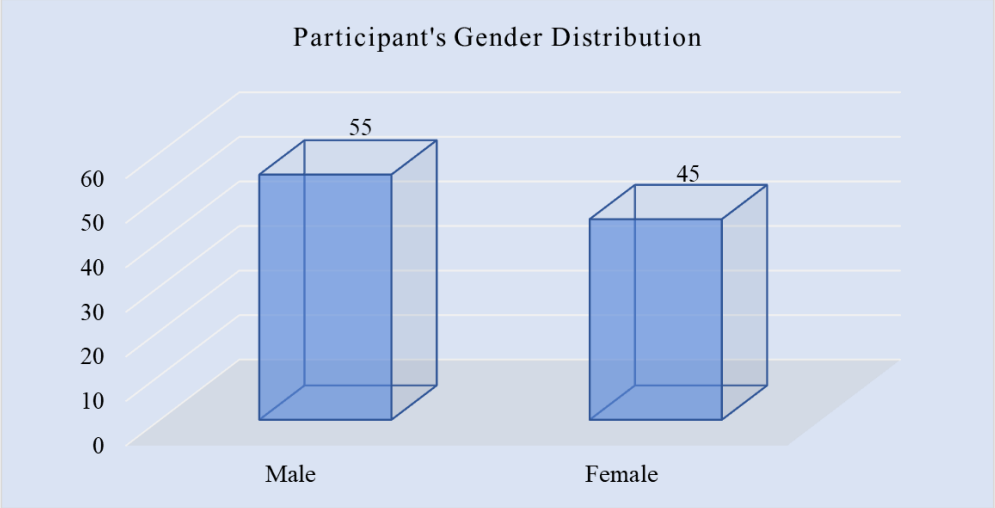

Figure I: Bar chart showed Distribution of participants by gender (N=62)

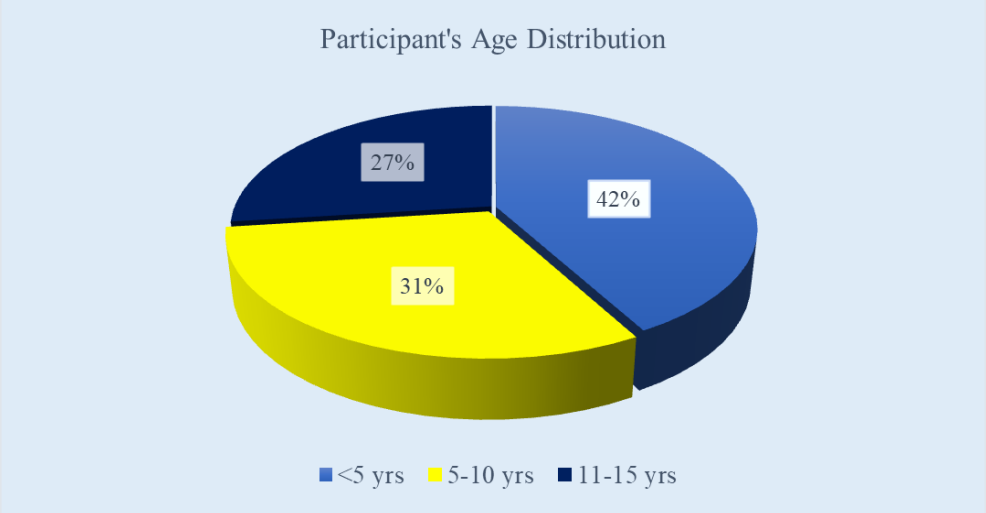

Figure II: Pie chart showed, Distribution of participants by age (N=62)

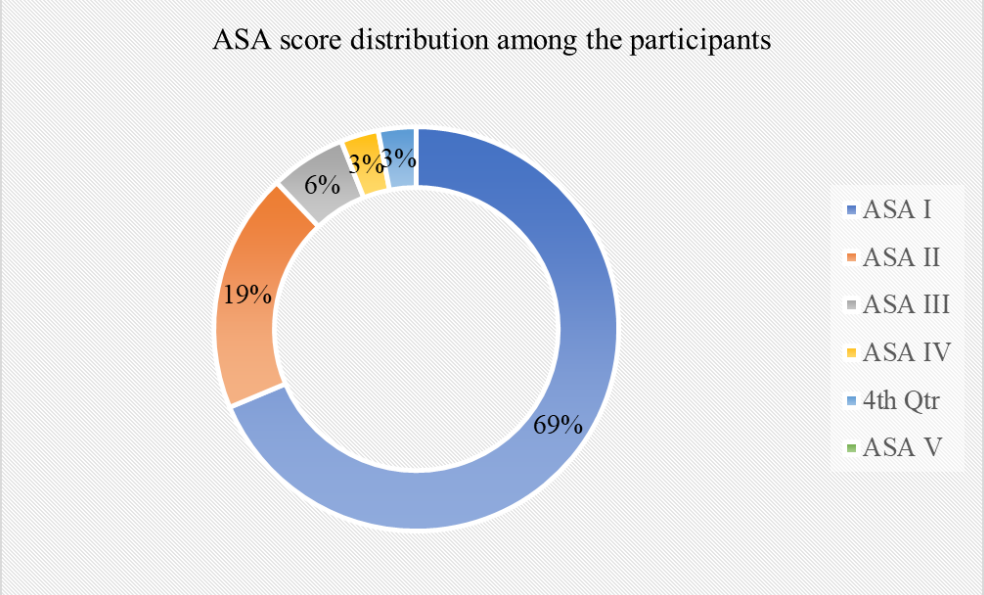

Figure III: Pie chart showed ASA score distribution among the participants (N=62)

