Academic Journal of
Pediatrics & Neonatology
ISSN 2474-7521

Juniper Publishers
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Case Report
Volume 2 Issue 5 – January 2017
DOI: 10.19080/AJPN.2017.02.555596

Acad J Ped Neonatol

Obstructive Fibrinous Tracheal Pseudomembrane: A Very Rare and Life-Threatening Complication of the Endotracheal Intubation

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Submission: October 21, 2016**; Published:** January 30, 2017

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Abstract

Obstructive fibrinous tracheal pseudomembrane is a rare complication associated with endotracheal intubation. We report the case of a 10-year-old boy hospitalized for a severe abdominal trauma. The boy remained intubated for 4 days. After extubation he started to have stridor and acute respiratory distress so a reintubation was necessary. After 24 hours, an elective extubation was performed and the boy presented stridor and dyspnoea with no improvement with medical treatment. A fibrinous mobile membrane was seen during a flexible bronchoscopy. The pseudomembrane was removed and the patient remained asymptomatic. The knowledge and an early diagnosis of this pathology is very important due to be a life-threatening complication.

Introduction

Damage of the airways caused by intubation is usually associated with mechanical trauma caused by the endotracheal tube (ETT). Stridor occurs in approximately 1-16% of the patients, but in 4-8% of these children the extubation fails and an urgent reintubation is needed. The most common causes are laryngeal or tracheal edema. The symptoms are usually presented within 1-4 hours after extubation and are usually resolved in under 24 hours. Stridor can persist in spite of the treatment with nebulized epinephrine and steroidal therapy or with repeated extubation failures. In such cases, a fiberoptic bronchoscopy and differential diagnosis of common causes including subglottic stenosis, vocal cord damage or subglottic/tracheal granulomas are all required [1].

In recent years an infrequent cause of extubation failure has been highlighted; obstructive fibrinous tracheal pseudomembrane (OFTP) with a similar presentation of stridor post-extubation. The knowledge of this pathology and its early diagnosis is extremely important as this is a potentially life-threatening complication [2].

Case Report

We present a case of a previously well 10-year-old boy who was admitted to the Pediatric Intensive Care Unit after severe abdominal trauma. The patient was under hemodynamic instability with an hemorrhagic shock caused by an hepatic and pancreatic laceration. His trachea was intubated with an appropriately sized 7-mm oral cuffed ETT, that passed easily into the trachea. A caudal pancreatectomy was performed. The child remained intubated and was on ventilatory support for 5 days. The patient had no fever or suggestive signs of infection in repeated blood testing. The blood culture and tracheal aspirates were negative. The chest x-ray was normal. A few hours after the extubation, the boy started to have severe stridor and acute respiratory distress and a reintubation was necessary. There were no early complications with the reintubation and the patient improved immediately. Repeated ETT suction revealed no secretions. After 24 hours, an elective extubation was performed. Inspiratory stridor and dyspnea started shortly after extubation with normal SpO2. The cause of the respiratory distress was thought to be laryngeal edema and this was treated with inhaled budesonide and intravenous steroidswith no improvement.

The symptoms became progressively worse and blood gas results showed increased PCO_2, so a flexible bronchoscopy was performed. In the trachea, a white, fibrinous mobile membrane was seen two centimeters below the subglottis in an anteroposterior and transverse position. This caused an intermittent complete obstruction of the airway during the inspiration (Figure 1). A rigid bronchoscope was introduced and the pseudomembrane was removed.

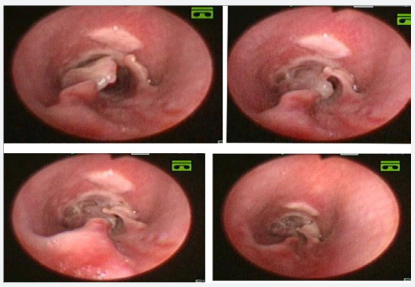

Figure 1: Obstruction of airway during inspiration.

The patient remained asymptomatic after extubation without difficulty breathing or stridor. The control bronchoscopy showed a normal airway size with a mild erythematous circumferential area. Secretions or other inflammatory symptoms were not observed. 21 days after admission the child was discharged home asymptomatic with no further complications.

Discussion

OFTP is a very rare and life-threatening complication of the endotracheal intubation. The first case was described in 1999 [2]. Birch described the first pediatric case in the year 2005. A 8-year-old that developed stridor in the first 24 hours after extubation for dental surgery with general anesthesia [3]. The real incidence is unknown as endoscopy to review airway injury after intubation is not a routine process. In 2011 a short series was reported in which a total of 24 adult patients were described and a review of the literature was made[4]. It is usually not considered a complication after a bronchoscopy in Pediatric Intensive Care Unit (PICU) patients or in Neonatal Intensive Care Unit (NICU) patients. However, a recent retrospective study performed over a 10 year period describes OFTP in 1.4% of PICU or NICU patients who had symptoms or clinical signs after extubation [1]. The hypothesis is that the pseudomembrane formation is caused by an ischemic injury of the tracheal mucosa and submucosa, which causes ulceration and necrosis. Finally, a fibrinous exudate and an infiltration of polymorphonuclear neutrophils can be observed, causing a functional stenosis [5]. The tracheal ischemia due to cuff pressure injury of the ETT has been suggested as the etiology, nevertheless it has been reported in children intubated with no tracheal cuff [1,3]. It is also associated with traumatic intubation or inappropriately large ETT. The OFTP can occur in patients within a short time of intubation; however the average time of previous intubation is 37 hours. The clinical presentation consists of stridor and a different grade of dyspnea that typically occurs before 24 hours postextubation in the pediatric patients. In adults this can occur 10-15 days later [4]. An important difference between OFTP and laryngeal edema is that OFTP does not respond to medical treatment. Differential diagnosis includes staphylococcal tracheobronchitis with tracheal pseudomembranes. In these cases, cultures could be positive, sepsis could be a clinical presentation and the lesion might not necessarily be localized to the site of the cuff or in the subglottis area. Bronchoscopy is used to diagnose OFTP. The typical endoscopic findings are circumferential membranes firmly attached to the trachea that move (or not) in the airway with the respiratory cycle. It can collapse the airway completely. It can be an annular or flapping septum. The lesion is located in the subglottis and the first tracheal rings. The rest of the airway is normal. Standard treatment includes rigid bronchoscopy and removal of the tracheal membranes. However, a flexible bronchoscopy with forceps or mechanical removal with a tracheal balloon can also be useful. There is no sequela. In some cases described in adults the condition fully resolved after expectoration with spontaneous membrane removal [5].

Conclusion

In conclusion, in patients with clinical symptoms of stridor and dyspnea after extubation that does not improve with medical treatment it is important to think about the formation of a tracheal pseudomembrane that causes airway obstruction. This obstruction can be intermittent or positional and can be life-threatening. Pediatric pneumologists, intensivists and otorhinolaryngologists should know this pathology for early bronchoscopic diagnosis and treatment.

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How to cite this article: Marina C S. Obstructive Fibrinous Tracheal Pseudomembrane: A Very Rare and Life-Threatening Complication of the Endotracheal Intubation. 2017; 2(5): 555596. DOI: 10.19080/AJPN.2017.02.555596

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