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RESPIRATORY INFECTIOUS DISEASES AND ANESTHESIA IN CHILDREN

Turki Wasel AlMutairi[1*], Sultan Khader Alanazi2, Meshari fahad alotaibi[3], Abdullah Ayed Alanazi[4] and Abdullah Mohammed Alharbi[5]

[1*]Respiratory Therapist, rrt.turki@gmail.com, Prince Sultan Airbase Hospital in AlKharj
[2]Anesthesia Technologist, soma2823@gmail.com, Northern Area Armed Forces Hospital
[3]Respiratory Therapist, messhary@hotmail.com, Northern Area Armed Forces Hospital
[4]Anesthesia Technologist, Alanazihfc@gmail.com, Northern Area Armed Forces Hospital
[5]Respiratory Therapist, amh-rt@outlook.com, Northern Area Armed Forces Hospital

***Corresponding Author:-** Turki Wasel AlMutairi
[*]Respiratory Therapist, rrt.turki@gmail.com, Prince Sultan Airbase Hospital in AlKharj

Abstract

Objectives: To determine the association between the respiratory tract infections (RTI) are a common childhood infection and anesthesia in children.

Methods: We examined samples from all patients with lung infections for pathogenic bacteria. We obtained sputum samples from patients and cultured them.

Findings: Streptococcus spp. was the most commonly detected bacterial species (37.8%) followed by Pseudomonas aeruginosa (24.3%) in children with lower respiratory tract infection.

Novelty: In clinical practice, medical health care providers should focus on the risk factors associated with pulmonary complications following general anaesthesia, develop reasonable plans based on these risk factors, and implement targeted treatment strategies and nursing care to reduce the risk of respiratory infection complications after surgery

Keywords: Pediatric anesthesia, Respiratory tract infections (RTI), anaesthesia in children, Respiratory Infectious diseases.

1. Introduction

Respiratory tract infections (RTI) are a common childhood infection. The highest incidence rates of acute respiratory infections (ARI) occur during the first two years of life, with infants experiencing six to eight ARIs per year. Although the majority of upper respiratory tract infections (URTIs) are self-limiting and resolve within 7-10 days, some patients have persistent symptoms for more than 3-4 weeks. [1] RTIs are caused by a number of different respiratory viruses, including influenza, parainfluenza, rhinovirus, human bocavirus, and human metapneumovirus. Their common feature is to invade the respiratory mucosa and result in airway inflammation, edoema, and bronchoconstriction, causing the airway to secrete volatile Viral infections also cause increased acetylcholine secretion and subsequent bronchoconstriction due to the inhibition of host cholinergic M2 receptors.[2]

Thorough pre-operative assessment and intervention are critical to the successful management of asthmatic patients. While asthma poses no additional risk in a well-prepared child, uncontrolled baseline bronchial hyperactivity raises the risk of peri-operative adverse respiratory events significantly. In the setting of emergency surgery, there is always an additional risk with poorly controlled asthmatic children because there is limited time for any effective pre-operative intervention.[3] However, in an elective procedure, surgery may be postponed and rescheduled until asthma is well under control. During the pre-operative visit, it is critical to assess the level of asthma control and current medications. [4]

Preoperative anaesthetic evaluation includes looking for URI symptoms, which, along with other comorbidities like asthma, seasonal allergies, eczema, and smoking, have been linked to an increased risk of perioperative respiratory adverse events.[5] While providing safe, high-quality perioperative care for children presents numerous challenges, the current study sought to investigate paediatric anaesthesia programmes with the goal of reducing anesthesia-associated respiratory tract infections.[6]

Tuberculosis poses a serious risk of nosocomial infection, even in developed countries. The severity of PARDS can be classified using the oxygenation index (OI) in ventilated patients or the Berlin criteria for ARDS P/F ratio cutoffs in nonventilated patients. The mortality rate from PARDS is between 18% and 35%. Viral respiratory infection is the most common underlying cause of paediatric acute respiratory distress syndrome PARDS.[7]