Table 2: Distribution of surgical procedures among the participants (N=62)

Surgical Procedures	n	%
General surgery	30	48%
ENT	11	18%
Orthopedics	8	13%
Maxillofacial	6	10%
Ophthalmic	5	8%
Cardiothoracic	2	3%

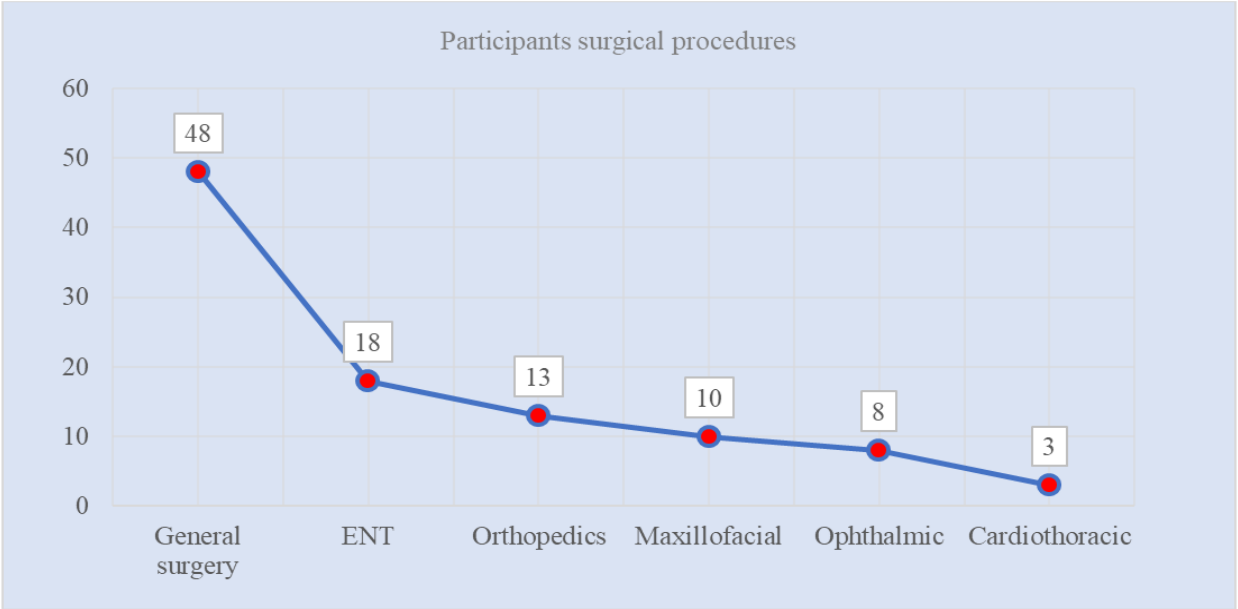

Figure III: Line chart showed, Surgical Procedures of the participants (N=62)

Table 3: Distribution of anesthesia technics among the participants (N=62)

Technique	n	%
General anesthesia	54	87%
General anesthesia & local infiltration	3	5%
General anesthesia & caudal block	4	6%
Subarachnoid block	1	2%

