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CASE REPORT

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Endoscopic management of pin stuck into the segmental bronchus

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Abstract

This case is a challenging case review of a successful removal of sharp and deep located airway foreign body using ventilating bronchoscopy.

KEYWORDS

airway foreign body, metallic pin, pediatric, segmental bronchus, ventilating bronchoscopy

1 | INTRODUCTION

Foreign body aspiration is a potentially life-threatening emergency that can result in acute respiratory distress, pneumonia, atelectasis, sepsis, or death.[1] Sharp and penetrating foreign bodies are of particular interest because of their potential to damage the airway and cause possible complications.

This case is a retrospective review of a successful removal of sharp and deep located airway foreign body using ventilating bronchoscopy.

2 | CASE REPORT

A 10-year-old female accidentally swallowed a 3.3 cm metallic sewing pin with pearl head while making hairpin to her dolls. She coughed a little, but she denied history of choking and dyspnea. She visited emergency room 4 h after swallowing, and she did not have any symptoms at the time of arrival. The posteroanterior chest radiography and chest CT revealed the pin bent about 30 degrees and located in the left lower lobe lateral basal segmental bronchus (Figure 1). Ventilating bronchoscopy was performed by using a size 3.5, 30 cm KARL STORZ bronchoscope and 2.9 mm-30/36 cm KARL STORZ telescopes. Optical forceps with alligator jaws and KILLIAN bean jaws were used. The pearl head of the pin was located at the bottom while the sharp tip of the pin, which was located at the top, was stuck in the mucosa. During the removal procedure, tip of the bronchoscope was located at the left main bronchus, and the optical forceps with telescopes were advanced to segmental bronchus. After grasping the mid-portion of pin, it was pushed down to distal direction for mobilization of the sharp tip. After the tip was exposed, it was grasped and pulled back into the bronchoscope with

giving minimal damage to nearby mucosa. The pin was bent about 30 degrees and this made the pin stuck inside the bronchoscope, and the sharp tip of the foreign body was hooked into the fenestration of the bronchoscope. Eventually, the foreign body and the bronchoscope were removed together (Figures 2 and 3, Video S1). The intraoperative bleeding was minimal, and there were no acute postoperative complications. Her vital signs were stable, and she was discharged at postoperative day 1 without any acute complications.

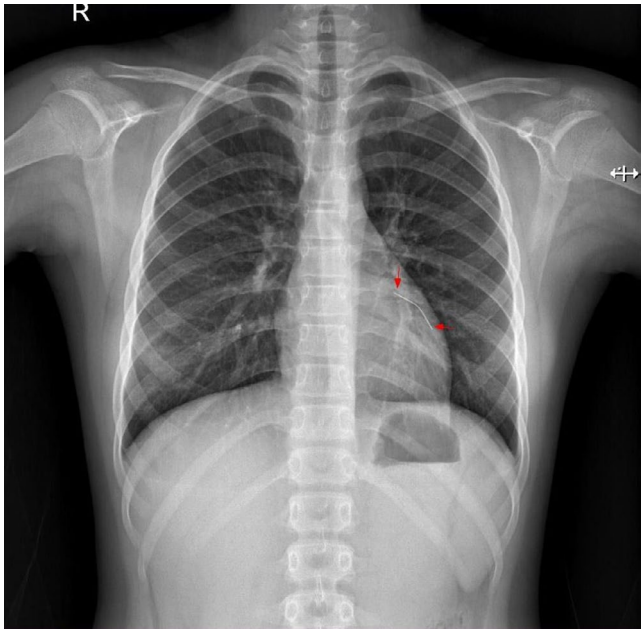

FIGURE 1 Chest radiograph demonstrating foreign body in the left lower lobe bronchus

