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Case Report

Intraoperative Atelectasis in a Small Child: A Case Report

Küçük Bir Çocukta İntraoperatif Atelektazi: Bir Olgu Sunumu

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ABSTRACT

Atelectasis is a common clinical event that can be seen after surgeries but is rare for intraoperative process. We reported our experience of acute intraoperative atelectasis in a small child planned for adenoidectomy by the Otolaryngology Clinic. After intubation, it was observed that there were no breathing sounds in the left lung by listening. The peripheral oxygen saturation started to decrease (SpO_2 = 99–82) and $EtCO_2$ (60) started to rise simultaneously. The patient was extubated. In the chest x-ray taken after extubation, an increase in lung ventilation was observed. Breathing sounds were normal in the postoperative care unit, and the patient was transported to the service and discharged on the first postoperative day.

Keywords: Atelectasis, anesthesia intraoperative, anesthesia

ÖZ

Atelektazi, ameliyatlardan sonra görülebilen ancak intraoperatif süreç için nadir görülen yaygın bir klinik olaydır. Kulak Burun Boğaz Kliniği tarafından adenoidektomi planlanan küçük bir çocukta akut intraoperatif atelektazi deneyimimizi bildirdik. Entübasyondan sonra, dinlenerek sol akciğerde solunum seslerinin olmadığı gözlendi. Periferik oksijen satürasyonu azalmaya başladı (SpO2=99-82) ve EtCO2 (60) aynı anda yükselmeye başladı. Hasta ekstübe edildi. Ekstübasyon sonrası çekilen akciğer grafisinde akciğer ventilasyonunda artış izlendi. Postoperatif bakım ünitesinde solunum sesleri normaldi ve hasta servise götürüldü ve ameliyat sonrası ilk gün taburcu edildi.

Anahtar Kelimeler: Atelektazi, intraoperatif, anestezi

INTRODUCTION

Atelectasis is a common complication that may occur after surgeries. Atelectasis can be described as the complete collapse of one or more anatomical pulmonary units or collapse of whole lung. The absence of breath sounds and mediastinal shift are the main clinical symptoms of collapse. An opacity can be seen on chest radiographically. Cyanosis, dyspnea, and tachycardia may accompany the other symptoms. Due to the intrapulmonary shunting of blood, a quick arterial oxygen desaturation occurs. According to the literature, the acute intraoperative pulmonary collapse has been reported as a rare complication of anesthesia.[1]

We aimed to share our experience of acute intraoperative atelectasis in a small child planned for adenoidectomy by the Otolaryngology Clinic.

Case Presentation

Adenoidectomy was planned by the Otolaryngology Clinic for a 6-year-old, 19 kg male patient under elective conditions. Informed consent form was obtained from patient's parents. Patient was evaluated as ASA (American Society of Anesthesiologists) 1 in the preoperative evaluation performed in the anesthesia outpatient clinic. Laboratory values (Hb: 12.8 g/dL, hematocrit: 39.4, platelet: 343 000, leukocyte: 7330, glucose: 94 mg/dL) were normal.

Posteroanterior chest radiography (Figure 1) was normal. After 8 hours of fasting, the patient was taken to the operation room. After ECG, SpO_2, and blood pressure monitoring, induction was performed with 1 mg/kg lidocaine, 1 µg/kg fentanyl, 2 mg/kg propofol, and 0.6 mg/kg rocuronium as muscle relaxant; 2% sevoflurane + 50% air + 50% O_2 was opened for maintenance. After intubation, it was observed that there were no breathing sounds

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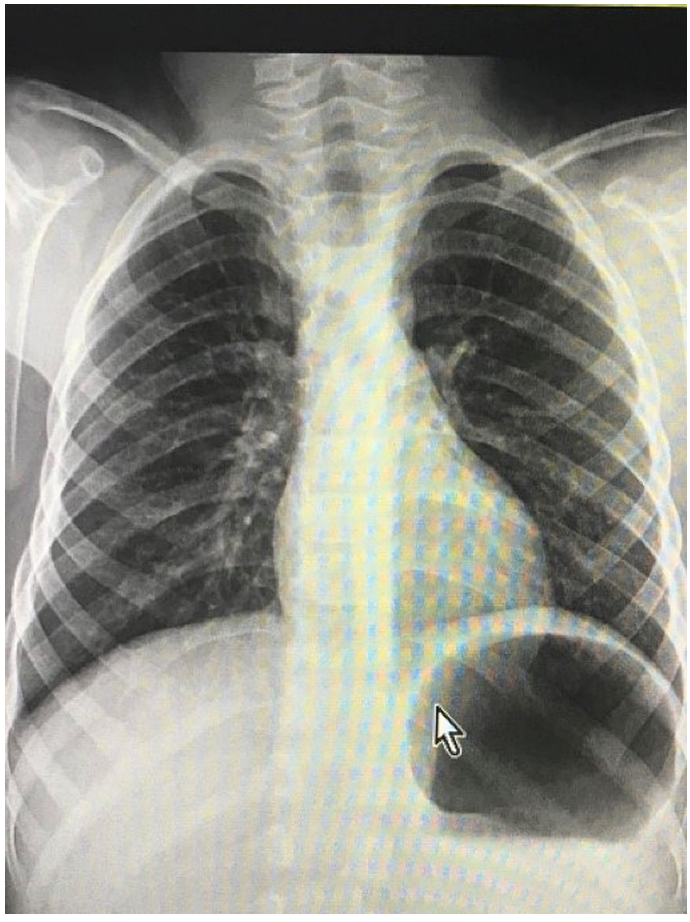