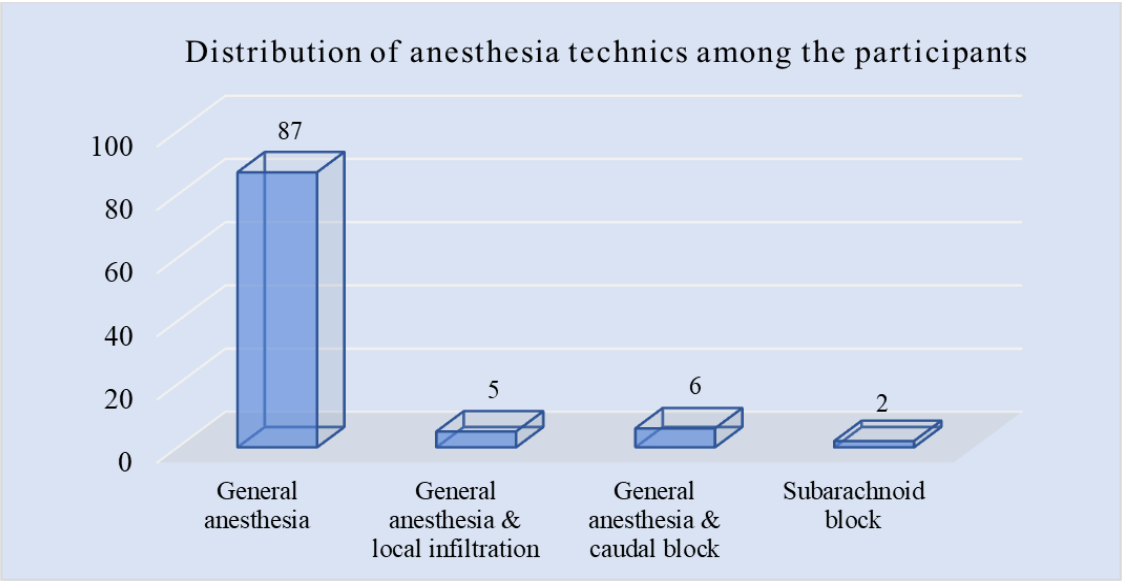

Figure IV: Bar chart showed, anesthesia technics of the participants (N=62)

Table 4: Distribution of intraoperative complications among the participants (N=62)

Complications	n	%
Bronchospam	7	11%
Bradycardia	6	10%
Hypotension	5	8%
Hypoventilation	4	6%
Tachycardia	4	6%
Laryngeal spasm	4	6%
Hypertension	4	6%
Apnoea	4	6%
Dysrrhythmia	3	5%
Cardiac arrest	2	3%

Table 5: Distribution of postoperative complications among the participants (N=62)

Complications	n	%
Tachycardia	12	19%
Prolonged unconsciousness	6	10%
Hypoventilation	5	8%
Restlessness	3	5%
Respiratory arrest	3	5%
Pain	3	5%
Shivering	3	5%
Hypotension	2	3%
Hypertension	2	3%
Hemorrhage	2	3%
Laryngospasm	2	3%
Bronchospasm	2	3%

DISCUSSION

The aim of this study was to assess the complications of anesthesia in children. In in this study, majority of the cases (68%), ASA I score was found. Besides this, in 19% and 6% cases ASA II and ASA III scores were found respectively which were noticeable. In about half (48%) of our total patients, general surgery was performed. On the other hand, in 18%, 13%, 10%, 8% and 3% cases ENT, orthopedics, maxillofacial, ophthalmic and cardiothoracic surgery were performed respectively. In this study, among all the participants, in majority (87%), general anaesthesia was used. Besides this in some cases, 'general anesthesia with local infiltration (5%)', 'general anesthesia with caudal block (6%)' and 'subarachnoid block (2%)' was applied. We found, the commonest respiratory problems observed in this study were bronchospasm, hypoventilation, laryngospasm and apnea. Besides this, the upper respiratory tract infection was common in pediatric age group. Children aged less than 1 year appear to have an increased incidence of airway complications as do those anesthetized by less experienced anesthetists and those undergoing airway surgery [10, 11]. A major concern for all anesthetists is when it is safe to anesthetize the child with an upper respiratory tract infection [12]. A running nose of recent onset, pyrexia/abnormal physical signs is reasons to defer elective surgery. If the surgery becomes urgent, the anesthetist must be aware of increased risk of bronchospasm [13]. In this study, in analyzing the complications among the participants we observed that, bronchospam and bradycardia and hypotension were the most common intraoperative complications which were found in 11%, 10% and 8% cases respectively. On the other hand, tachycardia, prolonged unconsciousness and hypoventilation were found as the most common postoperative complications among the participants which were found in 19%, 10% and 8% cases respectively. One of the problems of pediatric anesthesia is the control of body temperature particularly in the neonate as well as in small babies. It is thought that, babies have poor temperature regulating mechanisms and because of their large body surface area compared to their weight, they tend to lose heat to cold surroundings [14]. Anesthesia, because of its depression on metabolism as well as dilatation of cutaneous vessels, tends to cause a progressive fall in body temperature [15]. The mean body core temperature of infants as well as children undergoing prolonged surgery tends to decrease because heat loss often exceeds heat production [16]. By shivering at about 1 year of their age, children who become hypothermic after operation tend to shiver, as non-shivering thermogenesis is largely replaced [17]. There have been a number of myths as well as misunderstandings related to pain in children which has led to historically inadequate treatment of pediatric pain [18]. It has been recognized that, infants or children require adequate pain management and if not received May actually adversely affect patient outcome [19]. Many pain-assessment scales or scores have been

developed to assess pain in children [20]; among those the most reliable form of pain assessment is self-report.

Limitation of the Study

This was a single centered study with small sized samples. Moreover, the study was conducted at a very short period of time. That's why the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION & RECOMMENDATION

Anesthesia-related morbidity and mortality can be minimized with early identification and prompt management of any complication. In this current study we observed that, preterm infants are major prone to develop respiratory complications because of using anesthesia. Prior safety measures are very important for handling children in using anaesthesia. We would like to recommend for conducting more studies regarding the same issue with larger sample size for getting more specific findings.

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