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Management of Airway Foreign Body Aspiration with Atelectasis Complication

Puji Utami[1], Rizka Fathoni Perdana[2]

[1]Researcher, Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, UniversitasAirlangga, Surabaya, Indonesia, [2]Tutor, Department of Otorhinolaryngology, Head and Neck Surgery, Faculty of Medicine, Universitas Airlangga, Jalan Mayjen Prof. Dr. Moestopo 47, Surabaya 60131, Indonesia.

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Abstract

Background: A sharp foreign body aspirationis a problem that is usually found in teenage women who wear hijab. Straight-pins are used in wearing hijab to make a model and to hold it tight in place. Straight-pin aspiration has the potential to become a serious problem if it is inhaled in the airway and must be removed immediately in optimal conditions by using complete equipment to prevent complications.

Case Report: A 14 year old girl with straight-pin aspiration in the airwayhad come to emergency room of DrSoetomo General AcademicHospital, Surabaya, Indonesia. The initial location of the straight-pinwas in the right main bronchus and a rigid bronchoscopy was planned. Rigid bronchoscopy was performed but the foreign object failed to be removed and the foreign object moved further down and difficult to reach. A flexible bronchoscopy was performed and the foreign body was successfully removed. However, there was a complication of left lung atelectasis after the procedure. It was treated conservatively and healed.

Conclusion: Straight-pin aspirationin the airway is treated by rigid and flexible bronchoscopy with atelectasis as a complication. Flexible bronchoscopy is an alternative therapy for inhaled foreign bodies that are located distally and cannot be reached by rigid instruments.

Keywords: flexible bronchoscopy; foreign body; rigid bronchoscopy; straight-pinaspiration; child neglect

Introduction

Foreign body aspiration is the inhalation of an object into the respiratory tract and a severe incident that could potentially cause a fatal complication.[1] Straight-pin aspiration is common in muslim countries that occur a lot in young women.[2] Straight-pins are used to hold and make a model on the hijab. In the process of putting on the hijab, both hands are used to shape the hijab while the straight-pins, before they are used to hold the hijab tight in place, are temporarily bitten with the front teeth, sothey are easily inhaled when speaking and coughing.[3]

Corresponding Author: Rizka Fathoni Perdana, Tutor, Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Universitas Airlangga, Jalan Mayjen Prof. Dr. Moestopo 47, Surabaya 60131, Indonesia.

Email: rizka-f-p@fk.unair.ac.id

Phone: +62-856-3315-233

Usually, the blunt position, in the shape of pearl, is in the mouth so that the sharp part is proximal. The incidence of foreign bodies aspirationatDr. Soetomo General Academic Hospital Surabaya, Indonesia, in the 2010-2015 period was recorded as many as 87 cases, consisting of 27 cases of organic foreign bodies and 60 cases of inorganic foreign bodies with cases of needle foreign bodies as many as 50 cases. Complications of tracheobronchial foreign bodies can be due to foreign bodies themselves or due to the bronchoscopy procedure. Atelectasis is one of the complications that occur due to bronchoscopy[4].We presented a case on foreign body aspiration treated with bronchoscopy with atelectasis as complication. The purpose of this case was to discuss the clinical experience of handling a patient with a needle airway foreign body, in which the removal of the foreign body at the first attempt failed, and the presence of complications that arose as the result of the procedure.

CASE

A 14 years-old girl came to the Emergency Room (ER) of Dr. Soetomo Hospital, Surabaya, Indonesia, on November 6, 2017, with a diagnosis of straight-pin aspiration in the airway that called foreign body aspiration. The patient inhaled a straight-pin about 8 hours before. When she was doing her hijab, she bit the pin with her front teeth, but she had suddenly coughed and the pin was accidentally inhaled. She felt pain in the neck, without any complaints of breath shortness. Physical examination of the patient showed she was within normal limits. Chest x-ray examination showed a metal density in thoracic 3-4 left vertebrae (Figure 1)

