



Management of Foreign Body “Scarf Pin” Lodge in the Left Bronchus Via Rigid Bronchoscope

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ABSTRACT

Abstract

Introduction: Aspiration of a foreign body, such as a scarf pin, is common among teenagers who wear the headscarf. Diagnosis of foreign body aspiration is based on anamnesis, a history of choking and chest X-ray. Rigid bronchoscopy is an option for extracting foreign bodies from the tracheobronchial tree.

Objective: To understand the diagnosis and management of a foreign body scarf pin lodge in the left bronchus.

Case Report: Reported a case 14-year-old girl who presented to the Emergency room with the chief complaint of accidentally aspirating a pin 7 hours before admission. Chest X-ray examination revealed a homogeneous opacity of metallic density in the projection of the left main bronchus at the level of the thoracic vertebrae T6-T7. The patient was diagnosed with a foreign body, a pin, in the left bronchus. The patient was treated with a diagnostic and therapeutic rigid bronchoscope.

Conclusion: A headscarf pin foreign body may be found in the left bronchus due to the symmetric tracheal angle and the Bernoulli phenomenon effect. A rigid bronchoscope can be used for diagnostic and therapeutic purposes in this case. If there are postoperative complications such as laceration and perforation of the bronchus, immediately consult the Department of Cardiothoracic Vascular Surgery for further management

Keywords: foreign body; left main bronchus; rigid bronchoscopy; headscarf pin

What is already known?

An overview of diagnosis dan management of foreign body scarf pin stuck in the left bronchus.

What does this study add?

Postoperative complications such as laceration and perforation of the bronchus, immediately consult to the Department of Cardiothoracic Vascular Surgery for further management

Abstrak

Pendahuluan: Aspirasi benda asing pentul adalah salah satu kasus yang paling umum di kalangan remaja. Diagnosis aspirasi benda asing ditegakkan berdasarkan anamnesis, riwayat tersedak dan rontgen dada. Bronkoskopi kaku merupakan salah satu pilihan untuk mengeluarkan benda asing di trakeobronkial.

Objektif: Memahami diagnosis dan penatalaksanaan benda asing jarum pentul menancap di bronkus kiri.

Laporan Kasus: Dilaporkan kasus anak perempuan, 14 tahun ke Instalasi Gawat Darurat dengan keluhan tersedak jarum pentul sejak 7 jam sebelum masuk rumah sakit. Pemeriksaan rontgen dada menunjukkan adanya opasitas homogen dengan densitas logam (jarum) pada proyeksi bronkus utama kiri setinggi vertebra toraks 6-7. Dilakukan tindakan bronkoskop kaku diagnostik dan terapeutik pada pasien.

Kesimpulan: Benda asing jarum pentul dapat ditemukan pada bronkus kiri karena sudut trakea yang simetris dan efek fenomena Bernoulli. Bronkoskop kaku dan forsep fleksibel digunakan untuk diagnostik dan terapeutik pada kasus aspirasi jarum pentul di bronkus kiri. Bila ditemukan komplikasi seperti laserasi dan perforasi bronkus, segera konsul ke bedah torak dan kardiovaskular untuk tatalaksana lebih lanjut.

Kata Kunci: Benda asing; bronkus utama kiri, bronkoskopi kaku, jarum pentul

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Introduction

Tracheobronchial foreign body aspiration is a critical medical condition with a high risk of both morbidity and mortality, though it is more commonly seen in children.¹ In adults, the ingestion of foreign bodies is frequently associated with advanced age, psychiatric disorders, cognitive impairments, alcohol consumption, or intentional action motivated by personal gain, particularly among incarcerated individuals. Most foreign bodies (80–90%) move through the gastrointestinal tract on their own, without requiring medical intervention. Endoscopic intervention is required in approximately 10–20% of cases, while less than 1% of patients necessitate surgical intervention.² Before tying the veil, the patients, who are mostly women wearing hijabs, briefly insert the scarf pin between their teeth. The most frequent causes of aspiration include coughing, laughing, and talking.³

