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Case Report Open Access

Anesthesia in a Young Infant with Unrecognized Pertussis Infection - Mild Cold or Severe Infection? Reinforcing the Debate

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Abstract

Preoperative anesthetic evaluation for pediatric elective surgery includes the assessment of upper respiratory tract infection symptoms. In this case report, a 34-days-old term infant scheduled to elective unilateral inguinal hernia repair had an undiagnosed pertussis infection although the child presented mild symptoms. Especially in infants with less than 4 months pertussis should be suspected when the child presents a rhinorrhoea that remains watery associated with cough that is not improving, usually without fever. The impact of anesthesia in the progression and severity of the disease is unknown. Given the epidemiological context of pertussis infection resurgence on developed countries, there should be a low threshold of suspicion in the preoperative anesthetic evaluation given the risk of serious complications. Debate about surgical delay and impact of anesthesia in young infants is far from over and should include new questions about poor clinical presentation of severe respiratory diseases in these children.

Keywords: Upper respiratory tract infection; *Bordetella pertussis*; Pediatric anesthesia; Anesthetic complications

Introduction

Literature about anesthetic decision-making regarding upper respiratory tract infection (URTI) in children frequently highlights the importance of identifying risk factors for perioperative respiratory adverse events [1,2]. However, even with a careful evaluation, URTI differential diagnosis may be challenging. We report a case of a not suspected severe infection in an infant with upper respiratory tract symptoms.

Case Report

A 34-days-old term infant (39 weeks), weighing 3.900 kg, was scheduled to elective unilateral inguinal hernia repair after two previous episodes of hernia incarceration. In the preoperative evaluation, parents referred a clear watery rhinorrhea during the last week, with no fever or altered behavior and a negative history of smoking exposure. There were no pathological signs on pulmonary auscultation and blood counts were normal. It was decided to proceed with anesthesia.

After standard monitoring with oximetry, electrocardiogram and noninvasive arterial pressure, anesthesia was induced with thiopental 5 mg/kg, fentanyl 2 μg/kg and atracurium 0.5 mg/kg.

Mask ventilation was easily performed. During laryngoscopy vocal cords were visualized and a 3.0 endotracheal tube was advanced. After intubation a severe bronchospasm was detected. The tube was removed and face mask ventilation initiated. Anesthesia was deepened with a bolus of thiopental and sevoflurane. The same complication occurred after a second intubation attempt being managed in a similar way. It was also administered inhaled salbutamol and an intravenous adrenaline bolus. After reversal of bronchospasm signs, a size 1.0 i-gel® laryngeal mask was inserted with no complications. A caudal block was performed with administration of 4 ml of ropivacaine 0.2%. Anesthesia was maintained with sevoflurane. At the end of surgery, laryngeal mask was removed with no incidents.

In the recovery room, a nebulization with adrenaline and dexamethasone was initiated in the presence of cough and rhonchi on auscultation. No complications were observed until discharge to the nursing room. At day 1 after surgery, a pediatrician evaluated the child due to severe respiratory distress episodes and nose obstruction. During observation the child had an oxygen saturation of 94% without cyanosis or fever. Blood analysis revealed: white blood count 23-26 × 103/μl; hemoglobin 13.1 g/dl and platelets 833 × 103/μl. Results from molecular biology detection tests of the nasopharyngeal aspirate were negative for viruses and positive to *Bordetella pertussis*. The child was treated with azithromycin and stayed at the hospital during 13 days until full recovery.

Discussion

Preoperative anesthetic evaluation for pediatric elective surgery includes the assessment of upper respiratory tract infection (URTI) symptoms. The process of decision-making has the question of how long to postpone surgery [1,2], which has some important aspects to be point out.

Timing for surgical repair has been debated in order to balance the risks of anesthesia and surgery against the risk for incarceration and surgical complications [3,4]. Delay in repair is associated with future technical surgical difficulties, high incarceration rates, testicular atrophy and postoperative recurrence [5,6]. On the other hand, delay may diminish the risk of infant anesthetic complications and may allow ambulatory surgery. Additionally, the surgery itself is associated with operative complications [7,8].

In this case, child's age was considered appropriated (44-week post-conceptual age) [9] and surgery delay was associated with a high risk of hernia complications since the child had previous episodes of incarceration.

Concerning the presenting URTI symptoms and its severity, parents reported that the child had a clear watery rhinorrhea during the week before surgery, with no fever or altered behavior, suggesting a mild cold. Inquiry for other risk factors revealed that with exception of young age, there was no past history of pulmonary diseases or smoking exposure and there were no signs of lower respiratory involvement on pulmonary auscultation as well. In the presence of mild symptoms and few or no risk factors, there is a general consensus on proceeding with the procedure [1,2].