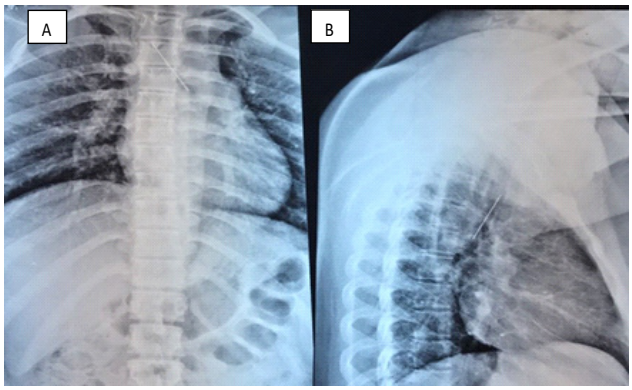

Figure 1: Chest radiograph before bronchoscopy. A. Anteroposterior, B. Lateral

The patient was diagnosed with a straight-pin aspiration in the left main bronchus. Bronchoscopy was performed with general anesthesia. The foreign body of a straight-pin was found in the left main bronchus, but failed to be extracted.It was dislodged and moved to the distal airway. Re-evaluation obtained a foreign bodies in the left superior lobe of bronchial lingua. Several attempts was done to remove the foreign objects but failed. The airway mucosa became edematous. It was decided to stop the bronchoscopy and scheduled to do flexible bronchoscopy three days later.

One day after the bronchoscopy, chest X-ray showed atelectasis of the superior lobe in the lower left lung (Figure 2). Atelectasis was treated conservatively with intravenous antibiotics and corticosteroids before the procedure.

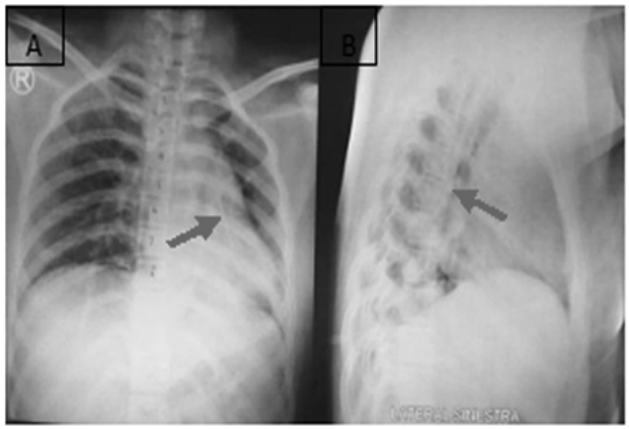

Figure 2: Plain chest radiograph after rigid bronchoscopy. A. Anteroposterior, B. Lateral. Arrows indicate foreign needle objects.

Flexible bronchoscopy was performed three days later under general anesthesia.The objects were found after 90 minutes of action. The foreign body was found in the left superior lingula of the bronchus and was embedded in the mucosa with a proximal sharp edge. The object wassuccessfully removed within 2 hours of action.

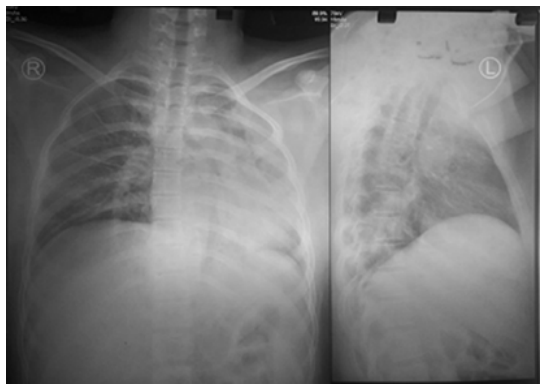

Figure 3: Plain chest radiograph after flexible bronchoscopy. A. Anteroposterior, B. Lateral

Figure 4: A. Needle foreign body in the mouth of the superior lobe, showing the sharp tip buried in the mucosa, B. The foreign body of the pin that was successfully removed.