Laryngeal and tracheal foreign bodies are relatively uncommon, whereas bronchial foreign bodies are significantly more prevalent, accounting for approximately 90% of cases. Typically, an acute irritative cough or stridor manifests immediately following the inhalation of a foreign body, which often alerts caregivers, enabling timely diagnosis and management of the child.⁴ The classic signs of foreign body aspiration, including witnessed acute choking, wheezing, unilateral loss of breath sounds with corresponding volume loss, or hyperinflation due to air trapping on radiographs, exhibit high sensitivity (approximately 70%) but variable specificity. Other clinical findings, such as chronic cough, recurrent pneumonia in the same region of the chest, atelectasis, and even pneumothorax or pneumomediastinum, are more frequently observed, who may or may not have a clear recollection of a potential aspiration event.⁵ When foreign body aspiration is clinically suspected based on physical examination and symptoms, bronchoscopy is indicated, even in the absence of radiographic findings. In this context, bronchoscopy serves both diagnostic and therapeutic purposes. Rigid bronchoscopy, performed under general anesthesia, is generally considered the method of choice for retrieving foreign bodies in pediatric patients.⁶ Here, presenting a case of the extraction of a foreign body in the left bronchus with rigid bronchoscopy.

Case Report

A girl (14 years old) came to the Emergency Room of RSUP M. Djamil Padang on August 24th, 2024, with the chief complaint of accidentally aspirating a pin 7 hours before admission. Previously, the patient had been holding the pin in her lip while putting on her headscarf, and then her friends startled her, causing her to gasp for air and accidentally inhale the pin. Suddenly, the patient choked on a pin and coughed. The patient's teacher brought her to RSUD Adnan WD Payakumbuh, and an anteroposterior-lateral thorax X-ray was performed, showing a radiopaque appearance at the left bronchus. Patient was referred to RSUP M. Djamil Padang. There was a bloody cough one time after choking. There was no difficulty in breathing. There was no history of a bluish face. There was no pain or difficulty in swallowing; the patient could eat and drink normally. There were no drooling, bloody saliva, chest pain, or hoarseness. There was no history of foreign bodies being inserted into the ear, nose, or mouth.

On general examination, the condition was stable. Blood pressure was 110/68 mmHg, respiratory rate 17 breaths/min, pulse rate 88 beats/min, and temperature 37 °C. Thorax examination, symmetrical chest wall movement, and there was no retraction. Breath sounds in both the right and left hemithorax were symmetrical and vesicular. The ear, nose, and throat examination showed no abnormalities. Patient underwent posteroanterior and lateral thorax X-ray, with the result that there was a homogeneous opacity of metallic density (needle) in the projection of the left main bronchus at the level of the thoracic vertebrae T6-T7, length 2.9 cm. Thorax in normal limit (Figure 1). Laboratory examination on August 24th, 2024, showed normal limits. Based on anamnesis, physical examination, and X-ray examination, the working diagnosis was a foreign body, suspected to be a pin in the left bronchus.



Figure 1. Posteroanterior thorax X-ray showed a homogeneous opacity of metallic density in the projection of the left main bronchus at the level of the thoracic vertebrae T6-T7, length 2.9 cm (red arrow).

The patient was planned for immediate diagnostic and therapeutic rigid bronchoscopy under general anesthesia. Informed consent was obtained from the patient's parents. The patient was then referred to the Departments of Pediatrics and Anesthesiology to assess operative tolerance; no contraindications to immediate bronchoscopy under general anesthesia were identified. After consultation with the Anesthesiology Department, bronchoscopy under general anesthesia was approved, with a requirement for a 6-hour preoperative fasting period.

