



Anaesthetic Management During rigid Bronchoscopy for Removal of Tracheobronchial Foreign Body in paediatric patients in Tertiary Care Center

Dr Neelam Kumar¹, Dr Neeraj Badyal², Dr Deeba Malik³, Dr Arti⁴

Corresponding Author: Dr Arti
Email ID: spreadasmile69@gmail.com

^{1,2,3}Post Graduate, Department of Anesthesiology and Intensive care, GMC Jammu
⁴Consultant ENT, Health Services Jammu

Abstract

Background: Tracheobronchial foreign bodies are one of the most serious paediatric emergencies associated with complications and mortality. The gold standard method for removal of aspirated foreign bodies is rigid bronchoscopy under GA.

Aims and objectives: Anaesthesia management during emergency bronchoscopy for both diagnostic and therapeutic purpose for removal of aspirated foreign body in suspected paediatric patients under general anaesthesia.

Results: A total of 36 paediatric patients between the age of 2 months to maximum of 36 months with mean age of 16.25 ± 8.64 months underwent bronchoscopy in the present study. Among 36 patients, 24 subjects (66.6%) were positive for foreign body. They presented with the symptoms such as cough (86%), fast breathing (58%) and wheeze (33%) as well as stridor (30%). Emergency bronchoscopy was done under GA with controlled ventilation along with muscle relaxant. Various complications like desaturation (41.7%), bronchospasm (38.9%), bradycardia (16.7%), laryngeal odema (8.33%), reintubation, (5.55%) and cardiac arrest (2.77%) were seen.

Conclusion: Emergency bronchoscopy is performed both for diagnostic and therapeutic purposes in suspected cases of foreign body aspiration.. It can be performed safely with the team work of ENT surgeon and Anaesthetist to manage the compromised airway in order to reduce complications and mortality.

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Introduction

The aspiration of a tracheobronchial foreign body is one of the most serious paediatric emergencies

mostly seen in less than 5 years [1]. Children in this age group are more likely to suffer foreign body aspiration due to narrow and short upper airways



and incomplete protective mechanisms. It should be removed as early as possible to reduce complications and mortality [2,3]. The goldstandard method for removal of tracheobronchial foreign bodies is rigid bronchoscopy . It was first performed by Gustav Killian ,a German Otolaryngologist in 1897 to remove aspirated pork bone from the right main bronchus with the rigid Oesophagoscope [4]. Now a days , with the advancement in anaesthesia techniques ,it is done under general anaesthesia and involves team work of ENT surgeon and Anaesthetists. This is a very challenging situation and good coordination between the two teams is required to reduce the anxious moment to occur. General anaesthesia can either be spontaneous and controlled ventilation. Present study is aimed at the anaesthesia management during bronchoscopy for both diagnostic and therapeutic purpose for removal of aspirated foreign body in suspected paediatric patients in a tertiary care center.

Material and methods

This prospective study was conducted in the Department of Anaesthesia in collaboration with the Department of ENT in GMC Jammu after obtaining institutional ethical clearance over a period of 3 months. 36 pediatric patients below 5 years (60 months) of age planned for bronchoscopy with the definitive or suspected history of foreign body aspiration after obtaining informed consent. Preoxygenation was done for 3-5 mins and inj propofol @1.5-2.5 mg per given for .i.v induction along with inhalational agent halothane or isoflurane with O₂ and N₂O in 50:50 ratio. Muscle relaxant inj succinylcholine or atracurium given and 4% lignocaine was sprayed locally in larynx to prevent chances of laryngospasm. When patient become apneic ,ENT surgeon introduce bronchoscope of appropriate size by keeping patient in supine position at the edge of the table with head extended. IPPV was given through the side port connected to the bronchoscope .check x-ray chest was done after 6- 8 hrs of procedure.

Data were collected in a Microsoft Excel database and analyzed. Differences between variables were assessed with the Student's t-test. Statistical significance was recognized for $p < 0.05$.