3 | DISCUSSION

Inhaled foreign body can result in acute respiratory distress, pneumonia, atelectasis, sepsis, or even death. The aspirated object depends on various factors such as age, sex, geographical area, sociocultural factors, socioeconomic status, occupation, and nutritional habits. The metallic sewing pin aspiration discussed in this case occurs predominantly in young Muslim females wearing hijab. While wearing headscarves with their two hands, they hold the pins between their lips or teeth, and actions such as laughing, talking, coughing, sneezing makes them accidentally swallow the pins. According to Kakunje et al., 3.7% of 270 sampled Muslim women experienced pin aspiration. These cases are commonly grouped together as "turban pin syndrome" or "hijab syndrome" in literatures.[2]

Foreign body aspiration is commonly believed to occur preferentially in the right bronchial tree because the right

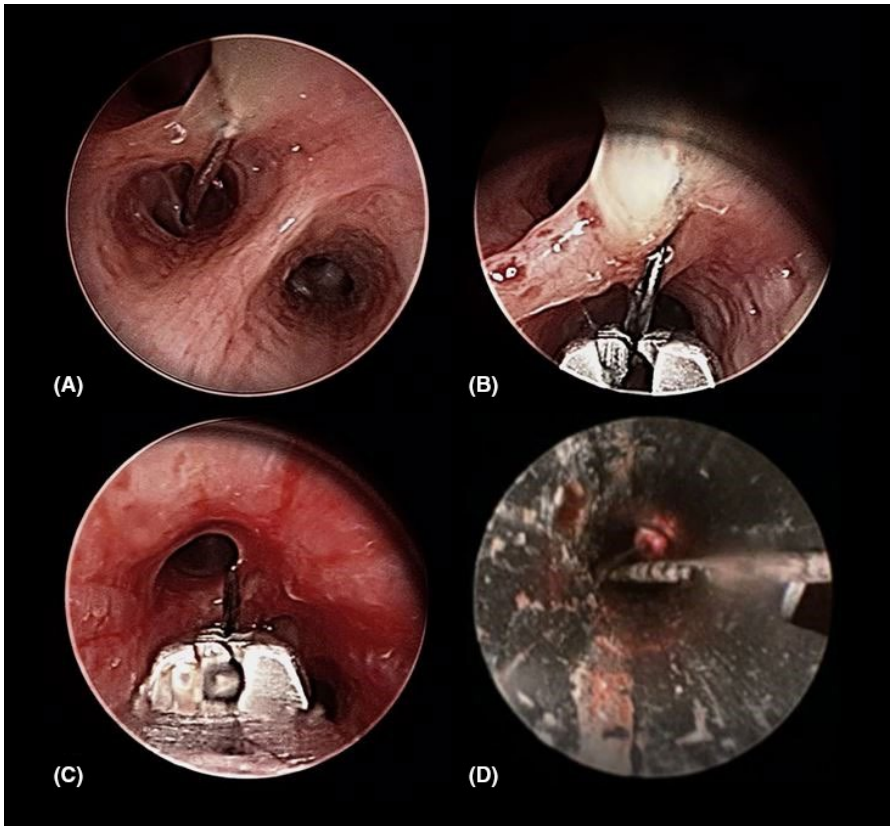

FIGURE 2 (A) Foreign body was located in the left lower lobe lateral basal segmental bronchus and the sharp tip was stuck in the airway mucosa, (B) The foreign body was pushed down to distal part for mobilization, (C) The tip was exposed, (D) The bent pin was stuck, hooked into the bronchoscope, and removed with the bronchoscope