On August 25th, 2024, diagnostic and therapeutic bronchoscopy using a rigid bronchoscope was performed. The patient was positioned supine on the operating table under general anesthesia with the head extended. Aseptic and antiseptic preparation of the operative field was carried out. The laryngoscope was held in the left hand and inserted into the mouth from the right side until the vocal cords were visualized. A no. 6.0 mm × 30 cm bronchoscope was then advanced through the vocal cords into the trachea and connected to the anesthesia circuit. A pin was found in the left bronchus, lodged in its anterior wall (Figure 2A). The foreign body was extracted using forceps. Evaluation revealed no remaining foreign body; the bronchial mucosa appeared hyperemic, with no active bleeding or edema, and a laceration was noted (Figure 2B). The bronchoscope was removed, and the procedure was completed. The patient was diagnosed with a bronchial foreign body (pin) in the left bronchus (Figure 2C). The patient was then referred to the Department of Cardiothoracic and Vascular

Surgery due to the bronchial mucosal laceration; no active bleeding or air leakage was observed. Consult note: No specific intervention was required by the Cardiothoracic and Vascular Surgery Department.

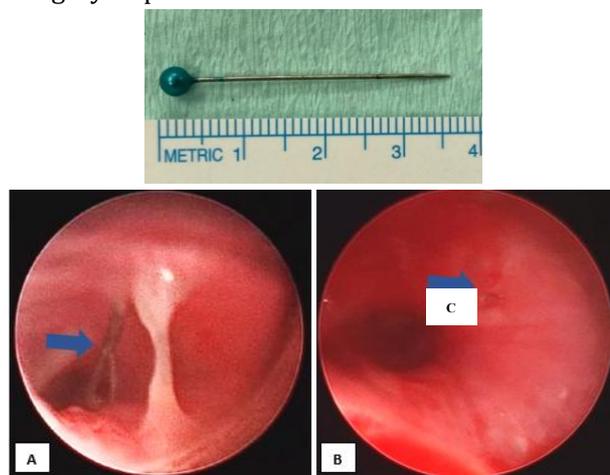


Figure 2. A. Before the extraction of the foreign body, there was a headscarf pin stuck in the left bronchial mucous, B. Evaluation there was laceration in the left bronchus, C. The foreign body is a scarf pin with a size of 36 mm

Post-bronchoscopy instructions included monitoring vital signs and checking for bleeding. The patient was admitted to the ENT ward and received a Ringer's Lactate infusion (500 mL over 8 hours), Ampicillin–Sulbactam 4 × 750 mg, Dexamethasone 3 × 5 mg, Ranitidine 2 × 50 mg, and Ketorolac 3 × 30 mg. The patient was observed for 24 hours postoperatively; no complaints of shortness of breath, chest pain, or coughing up bloody sputum were reported. Physical examination showed symmetrical chest expansion, no retractions, no stridor, and normal vesicular breath sounds. No crepitus was detected in the neck or chest.

On the third postoperative day, August 28th, 2024, the patient reported no shortness of breath, fever, chest pain, or coughing with bloody saliva. Physical examination was within normal limits. The patient was discharged with Cefixime 200 mg orally twice daily and was advised to return to the ENT outpatient clinic after discharge. At the one-week postoperative follow-up, the patient had no respiratory complaints. The physical examination was within normal limits, and the chest X-ray showed no pulmonary abnormalities.

Discussion

The patient girl (14 years old) came to the Emergency room of RSUP M. Djamil Padang with

the chief complaint of accidentally choking on a pin 7 hours before admission. A foreign body is stuck in the left bronchus. She had a history of holding the scarf pin between her lips while putting on her hijab and accidentally inhaling it. The study by Fenane et al.⁷ reported that the patients had an average age of 20 years. All patients were wearing hijabs, and aspiration occurred accidentally when they held a pin between their teeth while attempting to fasten their scarves. Most patients reported that the incident occurred while they were speaking, coughing, laughing, or taking a deep breath. In the study by Elamery et al.³, the median age was 13 years. Coughing was a common symptom of pin aspiration; however, in most cases, patients were asymptomatic, and the incident was identified primarily through history-taking. In older children and adolescents, foreign body aspiration may be associated with factors such as neurological disorders or loss of consciousness due to alcohol or drug use. It can also occur accidentally when objects are placed in the mouth or bitten.⁶