Results

A total of 36 paediatric patients between the age of 2 months to maximum of 36 months with mean age of 16.25 ± 8.64 months underwent bronchoscopy in the present study. Out of 36 patients 24 patient(66.6%) came to be positive for foreign body .common presenting symptoms,signs,radiological findings ,drugs used during bronchoscopy and complication are shown in table 1.Table 2 listed the comparison of complications in the patients presented early and late in which foreign body was retrieved. Frequency of complication was more in patients presented late with foreign body aspiration ,but statistical significance was not there as number of cases in our study were less.

Discussion

Tracheobronchial foreign body aspiration is a worldwide health problem in children associated with complications and mortality, depending on the type of foreign body and degree of airway obstruction [5].

Anatomical and physiological factors in children, including eating habits and curiosity to explore, lead to a high incidence in children in the age group between 6 months and 3 years old [6,7,8,9,10]. Similarly, patients of this age group were presented with foreign body aspiration in this study with the symptoms of cough, dysnea, wheeze, along with stridor and bluish discoloration. In accordance with literature [11,12], choking episodes are considered to be extremely important. These symptoms are not specific; in some cases, they can be absent, or can be present in patients with other lung diseases [13,14,15,16].

Radiological investigation shows normal chest x ray, or shows signs of pulmonary infectious or inflammatory infiltration, mediastinal shift, obstructive emphysema, atelectasis, and air trapping suggestive of foreign body aspiration. In



rare cases, pneumothorax or pneumomediastinum may be detected. Findings from chest X-rays alter the basis of object localisation and the time of aspiration [1] Among our study subjects, we found pneumitis in 27.7% of cases, followed by an x-ray that was normal (8%) and the presence of a radioopaque shadow of foreign bodies in 4 patients (11%). For patients with characteristic symptoms, false negative radiograph results do not preclude bronchoscopy, according to Volkman et al [17].

To evaluate patients with symptoms, rigid bronchoscopy (therapeutic and diagnostic) is the preferred method under general anesthesia. It allows instrumentation for foreign body removal and secures ventilation [18,19].

The key role of anaesthetic management is to ensure patient safety based on the Helsinki declaration [4,19]. Adequate oxygenation and ventilation, adequate depth of anaesthesia with minimal airway secretions, controlled cardiorespiratory reflexes and stable haemodynamics, rapid return of upper airway reflexes and prevention of pulmonary aspiration should be target of safe anaesthesia in rigid bronchoscopy [2,20].

In recent studies, it has been suggested that sedative premedication should be avoided since it suppresses the respiratory drive. Steroids (Dexamethasone 0.4–1 mg/kg i.v.) can be given to prevent airway oedema [21,22,23]. A combination of propofol and sevoflurane was used for anaesthesia induction and maintenance [24]. Sevoflurane was associated with fewer adverse effects than halothane during bronchoscopy and gastroscopy in children [25]. In our study, IV induction was performed with propofol in conjunction with halothane in 91.7 % of patients and isoflurane for the rest of the patients, as Sevoflurane was not available in our center. On the contrary, in the study done by Kalayanappagopalan et al [26], ketamine was used for induction, it was considered to be safe for children with full stomach in emergency. Various ventilation techniques are available during rigid

bronchoscopy, controlled ventilation with muscle relaxants is a most common technique for removing foreign body that are lodged distal to the carina or takes longer time to remove. Spontaneous ventilation with topical anesthesia can be used for more proximally located foreign body. Positive pressure ventilation is not preferred as it has risk of pushing the foreign body further distally into the airway [27,28]. Hyperventilation with 100 percent oxygen done to denitrogenate the lungs and to lower PaCO₂. Oxygen can be delivered by insufflation at high flow rates (10-15 litre/min) by apnoeic oxygenation without actually ventilating the patient. Although satisfactory oxygenation can be achieved for long periods, apnea should not extend beyond 5 minutes because of carbon dioxide accumulation. When the surgeon has passed a ventilating bronchoscopy through the vocal cords, breathing circuit can be connected to the 22mm connector on the bronchoscope [29,30]. 4% topical lignocaine sprayed in larynx and the cords prior to the introduction of bronchoscope to reduce the haemodynamic and airway reactions during introduction of the bronchoscope into the airways. It reduces the need for general anaesthesia and the risks of laryngospasm [31,32]. Bucking and reflexes should be suppressed by maintaining deep anaesthesia to avoid trauma to tracheal wall, subglottis and vocal cords during retrieval of foreign body [30,33].