Eleven hours after the procedure, there was no breathless, but there was a cough with blood spots. Vital signs of the patientshowed oxygen saturation of 93% without supplemental oxygen. Examination of the chest revealedasymmetrical chest motion with left side trailing and decreased breath sounds in the lower left lung. The patient was given with supplemental oxygen with a nasal cannula 3 liters/minute and was given with chest physiotherapy. There was a suspicion of lung atelectasis in the left superior lobe.

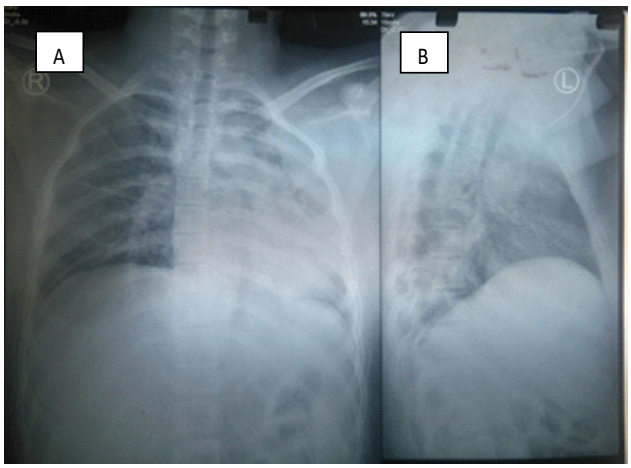

Figure 5: Chest plain photo after flexible bronchoscopy. A. Anteroposterior, B. Lateral.

Consolidation is seen on the lobe of the bottom of the superior left lung.

The patient did not have difficutly to breath and the cough was minimal one day later. The oxygen saturation improved 97% without additional oxygen. Chest motion was symmetrical, vesicular lower left lung breath sound improved compared to the previous day, and there were additional crackling breath sounds in the lower left lung. The treatment was continued with additional nebulization therapy with salbutamol every 8 hours. On the second day, the crackles improved and thoracic plain photo was taken, showing normal results.

The patient wasdischarged with cefixime 2x100 mg home medicine. The patientwas scheduled for check-up after 3 days without any complaints.

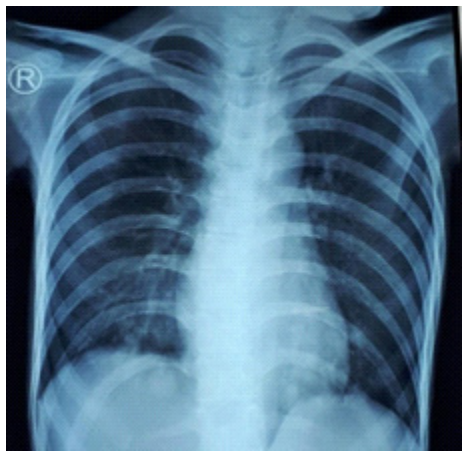

Figure 6: Chest plain photo before discharge

Discussion

The patient aspired a foreign body, a straight-pin, which she bit with her front teeth before being used for fixing her hijab. She suddenly coughed, so the straight-pin was inhaled into the airway. Straight-pin aspiration into the tracheobronchial system rarely causes symptoms because the needle does not cause obstruction, but causes infection or granulation around the needle which can cause discomfort.[3] The patient experienced a persistent cough in this case when the initial foreign object was inhaled and then the cough disappeared. The patient came to the hospital in asymptomatic phase so that there were no complaints and physical examination was within normal limits.

Airway foreign bodies may not cause acute airway obstruction, but may cause other reactions, depending on the type of the bodies, whether they are organic or inorganic.Inorganic foreign bodies, such as needles, are not hygroscopic, so that there is less tissue reaction than organic foreign bodies, but sharp foreign bodies are more dangerous because they have potential to cause airway perforation.[5] In this case, the foreign body did not cause obstruction nor showed clinical symptoms. The small size of the straight-pin did not obstruct the lung segment because the proximal or distal end diameter of the foreignbody was smaller than the left bronchial lumen's size so that the airflow in lung was not disturbed.