This case report showed a serious URTI although the child presented mild symptoms. Despite the majority of URTIs only evolve to a benign cold, children may present with undiagnosed severe infections including croup, influenza, bronchiolitis, herpes simplex, pneumonia, epiglottitis, and strep throat [2]. As we could realize in this case report, pertussis infection is also one of that undiagnosed infections with initial symptoms simulating a URTI [10].

A resurgence of pertussis has been well documented in many industrialized countries. In countries with well-developed immunization programs, the problem is more pronounced in two age groups: those over the age of 10 years and those under the age of 5 months. Currently, the true incidence of pertussis is generally considered to be substantially higher than reported, depending on the level of clinician suspicion and reporting [11].

In United States and Europe are implemented immunization programs with an a cellular pertussis vaccine which is included in the DTPa (diphtheria, tetanus, and pertussis) vaccine. Vaccination schedules distribute five doses of DTPa vaccine at the ages of 2, 4, 6 months, between 15 and 18 months and the last dose between 4 and 6 years. Currently there's no vaccination regimen starting earlier than 6 weeks of age. Additionally, two or more doses of a pertussis-containing vaccine appear to be needed for protection [11,12]. Absent or incomplete protection may be the main reason for infection and its severity in young infants. In this case report the young infant had no vaccine dose yet because of his age (34-days-old).

A different problem occurs in older children since the duration of protection following the five doses schedule is limited to 5-6 years. Both groups have a higher incidence of pertussis infection; however severe infection and complications are more common in infants [11-13].

Classic pertussis is divided in three stages: catarrhal stage (mild cough and coryza), paroxysmal stage and a convalescent stage in which the cough subsides several weeks or months. Atypical presentations occur in young infants and in individuals who have been vaccinated, which contributes to the under-recognition of pertussis infection [11]. Symptoms in young infants, particularly those under 4 months, include a catarrhal stage during which the infant can appear deceptively well with no fever, watery coryza, sneezing and a mild cough. Many children under 6 months of age do not develop paroxysmal cough or the characteristic inspiratory whoop. The paroxysmal stage may be associated with gagging gasping, vomiting, cyanosis and bradycardia. Complications include apnea, seizures, encephalopathy and pulmonary hypertension. Most deaths from pertussis occur in infants younger than 6 months of age [14,15].

Clinical diagnosis may be problematic given the wide spectrum of presenting symptoms especially in unimmunized infants and those with partial immunity related to past vaccination. Laboratory tests available include culture, serology and polymerase chain reaction (PCR) methods. For culture, specimens must be collected through nasopharyngeal swabbing or nasopharyngeal aspiration in younger children. Results can be available in 72 hours, especially in high titer infection, such as in unimmunized infants, but 2 weeks are required before culture may be definitively reported as negative [11]. PCR is particularly useful in infants where pertussis is suspected as serology is not applicable and specimens are more easily transported and more rapidly reported than for culture. However, the sensitivity of PCR also decreases with the duration of symptoms, since the method is based on the detection of the microorganism [13]. Serology tests have a reduced sensitivity in the first 2 weeks of infection [11,13].

Treatment with antibiotics does not significantly affect the length or severity of infection but aims to reduce transmission to other persons. Azithromycin (10 mg/kg/d for 5 days) and clarithromycin are recommended as first line agents and have fewer side effects when compared to erythromycin (previously considered as a gold standard) [16]. Since treatment does not significantly shorten the clinical course in infected patients, symptoms may last for several weeks and during the convalescent stage cough will also subside after weeks to months [11]. Taking these points into account and if an urgent surgery is needed regional anesthetic techniques must be considered as a better approach in these infants.

Most of perioperative respiratory complications in children with URTI are manageable with minimal associated morbidity by an experienced pediatric anesthesiologist. However, in this particular case of a severe disease with an initial innocent/benign presentation in a young infant, the anesthetic implications are unknown and may be serious in terms of morbidity and mortality.

Moreover, to our knowledge, the impact of anesthesia in the progression and severity of the disease is also unknown.

Given the epidemiological context of pertussis infection resurgence on developed countries [11], there should be a high index of suspicion in the preoperative anesthetic evaluation given the risk of serious complications. Especially in infants with less than 4 months pertussis should be suspected when the child presents rhinorrhea that remains watery and a cough illness that is not improving, usually without fever. Molecular biology detection tests for viruses and *Bordetella pertussis* using specimens collected from the nasopharyngeal aspirate are rapidly reported and may constitute a useful tool for decision-making in these situations.

Conclusion

Debate about surgical delay and impact of anesthesia in young infants is far from over and should include new questions about poor clinical presentation of severe respiratory diseases in these children.

Clinical suspicion on *Bordatella pertussis*, given the child clinical presentation and the pediatric anesthesiologist know how, might justify a systematic laboratory investigation, given the potential morbidity and/or mortality of this infection.

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