In our case, the foreign body was located in the left main bronchus. Regarding the location of foreign bodies that become stuck, the majority are found in the bronchial tree (88.46%), while the remaining are situated in the trachea (11.53%), with none lodged in the larynx.⁸ According to the literature, the most common site of foreign body impaction is the Right Main Bronchus (RMB) at 35.3%, followed by the Left Main Bronchus (LMB) at 31.4%.⁹

Foreign body aspiration occurs in three phases: the initial phase involves choking, coughing, and gasping; the second phase is a silent phase; and the final phase involves complications such as pneumonia and atelectasis. The clinical presentation varies depending on the location of the foreign body. Symptoms can range from complete obstruction, when the foreign body is large and lodged in the larynx, to no symptoms at all when the foreign body is small and located in the terminal bronchioles.¹⁰ In another study, patients became asymptomatic following a period of intense coughing, indicating the non-asphyxiating nature of the foreign body.¹¹ The patient reported a 7-hour history of choking prior to hospital admission.

Most cases of tracheobronchial foreign body aspiration are asymptomatic. The right side is the most common site of aspiration, accounting for approximately 70% of all cases, due to its more

vertical anatomical structure. The tendency for a foreign body, such as a pin, to lodge on the left side can be explained by the Bernoulli effect. The negative pressure created during activities like laughing, coughing, or speaking, combined with the relatively narrower diameter of the left bronchus compared to the right, results in greater suction force in the left bronchial tree, which facilitates the pin's movement to the left side.¹² Bernoulli phenomenon migration of foreign body can occur to the left bronchus during vigorous coughing, sneezing, due to the development of rapid negative pressure within the narrow left bronchus when compared to the right bronchus. When a foreign body is retained in the bronchial mucosa for a prolonged period, it can predispose to an inflammatory reaction and granuloma formation, which makes it difficult to extract by bronchoscopy.¹

The result of the chest X-ray showed a homogeneous opacity of metallic density (needle) in the projection of the left main bronchus at the level of the thoracic vertebrae 6-7, length 2.9 cm. Metallic foreign body aspirations tend to be easily visualized by X-ray and thus do not pose a problem in radiological localization.¹³ Organic foreign bodies are typically associated with more severe airway reactions than inert inorganic foreign bodies. However, in this small study, no significant difference was observed in the airway reactions between the two types of foreign bodies. Both organic and inorganic foreign bodies resulted in erythema and fibrin clots macroscopically, as well as bronchial epithelial erosion and suppurative bronchopneumonia microscopically.¹⁴

Radiolucent foreign bodies are difficult to detect. Signs in radiology include air trapping, hyperinflation, or atelectasis.¹⁵ The study reports that all chest X-ray (CXR) findings, except for the detection of foreign bodies, are nonspecific. A negative CXR cannot rule out foreign body aspiration, and rigid bronchoscopy is essential when there is a high suspicion of inhalation.⁹

In this case, the patient complained of bloody saliva when she coughed. Other symptoms, such as foreign body aspiration presenting with hemoptysis in adults, have been linked to various objects beyond food particles, including dental prostheses, metallic items, and organic materials. In a case series, hemoptysis resulting from foreign body aspiration was observed in adult patients, ranging from middle-aged individuals to the

elderly, underscoring the wide demographic and clinical range of this condition.¹⁶ Patients may be asymptomatic, with present symptoms from the acute onset of cough, shortness of breath, and at times, asphyxia. Patients may present subacute with hemoptysis or with post obstructive pneumonia and lung abscess formation.¹⁷

Several publications have reported on the inhalation of headscarf pins and the methods used for their extraction. Successful removal of the pins has been achieved through rigid bronchoscopy, flexible bronchoscopy, bronchoscopic techniques using a magnet, and surgery. Rigid bronchoscopy is considered a safer procedure and has been reported with no complications. Flexible bronchoscopy is more accessible and does not require general anaesthesia. Maintaining the cough reflex could be helpful in preventing the pin from migrating too far distally. Repositioning metallic pins more proximally with the application of magnetic force or traditional crocodile forceps is another method for removing them from the terminal airways after they have moved out of the rigid bronchoscopy's field of vision. When pin penetration has not yet taken place, this method may help prevent the need for video-assisted thoracoscopic surgery (VATS) or surgical thoracotomy.¹¹ The gold standard for removing a foreign body from the bronchus is rigid bronchoscopy. Rigid bronchoscopes provide support for continuous airway ventilation and enable the use of a variety of forceps to manipulate a foreign body.⁴