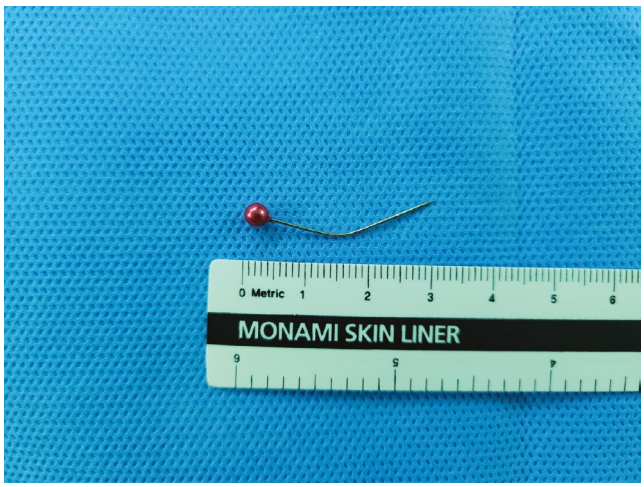

FIGURE 3 Removed foreign body

main bronchus is steeper and wider than the left main bronchus.[1] However, prior researches showed that the metallic hairpins were more likely to be lodged in left bronchial tree with statistical significance. Rizk et al. explained this phenomenon with the Bernoulli effect. Maneuvers such as coughing, laughing, or speaking generates larger negative pressure at the narrower left bronchus than right main bronchus, and this appears to outweigh the anatomic predominance of right bronchus in the case of metallic pin inhalation.[1]

These pins have a long narrow body with a round colored plastic bead at one end. The beaded end usually points downward due to its heavy weight, and it makes the pin goes deeper into the tracheobronchial tree. Sometimes the pointed end gets stuck in the airway mucosa, and during the removal process, the sharp end can scratch the airway and can cause complications such as tracheobronchial wall erosion, fistula, pneumothorax, and emphysema.[3] If the pin is distally located, removal becomes more challenging process because even minimal amount of bleeding can obscure the endoscopic view of narrow airway.

The location of the pins, the time from the onset to the intervention, the physician's experience and skills are important factors that determine the patient's morbidity. Laryngoscopy, fiberoptic bronchoscopy, rigid bronchoscopy, or thoracotomy can be used to remove the foreign body. According to prior articles, thoracotomy rates variated from 1.6 to 7.0%, and as the deeper, the foreign body was located, the higher rate of thoracotomy was performed.[1,3,4]

Performing ventilating bronchoscopy in the left bronchus is technically harder than the right bronchus because of its narrower diameter and more horizontal division. Therefore, some clinical methods are needed in order to reach the foreign body located at the left segmental bronchus with rigid bronchoscopy. First, the patient's head should be turned to the right side to place the scope in the left main bronchus. Second, the bronchoscope should be placed as deep as possible, beyond the carina, then the optical forceps should be advanced into the segmental bronchus. For child like in this case, bronchoscope can be located no more than the main bronchus due to the short diameter of the bronchus. However, if the bronchoscope is placed at the carina, moving the optical forceps toward the segmental bronchus is difficult because of the lower airway collapse.

After the foreign body was in sight, two important steps were performed to reduce bronchial wall damage during removal process—1. The pin was pushed down to distal part for mobilization, 2. The bent pin was stuck, hooked into the bronchoscope, and removed with the bronchoscope. The pointing end of metallic pin could not be grasped easily using tooth forceps as well as alligator forceps due to its slippery nature. Sahu et al. removed an aspirated board pin by hooking the sharp end of the foreign body inside the fenestration of cup forcep.[5] These intervention techniques eventuated successful removal of deep located sharp and pointed pin without complication, and prevented more invasive procedures such as thoracotomy.

4 | CONCLUSION

We present a challenging but successful removal of sharp and deep located metallic sewing pin stuck into the segmental bronchus with ventilating bronchoscopy.

ACKNOWLEDGEMENT
None.

CONFLICT OF INTEREST
The authors have no conflicts of interest to disclose.

AUTHOR CONTRIBUTIONS
Professor Seong Keun Kwon performed the surgery. Young Chul Kim assisted the surgery and took care of the patient during the admission period. Young Chul Kim summarized the case. Seong Keun Kwon read and approved the final manuscript.

CONSENT
The study was published with the written consent of the patient's legal guardians.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are openly available.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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