INTRODUCTION
Pediatric foreign body aspiration can be a life-threatening emergency requiring immediate intervention. The standard intervention for the vast majority of airway foreign bodies is rigid bronchoscopy,1 which was first performed by Gustav Killian in 1897. However, for some large or irregular airway foreign bodies, endoscopic removal remains challenging, even in the most experienced hands. In such cases, open surgery may be preferred to protect the airway and facilitate foreign body removal. We present a unique case of a 9-cm sharp metallic chain lodged in the lower trachea and right main bronchus of a 16-month-old girl, which was removed using combined low tracheotomy and rigid bronchoscopy. This case highlights the treatment options for large and irregular airway foreign bodies in rare locations.

CASE REPORT
A 16-month-old girl was brought to the Emergency Department of Beijing Children’s Hospital for respiratory distress. She was found gasping 24 hours earlier for unknown reasons. On admission, she was afebrile (36.1°C), with a respiratory rate of 36 breaths/min and an oxygen saturation of 96% on room air. Physical examination showed wheezing, biphasic stridor, suprasternal retractions, and bilaterally decreased breath sounds. Chest radiography revealed a radiopaque, shrimp-shaped foreign body in the lower trachea and right main bronchus with air trapping on the left side (Figure 1). No pneumomediastinum or pneumothorax were recognized. Immediate rigid bronchoscopy was performed under general anesthesia. The patient was anaesthetized with high-frequency jet ventilation, and a 4.0-mm rigid bronchoscope (Karl Storz, Tuttlingen, Germany) was passed into the trachea. A large foreign body with multiple spikes was partially visualized in the lower trachea. On attempted extraction, traces of blood were seen, and we stopped the procedure. A thoracic surgeon was consulted, and thoracotomy and bronchotomy were not recommended because of the foreign body’s location. Transillumination using the bronchoscope revealed the location of the foreign body at the lower neck, and low tracheotomy was then performed. The child was ventilated using the rigid bronchoscope placed proximal to the foreign body. The neck incision was determined by transillumination, and the tracheal incision was made vertically from the third to sixth tracheal rings. Under direct vision, the sharp points were elevated separately, followed by removal of the entire foreign body via the tracheostoma. The foreign body was a 90-mm × 6-mm metallic chain with multiple spikes (Figure 2). The tracheal incision was closed from the sixth to fifth ring, and we placed a 4.0-mm cannula (Rusch, Teleflex Medical, High Wycombe, England) to secure the tracheostomy site.
Bucks, UK) in the tracheostomy while withdrawing the rigid bronchoscope. A radiograph was taken to ensure the proper position of the tube and to rule out any potential pneumomediastinum or pneumothorax. Food and drink were orally forbidden until a tracheoesophageal fistula was ruled out by esophagography 3 days postoperatively. Intravenous glucocorticosteroids and antibiotics were used prophylactically to reduce airway edema and possible infection, and the child was weaned from the tracheotomy and discharged after 5 days’ hospitalization. At the 3-month follow-up visit, she remained completely asymptomatic, and flexible bronchoscopy showed full recovery of the tracheobronchial tree.

**FIGURE 1** Chest radiograph showing the radiopaque foreign body in the lower trachea and right main bronchus with air trapping on the left side.

**FIGURE 2** The 90-mm × 6-mm metallic chain with multiple spikes, an accessory from the mother’s sweater, which was huge compared with the trachea of a 16-month-old girl.

**DISCUSSION**

This is an extremely rare case of a 90-mm × 6-mm sharp metallic chain in the lower trachea and right main bronchus, which was removed successfully using combined rigid bronchoscopy and low tracheotomy. To our knowledge, no previous studies or case reports discuss the treatment of such a large and irregular foreign body in this location. Our report adds to the literature and increases awareness of treatment options for large and irregular airway foreign bodies in rare locations.

Rigid bronchoscopy is considered the gold standard for diagnosing and managing airway foreign bodies. However, for some large and irregular foreign bodies, endoscopic removal can lead to serious complications including bleeding, laceration of the tracheal wall, and air leakage. Therefore, rigid bronchoscopy alone was not an option to remove the airway foreign body in our patient.

Conventional tracheotomy, usually performed at the third or fourth ring, is an alternative for some large and irregular subglottic foreign bodies. Our case is distinctive in that the metallic chain was located far from the subglottis and was wedged in the lower trachea and right main bronchus. Therefore, conventional tracheotomy also was not an option for removal.

Thoracotomy and bronchotomy are considered last resorts for some irregular bronchial foreign bodies. In our patient, anterolateral thoracotomy and bronchotomy were not preferable because the rare location in the mid-trachea made removing the foreign body more difficult. Low tracheotomy over bronchoscopy was preferred for foreign body removal in our patient and was performed from the third to sixth rings, which differed from conventional tracheotomy. The lower incision allowed better inferior access to facilitate identifying and removing the long chain in the airway. Optimal cooperation between otolaryngologists and anesthesiologists is essential during this procedure.

In conclusion, removing large and irregular airway foreign bodies can be challenging, even for experienced otolaryngologists. In such cases, open surgical procedures are an alternative; however, open surgery must be chosen cautiously, and on a case-by-case basis, depending on the characteristics and location of the airway foreign body. For some large and irregular foreign bodies in the distal trachea and upper bronchus, low tracheotomy is an alternative over rigid bronchoscopy.

**CONFLICT OF INTEREST**

The authors have no conflicts of interest relevant to this article.

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