Previous study showed that Pneumococcus is the most common bacterial organism involved in bacterial pneumonia, with H. influenza and S. aureus also contributing to the bacterial infection. Gram-positive microorganisms colonising the nasopharynx are not pathogenic. [8] Other study demonstrated that, Viral infections are typically mild and self-limiting. However, bronchiolitis is a potentially fatal viral infection caused primarily by RSV in young children aged 2 to 6 months. [9]

2. Material and methods

To diagnose respiratory tract infections in children after anaesthesia, physical examination, imaging (chest X-ray, chest computed tomography), symptoms (cough and sputum) within 3 days, body temperature >37.6°C, and white blood cell count ≥11.0 × 109/L are required. Patients were divided into two groups based on whether they had a respiratory tract infection or not.[10]

We examined samples from all patients with lung infections for pathogenic bacteria. We obtained sputum samples from patients and cultured them within 30 minutes. Pathogens were identified and screened at the King Abdulaziz Medical City Laboratory in Riyadh, Saudi Arabia, using an automated bacterial identification instrument (VITEK-2; bioMérieux, Craponne, France).

3. Results

We performed statistical analysis on the incidence of lung infection following general anaesthesia. We estimated the distribution of pathogenic bacteria in children with lung infections. On this basis,

we compared differences between the two groups in terms of basic characteristics (age, gender, BMI, and surgery duration).

We analysed all of the data using IBM SPSS 20.0 software (IBM Corp., Armonk, NY, USA). For univariate analysis, enumeration data were expressed as numbers and percentages was used. Variable data were expressed as mean ± standard deviation, and group comparisons were made using the t-test. Independent risk factors were analysed using multivariate logistic regression. Statistical significance was defined as a p-value of less than 0.05.

Table (1): pathogenic bacteria detected from children with lung infections following general anaesthesia.

Pathogens	Cases	%
Gram-negative bacteria	15	40.5%
Klebsiella pneumoniae	6	16.2%
Pseudomona aeurginosa	9	24.3%
Gram-positive bacteria	20	54%
Streptococcus spp.	14	37.8%
Enterococcus spp.	6	16.2%
Fungus	2	5.4%
Candida albicans	2	5.4%
Total	37	100%

The results from table 1. showed that, Streptococcus spp. was the most commonly detected bacterial species (37.8%) followed by Pseudomonas aeruginosa (24.3%) in children with lower respiratory tract infection.

Table (2): logistic regression analysis on the incidence of lung infection following general anaesthesia in children

Variables	95% CI	SE	p- Value
Age < 5	1.115-3.646	0.119	0.025
Male/female	1.310-1.023	0.706	0.091
BMI (kg/m2)	1.116-8.310	0.109	0.082

Ear, nose and throat surgery	1.104-5.074	0.124	0.002
Duration of surgery ≥180 minutes	1.166-4.435	0.114	0.041
Length of hospital stay	1.201-9.110	0,184	0.095

The results from table 2. showed that, there were significant differences among children with lung infection with respect to age, Ear, nose and throat surgery and Duration of surgery ≥180 minutes (all $p < 0.05$). We found no significant differences with respect to BMI, gender and Length of hospital stay.

4. Discussion

Monitoring, equipment, medications, techniques, and resuscitation protocols have all improved, allowing for safer care.

To reduce the spread of infection, operating theatre personnel should be kept to a minimum and disposable equipment used. Appropriate PPE based on the pathogen's contagiousness will help to limit the spread of infection to healthcare workers. [11] N95 masks are used to prevent the spread of SARS-CoV-2, Mycobacterium tuberculosis, and other airborne infectious invasive pathogens. [12]

4.1 Limitations and future perspectives: It is best to monitor the effect of anaesthetic agents during paediatric treatment in terms of response. The effectiveness of anaesthesia agents in terms of patient survival has not been studied.

5. Conclusions

In clinical practice, medical health care providers should focus on the risk factors associated with pulmonary complications following general anaesthesia, develop reasonable plans based on these risk factors, and implement targeted treatment strategies and nursing care to reduce the risk of respiratory infection complications after surgery.[13]

Gloves, masks or respirators, gowns or aprons, goggles, head covering, and a face shield are all part of full PPE. However, surgical face masks may protect against droplet transmission but not against aerosolized particles in some viral infections, so respirators or N95 masks are recommended.[14]

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