In uneventful condition mask ventilation can be done till patient breathes spontaneously after removal of foreign body but in case of any complication or prolonged procedure patient is kept intubated with positive pressure ventilation and shifted to ICU till adequate protective reflexes or airway oedema subsides [30,34].

In this study we have seen that number of complication was more in the patients who presented late with foreign body. According to the available literature, various complications like bradycardia, laryngeal oedema, bronchospasm, pneumothorax, hypoxemia, cardiac arrhythmia, cardiac arrest seen in our study was consistent with

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it [2,10,35,36]. These serious complications can be avoided or handled in time by careful intra op and post op monitoring of vitals [37]. Postoperative chest x-ray should be mandatory after bronchoscopy in every case [38].

Conclusion

Emergency bronchoscopy is performed both for diagnostic and therapeutic purposes without any

delay in patients with high index of suspicion with foreign body or intractable pulmonary infection. Under well trained team and equipped centers, it can be performed safely and with minimal complications. The mortality rate can be reduced by timely detection and intervention in the event of complications.

Tables

Table 1: Frequency of chief complains, signs, radiological findings, anaesthetic drugs used, complications in patients.

Sno	Parameters		Frequency	Percentage	
1	h/o foreign body		16	44.4	
2	Complaints	Cough	31	86.1	
		Stridor	11	30.5	
		Wheeze	12	33.3	
		fast breathing	21	58.3	
		Vomiting	5	13.8	
		bluish discolouration	6	16.6	
		Fever	8	22.2	
3	signs on preanaesthetic examination	Stridor	14	38.8	
		Cyanosis	4	11.1	
		respiratory distress	32	88.8	
		Crepts	4	11.1	
		dec air entry	26	72.2	
		Wheeze	17	47.2	
		dec saturation	11	30.5	
4	radiological findings	obstructive emphysema	7	19.4	
		lung collapse	6	16.6	
		foreign body seen	4	11.1	
		Pneuminitis	10	27.7	
		Normal	8	22.2	
5	Anaesthetic agents and drugs	inhalational agent	Halothane	33	91.7
			Isoflurane	3	8.3
		neuromuscular blocking agent	Succinylchloine	18	50
			Atracurium	18	50
		steroid	Hydrocortisone	13	36.1
Dexamethasone	23		63.9		
	Complications	Desaturation	15	41.7	

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6	Bradycardia	6	16.7
	Laryngospasm	0	0
	Bronchospasm	14	38.9
	Reintubation	2	5.55
	laryngeal odema	3	8.33
	post op ventilatory support	3	8.3
	cardiac arrest	1	2.77
	Death	1	2.77
7	foreign body found	24	66.6

Table 2: Comparison of complications in patients presented late or early in which foreign body was retrieved

Complications	Early Presentation		Late Presentation		(Chi. Sq. test) P-value
	No.	%age	No.	%age	
Desaturation	2	16.7	7	58.3	0.039
Bradycardia	2	16.7	2	16.7	1.00
Laryngospasm	0	0.0	0	0.0	-
Bronchospasm	3	25.0	7	58.3	0.105
Reintubation	0	0.0	0	0.0	-
laryngeal odema	1	8.3	2	16.7	0.543
post op ventilatory support	2	16.7	2	16.7	1.00
cardiac arrest	0	0.0	1	8.3	0.318
Death	0	0,0	1	8.3	0.318

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