Straight-pin airway foreign-body is mostly located in the main branch of the left bronchi. Some experts attributed this finding to the Bernoulli

phenomenon. Coughing, laughing or talking would cause greater negative pressure on the left bronchus, which is narrower than the right bronchus, causing the movement of small and long shaped needles to the left side.[1] A straight-pin that was inhaled in this case located in the main branch of the left bronchus, in accordance to the Bernoulli phenomenon.

The difficulty of diagnosis is a common problem when faced with cases of airway foreign-bodies. The straight-pin airway foreign-bodies diagnosis is more straightforward because the straight-pin is made of metal and is easily recognizable from its shape on radiological examination.[1] Chest x-ray of the patient showed a metal-density object in the left thoracic 3-4 vertebra so that the diagnosis of straight-pin foreign body could be made.

Sharp radiopaque foreign bodies seen on plain chest radiographs should be removed immediately by rigid and flexible bronchoscopy. Foreign-bodies could be taken by rotating to reduce the risk of trauma and could be covered by advancing the bronchoscope or pulled into the bronchoscope lumen.[6] When performed rigid bronchoscopy, the straight-pin should be grasped and brought into the bronchoscope.[3] In this case, taking a straight-pin was done with a rigid bronchoscope because it was the standard for taking out foreign-bodies on the airway. Due to the the shape of the straight-pins, when taken, the straight-pin came off and moved to the lingula position of the left superior lobe of the bronchus.

The foreign body was hard to remove since the needle pointed into the bronchial mucosa which created a resistence when it was pulled. The mucosa of the bronchi was edged and made it difficult to take foreign objects so it was decided to stop the operation. Plain chest radiographs were performed primarily for repeated bronchoscopy which could show the distal migration of foreign bodies.

Airway foreign bodies located in the main tracheobronchial tract are frequently displaced and moved during the retrieval procedure. Objects of irregular shape and objects with sharp edges tend to puncture the tracheobronchial mucosa and become fixed.[7]In this case, the bronchoscopy procedure caused the straight-pin to shift distally. Flexible bronchoscopy is used to remove foreign objects located in the lingula with a sharp tip that makes it difficult to remove using rigid bronchoscopy.

Complications that may occur in the aspiration of a foreign body in the tracheobronchial can be due to from the foreign body itself or due to the bronchoscopy.[5] In this case, complications occurred as a result of bronchoscopy in the form of atelectasis of the inferior lobe of the left lung and edema on the bronchial mucosa. The diagnosis of atelectasis is based on clinical symptoms, physical examination, laboratory examination, radiological examination and bronchoscopy. The patient complained tightness and cough with spotting blood.

Physical examination showed asymmetrical chest motion with left side trailing and decreased breath sounds in the lower left lung. Plain chest radiograph of the patient after bronchoscopy showedopacification in the lower part of the left lung. The patient was suspected of having atelectasis as a complication of bronchoscopy and was given with systemic corticosteroid therapy, systemic antibiotics, nebulization and chest physiotherapy.

The patient's condition had gradually improved. Her complaints had improved, and physical examination and support had also improved. The patient was discharged and scheduled for a visit in the outpatient unit. At the time of control, three days later, the patient had no complaints and was advised to return to control if there were complaints.

Conclusion

We reported straight-pin aspiration in the airway treated by rigid and flexible bronchoscopy with atelectasis as a complication. Flexible bronchoscopy is an alternative therapy for foreign bodies that are located distally and cannot be reached by rigid instruments.

Conflict of Interest: The authors report no conflict of interest related to this manuscript.

Ethical Approval: This study received a certificate of ethical clearance from the ethical commission of Dr. Soetomo General Academic Hospital number 0202/ LOE/301.4.2/XI/2020.

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