According to another study, rigid bronchoscopy is more effective than flexible bronchoscopy for removing tracheobronchial foreign bodies because it is easier to manipulate, can be performed under general anesthesia, and maintains and controls the airway more effectively.¹ However, patient-related factors and operator skills also play a role in determining the successful outcome of the procedure.¹⁷ Indication of flexible bronchoscopy for patients with foreign body aspiration, with cervical spine instability, skull and jaw fractures, such trauma patients may be particularly at risk for the aspiration of broken teeth or dentures, or a preceding aspiration leading to near asphyxia and loss of consciousness.⁵

During bronchoscopy, desaturations and low SpO₂ can raise the risk of post-procedural complications such as persistent hypoxemia and supraventricular arrhythmias. Peri- and post-

procedural hypoxemia and cardiac arrhythmias are associated with the kind of procedure, patient age, sedative type and use, and patient posture during bronchoscopy.¹⁸ Hypoxemia in bronchoscopic procedures is characterized by a sustained SpO₂ below 90% for more than one minute or a decrease in percutaneous oxygen saturation (SpO₂) of more than 5% from baseline values.¹⁹

Forceps are the most commonly used instruments for removing foreign bodies. They come in various designs with different tooth configurations and diameters to handle objects of different sizes and textures. Shark tooth, rat tooth, and alligator forceps are employed to grasp coins, plastic items, and other non-crumbling foreign bodies like bones. Rubberized tips are used to grasp more delicate objects and provide the added benefit of protecting the airway mucosa.¹³ When determining the size of a foreign body, a thorough imaging review is highly beneficial. The forceps' "jaws" must line up with the foreign object so that the maximum opening diameter is perpendicular to it. The jaws should be kept close to the bronchoscope's distal tip. The foreign body may need to be released from the airway wall with a small rotational force once the grip is established, and the bronchoscope is withdrawn in a coaxial motion (Table 1).²⁰ In this patient, flexible forceps were utilized to grasp the pin, which was lodged in the bronchial mucosa.

Table 1. Types and features of forceps and baskets for bronchoscopic.²⁰

No.	Instrument Name	Features
1.	V-shape grasping forceps	Assists in the retrieval of thin, flat objects, such as fish bones, coins, dentures, and jewelry
2.	Rat tooth grasping forceps	Assists in the retrieval of flat objects, such as coins, dentures, and jewelry
3.	Shark tooth grasping forceps	Large jaw and sharp tooth; similar to a rat tooth forceps in use
4.	Rubber tip grasping forceps	Assists in the retrieval of sharp or flat objects, such as nails, needles, pins, and blades
5.	Mini three-prong grasping forceps	Assists in the retrieval of irregularly shaped objects, such as food
6.	Mini grasping basket	Assists in the retrieval of smooth, rounded objects, such as peanuts and almonds. Small size allows it to be used through smaller channel bronchoscopes

No.	Instrument Name	Features
7.	Grasping basket	Assists in the retrieval of smooth, rounded objects
8.	Zero tip airway retrieval basket	Aids in accessing the upper lobes, which are rigid bronchoscopy may be insufficient; the small outer diameter allows it to be passed through pediatric bronchoscopes
9.	Fishnet basket	Assists in the retrieval of smaller foreign bodies

Computed tomography and virtual bronchoscopy correctly identified all cases of foreign body aspiration.⁸ Through the Virtual Reality-based simulation, we gained a clearer understanding of the extent and depth of the metallic components' invasion compared to 3D CT. As a result, the removal strategy was adjusted to include not only the use of gripping forceps but also the excision of granulation tissue to facilitate the extraction of the metallic part. Therefore, Virtual Reality may serve as a valuable tool in the removal of airway foreign bodies via bronchoscopic intervention, such as in cases of airway stenosis.²¹

