Research Article
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Safe anesthesia for minor surgical procedures without venous cannulation in healthy children-864 cases

Abstract

Introduction: Establishing intravenous (IV) access is customary for patients undergoing general anesthesia, especially in the pediatric population. Obtaining reliable vascular access in small children is frequently made challenging. Pediatric patients are often less co-operative, and prone to develop psychological trauma. Though general anesthesia without IV access is safe for healthy pediatric patients undergoing simple and brief procedure. However, it is not encouraged to anesthetize children with complex medical conditions without IV access, especially for long durations of general anesthesia.

Purpose: The objective of this study was to examine complications & risk following pediatric short surgical procedures under anesthesia without IV placement.

Methods: This observational study was carried out in Combined Military Hospital, Dhaka, among 864 children of different age ranging from 1 to 7years. This study was conducted among children scheduled for the elective short surgical procedures under general anesthesia with spontaneous ventilation having American Society of Anesthesiologists (ASA) grade I & II, during the period of May 2011 to Feb 2017. The total number of anesthetics and rescued IV placements were identified. Patient characteristics, length of the procedure, laryngeal mask airway (LMA) placement, and complications like desaturation, laryngospasm, secretion & bleeding related risk of aspirations were recorded.

Results: 864 patients were included in this study over a period of 6 years. Out of the 864 cases, only 61 patients required rescue and/or elective IV placement (7.06%) and significantly, 803 cases (92.94%) were performed safely without IV access. In 132 (15%) of the 864 cases, anesthetics were administered with a laryngeal mask airway (LMA), out of which a large proportion of cases 103 (78%) did not have IV access. Among the total number of patients only 9 developed transient desaturation and 2 developed laryngospasm. Out of the 9 transient desaturation patients 5 required rescue LMA in an attempt to manage airway. There were only 11 complications (1.27%) among 864 cases, all of which were resolved safely. There were no incidence of deaths or prolong admissions for complications.

Conclusion: The study was conducted over 6 years with 864 cases recorded. During this study almost 93% of cases were performed successfully and thus illustrates that it is safe to perform short surgical procedures under general anesthesia without securing IV access. All emergency post-complications IV placements (1.27%) were successful. Perioperative complications were resolved safely where no long-term sequelae were seen.

Keywords: venous cannulation, psychological trauma, safe anesthesia

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Introduction

Establishing intravenous (IV) access is customary for patients undergoing general anesthesia, especially in the pediatric population.[1] General anesthesia utilizing inhalational agents without intravenous access for minor procedures is controversial.[2] Obtaining reliable vascular access in small children is frequently made challenging by anatomical factors-in particular, small, mobile veins and excess of subcutaneous fat which makes visualization and palpation of veins difficult. Pediatric patients are often less co-operative, and the potential for psychological trauma, especially with repeated procedures in the conscious patient, further complicates matters.[3] Omitting IV access increases efficiency, reflect confidence and patient satisfaction; however, the ability to introduce rapid acting medications into the circulation during an unanticipated emergency becomes challenging.[2] Though general anesthesia without IV access is safe for healthy pediatric patients undergoing simple and brief procedures such as release of tongue tie, myringotomy tubes, dental extraction and examination under anesthesia (EUA). However, it is not encouraged to anesthetize children with complex medical conditions without IV access, especially for long durations of general anesthesia.[1] The objective of this study was to examine complications & risk following pediatric short surgical procedures under anesthesia without IV placement.

Methods

This observational study was carried out in Combined Military Hospital, Dhaka, among 864 children of different age ranging from 1 to 7years. This study was conducted among children scheduled for the elective short surgical procedures under general anesthesia with spontaneous ventilation having American Society of Anesthesiologists (ASA) grade I & II, during the period of May 2011 to Feb 2017. Children anticipated having a difficult airway, reactive airway disease, recent history of upper airway infection, the risk of aspiration, coagulopathy, chronic medical illness were excluded from the study. Pre-anaesthetic checkups were completed 24hours prior

to surgery as in-hospital cases. The procedure was explained to the parents and written consent was obtained.

On arrival at operation theatre baseline preinduction parameters like heart rate, NIBP, SpO_2 were recorded. The techniques of general anesthesia like induction, analgesia, maintenance, manual intermittent synchronized ventilatory support and postoperative analgesia were the same for every single child. All patients were instructed to take several deep breaths via Ayre's T piece till titration to effect with 2 to 3% sevoflurane in oxygen. Proper preoxygenation were conducted for patients till denitrogenation. This procedure replaces alveolar nitrogen with oxygen to achieve an intrapulmonary oxygen reserve that allowed apnea to be as prolonged as possible with the least possible desaturation. Patients were positioned at 150 Trendelenburg position to permit blood & secretion to accumulate on the hypopharynx as it is the bottom part of pharynx situated behind the larynx. The patients were handed over to the surgeons who were then allowed to do the procedures after fixing the nasal prang and oxygen inhalation @ 2-3 L/min to ensure oxygenation. Emergency suction, cannula, airway devices, and medicines were kept ready for rescue.

