

Nursing Activities in the Prevention and Treatment of Perioperative Complications After Airway Foreign Body Removal in Pediatric Patients

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Purpose: 1) To evaluate postanesthesia complications after bronchoscopy performed for a suspected foreign body (FB) in the pediatric population and 2) To propose an algorithm of nursing activities for management of this problem.

Design: A retrospective descriptive design was used.

Methods: A chart review of 155 children who underwent rigid bronchoscopy for FB removal was conducted.

Finding: Complications occurred in 78% of children: 43% of them experienced desaturation below 90% requiring oxygen therapy. Therapy ranged from oxygen administration via blow-by nasal cannula or face mask (89%) to positive pressure ventilation via bag-mask (23%). Seven percent of the population required intubation and admission to intensive care unit (all were less than 2 years of age).

Conclusions: Our results suggest special attention to the children less than 2 years of age as serious respiratory failure may occur after FB removal. The algorithm for nurses was created to manage children after bronchoscopy.

Keywords: children, desaturation, foreign body aspiration, postanesthesia care unit.

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FOREIGN BODY (FB) INHALATION may be a life-threatening event in children. They are at particular risk for airway obstruction because of the specific anatomical and physiological characteristics presented only until adolescence. Asphyxiation stays a leading cause of accidental death in children under 4 years.¹ In Poland there are no

studies concerning FB aspiration. According to American data, airway obstruction remains a cause of 2,000 to 3,000 deaths per year. In 2006, the incidence rate was 0.5 deaths per 100,000 population aged 0 to 4 years.² The smaller diameter of a young patient's airway, poor coordination between swallowing and

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Conflict of interest: None to report.

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closing the glottis predisposes to obstruction in this age group. An obstruction of one of the bronchi, diminishing its radius by half (caused by FB or mucosal edema) generates a 16-fold increase of airway resistance.¹

Pediatric patients often do not cooperate with needed interventions but are more likely to experience postanesthesia airway complications when compared with adults. When a child cries and is anxious, air flow becomes turbulent and airway resistance inversely increases up to the fifth power of the radius. It is very important to keep a child as calm as possible until the problem is solved. Infants and young children have a high oxygen demand because of higher metabolism, so hypoxemia develops more rapidly among them compared with adults.¹

Rigid bronchoscopy under general anesthesia is a gold standard for extraction of FBs;² however, some complications may occur. The risk of post-procedure hypoxemia requires accurate monitoring and timely intervention. Preparation for bronchoscopy may be modified depending on the patient's clinical presentation. If an inhaled FB causes minimal respiratory distress without cyanosis, fasting is advised to prevent regurgitation and potential aspiration of stomach contents (6 hours for solids and infant formula, 4 for breast milk, and 2 for clear fluids).³ After the procedure, it is recommended that a nurse experienced in pediatric recovery attend the patient in a postanesthesia care unit (PACU). It is worth noting that in Poland anesthesia is performed only by a physician, and the anesthetic nurse assisting in the operating room (OR) or PACU is specialized in nursing anesthesia.

A PubMed database search revealed no articles dedicated to the role of anesthetic/PACU nurses in postoperative maintenance of pediatric patients after bronchoscopy. Long-term oxygen desaturation may lead to hypoxia, respiratory failure, and eventually cardiac arrest. We, therefore, characterized the interventions used at Children's University Hospital. The aim of this study was to evaluate postanesthesia complications after bronchoscopy performed for a suspected FB aspiration. There is also discussion of the role of the nurse in the prevention and treatment of post-procedural complications. The data presented in this article

are part of a larger study of FB endoscopic removal in one hospital facility.

Materials and Methods

Patients and Setting

The study was conducted in Children's University Hospital of Lublin, which is the biggest pediatric tertiary care research hospital in south-eastern Poland, with 405 beds. One hundred fifty-five patients between 6 months and 15 years who underwent bronchoscopy for suspected FB aspiration from January 1998 to December 2010 were identified retrospectively from the hospital's database.

Personnel During Bronchoscopy

Each bronchoscopy was performed by a pediatric otorhinolaryngologist assisted by a trained nurse. General anesthesia was conducted by a senior anesthesiologist, accompanied by an anesthetic nurse who was responsible for:

- identification of the patient on admission to OR.
- intravenous (IV) access and drug administration.
- thermal comfort during and after bronchoscopy.
- patient's monitoring (non-invasive blood pressure, continuous cardiopulmonary, and pulse oximetry monitoring).

Postanesthesia Nursing Monitoring

Children admitted to PACU had vital signs and pain level monitored and noted by a PACU nurse who has similar powers and duties as an anesthetic nurse (on the night shift it is often the same person). Sedation was documented using a modified Aldrete score.⁴ Those with scores higher than 8 were transported to the Pediatric Otorhinolaryngology Department, where a pulse oximetry sensor was attached to the earlobe or fingertip for at least 6 hours.

Oxygen Desaturation

There was no standing protocol for temporary desaturation level. We defined oxygen desaturation as pulse oximetry indicating < 90% according to criteria proposed by Chen, Zhang, Li, Liu, and Wu.⁵

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