Figure 1. Preoperative posteroanterior chest x-ray.

in the left lung by listening. Endotracheal tube was retracted, and continuous auscultation was performed; however, when breathing sounds could not be heard, aspiration was done through the tube.

The peripheral oxygen saturation started to decrease (SpO_2 99–82) and $EtCO_2$ (60) started to rise simultaneously. He had tachycardia (130 beats/min). He started to breathe with 100% O_2, and aspiration within the tube was repeated. Lung sounds could not be obtained in the left hemithorax in auscultation. Emergency portable chest radiograph was taken, and total atelectasis was observed in the left lung. In order to improve the general condition of the patient, prednol 20 mg iv and decort 2 mg iv were pushed very slowly, and consultation was requested from thoracic surgery. Rigid bronchoscopy was performed by thoracic surgery and no pathology was seen. Against the secretory atelectasis, possibility aspiration was done again, and the endotracheal tube was pulled to the vocal cord level. In the chest radiographs, which were taken later, aeration was observed in the left lung, and breathing sounds were heard (Figure 2). The peripheral oxygen saturation of the patient started to increase (SpO_2 = 82–93) and $EtCO_2$ (48) started to decrease

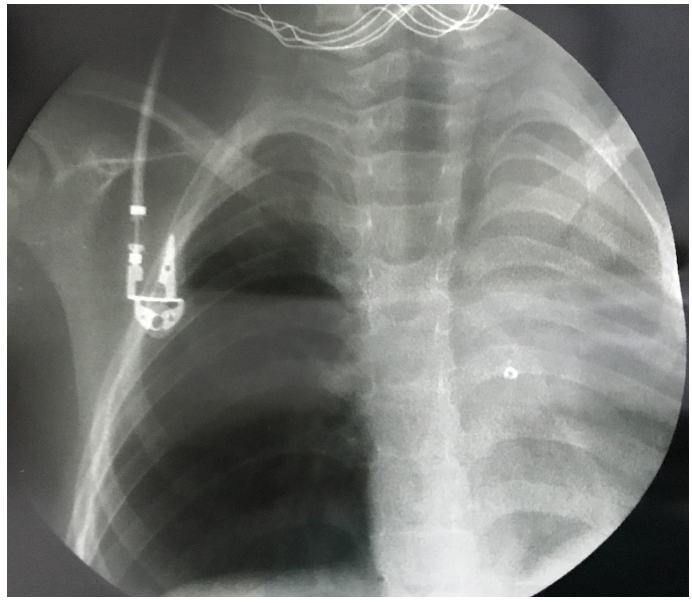


Figure 2. Intraoperative anteroposterior chest x-ray.

simultaneously. The operation of the patient was canceled, sugammadex 40 mg iv was given, and the patient was extubated. In the chest x-ray taken after extubation (Figure 3), an increase in lung ventilation was observed. It was observed that the patient's saturation was normal (SpO_2 = 98), patient regained consciousness, and breathing sounds were normal in the postoperative care unit. The patient was transported to the service. Postoperative posteroanterior chest x-ray was taken, pediatrics consultation was done, and the patient was discharged on the first postoperative day.