The total number of anesthetics and rescued IV placements were identified. Patient characteristics, length of the procedure, laryngeal mask airway (LMA) placement, and complications like desaturation, laryngospasm, secretion & bleeding related risk of aspirations were recorded.

Results

864 patients were included in this study over a period of 6years. Demographic characteristics are summarized in Table 1. Different types and category of surgeries are summarized in Table 2. The mean age and weight of the patients were 2.5±0.78years and 14.5±3.45 Kgs, respectively.

Table 1 Demographic characteristics and baseline vitals (n=864)

Variables	Frequency	Percentage (%)	p value
Age (years)	2.5±0.78		
Sex			
M	536	62.00%	<0.0001*
F	328	38.00%	
Weight (Kgs)	14.5±3.45		
ASA Grade			
I	743	86.00%	<0.0001*
II	121	14.00%	
Mal Class			
I	812	94%	<0.0001*
II	52	6%	
HR(per min)	108.1±14.2		
SpO_2 (%)	98%		

P value reached by Z proportion test, *significant

Table 2 Number & category of different surgeries (n=864)

S/N	Type of surgeries	Number (total patients=864)	Average time of surgery (min)	P value
1	Release of tongue tie	534	9.12±2.54	<0.0001*
2	Myringotomy tube insertion	82	11.54±3.45	
3	Examination Under Anesthesia (EUA)	204	10.14±3.87	
4	Dental extractions	44	6.22±1.28	

P value reached by ANOVA test, *significant

Out of the 864 cases, only 61 patients required rescue and/or elective IV placement (7.06%) and significantly, 803 cases (92.94%) were performed safely without IV access (Table 3).

In 132 (15%) of the 864 cases, anesthetics were administered with a laryngeal mask airway (LMA), out of which a large proportion of cases 103 (78%) did not have IV access (Table 4).

Among the total number of patients only 9 developed transient desaturation and 2 developed laryngospasm. Out of the 9 transient desaturation patients 5 required rescue LMA in an attempt to manage airway (Table 5).

Table 3 Cases performed with or without IV

S/N	Frequency	Percentage (%)	P value
Surgery without IV	803	92.94	
Surgery with IV	61	7.06	0.0002*
Total	864	100	

P value reached by Z proportion test, *significant

Table 4 Cases performed with LMA (total patients-132/864)

S/N	Frequency	Percentage (%)	P value
Surgery without IV	103	78	
Surgery with IV	29	32	<0.0001*
Total	132	100	

P value reached by Z proportion test, *significant

Table 5 Incidence of complications (n=864)

S/N	Traits	Number	Percentage (%)
1	Rescue LMA insertion	5	0.58
2	Incidence of desaturation	9	1.04
3	Incidence of laryngospasm	2	0.23
4	Aspiration of gastric contents/secretion	0	0
5	No complications	853	98.73

There were only 11 complications (1.27%) among 864 cases, all of which were resolved safely. There were no incidence of deaths or prolong admissions for complications.

Discussion

This study was conducted to examine and understand the safety and consequences of minor procedures without IV cannulation at Combined Military Hospital, Dhaka. Encounters with needles are frightening experiences for most young children. Reduction of anxiety experienced by children is important for humanitarian reasons and to improve cooperation with medical staff. Anxiety at induction of anesthesia is associated with distress on awakening in the recovery area and with later postoperative behavior problems. Perioperative anxiety has been associated with negative behaviour during and after the surgical experience, like post-operative pain, sleep disturbances, parent-child conflict and separation anxiety.[4] Children's surrender does not necessarily imply acceptance of the procedure. So, parents should play a supportive role & doctor's role must be protective to minimize needle-related panic.[5] Surgery and anesthesia induce considerable emotional stress on both parents and children. To minimize the emotional stress of anesthesia and surgery, the pediatric anesthesiologist must address situations and procedures that the child may find threatening. Parental presence during the induction of anesthesia is associated with smooth inhalational induction and parental satisfaction regarding not only the separation process from their child but also with the overall functioning of the hospital.[6]

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There are limited studies in this field. The outcome and findings could have been more credible if similar studies could have been performed in different centers. However, findings and results of our study are consistent with Chun W. HUNG study.

Conclusion

The objective of this study was to examine complications and risks following pediatric short surgical procedures under anesthesia without IV placement. The study was conducted over 6years with 864 cases recorded. During this study almost 93% of cases were performed successfully and thus illustrates that it is safe to perform short surgical procedures under general anesthesia without securing IV access. To minimize the emotional stress of anesthesia and surgery, the pediatric anesthesiologist must address situations and procedures that the child may find threatening. All emergency post-complications IV placements (1.27%) were successful. Perioperative complications were resolved safely where no long-term sequelae were seen.

Acknowledgments

None.

Conflicts of interest

None.

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