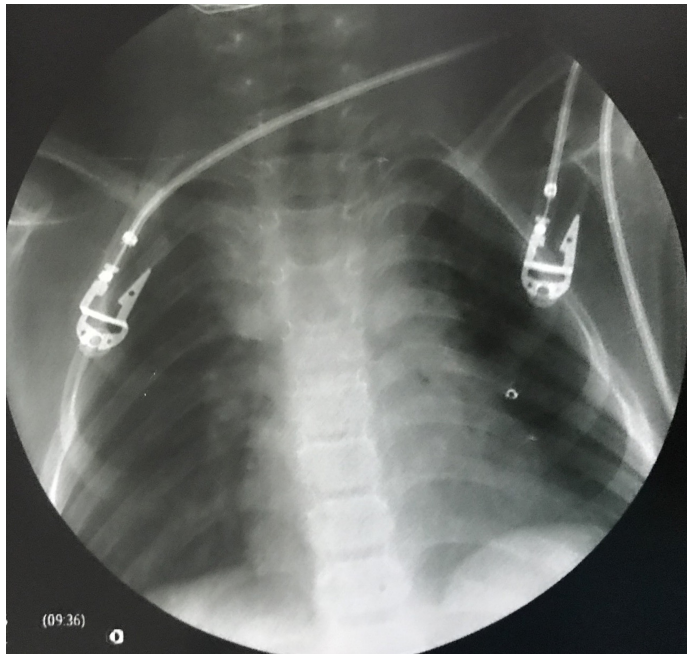


Figure 3. Post-extubation anteroposterior chest x-ray.

DISCUSSION

Atelectasis can be described as the complete collapse of one or more anatomical pulmonary units or collapse of whole lung. The absence of breath sounds and mediastinal shift are the main clinical symptoms of collapse. Intraoperative atelectasis is a rare but very important situation.[1]

Cassels and Rapaport[2] in their large series of 6500 anesthesia records reported pulmonary collapse in their 18 patients (0.26%).

Bergamini and Shepard reported 2 cases of fatal bilateral collapse. They explained the fatal collapse as a vasomotor disturbance of a reflex nature.[3]

In 1948, Pallin and Golman reviewed 3 patients who experienced massive pulmonary collapse during spinal anesthesia. They explained the problem as collapse to an over-active parasympathetic nervous system.[4]

Churchill-Davidson declared a fatal case of intraoperative pulmonary collapse in the course of laparotomy. He explained the mechanism of the collapse as a reflex bronchiolar smooth muscle contraction leading to venous congestion and edema of the small airways with consequent bronchiolar occlusion.[5]

Raffensperger et al reported 2 fatal cases of pulmonary collapse after the termination of esophageal surgery. They explained that the fatal process was due to respiratory depression, rapid absorption of alveolar gas, and bronchospasm combination.[6]

In 1963, Kyle declared a patient with bilateral massive collapse during thoracotomy concurrent with asthma. He could not explain the mechanism and reported that the bronchoscopy was negative.[7]

Coroneos et al described another collapse during thoracotomy. They explained that this pulmonary collapse was due to severe reflex bronchiolar spasm. They reviewed pulmonary collapse in 11 cases and concluded that 7 occurred during thoracotomy, and they explained that deflation and retraction of the lung, use of high concentrations of oxygen, and loss of surfactant led to the pulmonary collapse.[8]

Stanley et al reported 3 cases of pulmonary collapse and they attributed the problem to the presence of mucous plugs in the bronchi. The use of dry gases to the tracheobronchial tree, use of anticholinergic agents, maintain changes in mucus secretion and drying of respiratory mucous membrane. A simple precaution may be decreasing cigarette smoking for 1 or 2 weeks prior to surgery.[9]

Gebhard et al reported a patient with bilateral intraoperative atelectasis due to latex allergy. They reported that the first symptoms occurred 2 hours after beginning of the surgical procedure, and skin manifestations appeared 30 minutes later. Certain anesthetics may hide the acute clinical manifestations and may modify mediator release. The atelectasis incidence can be 40% among asthmatic children.[10]

Incidence of atelectasis after induction of anesthesia among children varies between 68% and 100% according to the earlier studies. Tusman et al reported that atelectasis occurred after induction of anesthesia in all children younger than 7 years.[11-13] Song et al[14] explained the high risk of anesthesia-induced atelectasis by the high compliance of chest wall in children and the higher closing volume than the functional residual capacity in children. Lee et al[15] reported that they gave 100% oxygen until the tracheal intubation process finished in all children.

CONCLUSION

In our patient, the mechanism of the atelectasis is unclear. We think that the most reasonable process is reflex bronchiolar smooth muscle contraction leading to bronchiolar occlusion. In conclusion, it is no matter what the mechanism is, anesthesiologists should be aware of this unexpected, severe atelectasis process.

Hasta Onamı: Bu çalışmaya katılan hastanın ebeveynlerinden yazılı onam alınmıştır.

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Declaration of Interests: The authors declare that they have no competing interest.

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