Prompt removal of aspirated pins from the bronchus is crucial, ideally within 24 hours, to enhance procedural success and prevent morbidity. Nevertheless, delayed diagnosis does not negate the requirement for immediate extraction. Challenges such as failure to visualize the foreign body, perioperative complications, and the potential for emergency thoracotomy necessitate careful consideration. The inability of Rigid Bronchoscopy to visualize the foreign body necessitated a shift in management strategy, leading to the decision to perform a thoracotomy following patient stabilization. Successful extraction of a scarf pin was achieved via thoracotomy, performed in consultation with cardiac surgeons.⁹ Julianda et, al²² In their case report, they performed a thoracotomy because the foreign body could not be visualized using rigid bronchoscopy. Thoracotomy becomes the necessary recourse when bronchoscopic extraction is unsuccessful, specifically for foreign bodies lodged in the segmental bronchus that are prone to dislodgement or migration during the endoscopic attempt. Successful extraction of the foreign body was achieved via rigid bronchoscopy, thereby obviating the need for a thoracotomy in this patient.

Delayed removal of an intrabronchial foreign body causes major complications like obstructive emphysema, pulmonary abscess, pneumomediastinum, bronchiectasis, and recurrent pneumonia.¹⁷ One of the complications after bronchoscopy is airway spasm. That is a functioning state rather than a separate illness. According to univariate analysis, the incidence of airway spasm was correlated with age, duration of foreign body retention, history of pneumonia, and the length of surgery. According to pertinent research, youngsters are more likely to experience an annoying cough, and the airway mucosa will get more severely irritated the longer the foreign body is in the airway.²³

The complications of foreign body aspiration, included severe laryngeal edema, bronchospasm, pneumothorax, pneumomediastinum, cardiac arrest, tracheal or bronchial lacerations, and hypoxic brain injury. These significant complications occurred in 91 out of 9,437 children (0.96%). Other serious complications reported included infections, bleeding, and failed bronchoscopic removal, which required thoracotomy or tracheotomy.⁸ Iatrogenic tracheobronchial injury (TBI) may have anatomical or mechanical risk factors. The anatomy risk factors include distorted anatomy, female gender, age above six years, and severe infected trachea. Surgical repair of acute TBI is considered when the injury is more than 4 mm and has a risk of massive air leak, mediastinal sepsis, or airway obstruction.²⁴ Our patient had an injury of around <1 mm in the anterior aspect of the left main bronchus. There was no huge leak and early features of infections.

Complications arising from the inflammatory response with granuloma formation in the bronchial tree are associated with the extended delay between the inhalation of the foreign body and its removal.¹¹ Patients presenting with granulation tissue after foreign body extraction are prescribed a brief course of glucocorticoids (0.5 mg/kg prednisolone, tapered over 21 days). If this treatment is ineffective, alternative approaches such as cryotherapy or argon plasma coagulation are employed, and balloon bronchoplasty is utilized for managing bronchostenosis.²⁵ Baram et. al²⁶ reported one patient succumbed to scarf pin aspiration, with the cause of death attributed to extensive endobronchial hemorrhage encountered

during the extraction procedure via rigid bronchoscopy.

Salbutamol was sprayed into the endotrachea, the patient was orally intubated for anesthesia, and 5 mg of dexamethasone was administered intravenously. Extubation should be performed once the patient has fully recovered adequate spontaneous breathing.²³ When pneumonia or bronchitis is present, antibiotics are often indicated. Steroids are routinely administered to reduce edema caused by endoscopic instrumentation, and bronchodilators may help clear pulmonary secretions. In this case, steroids were given during and after the procedure to minimize complications. Most patients can be discharged within 24 hours postoperatively if the observation period shows no abnormal respiratory symptoms.²⁷

Conclusion

A foreign body, such as a scarf pin, in adolescents can be found in the left bronchus because the diameter of the left bronchus is narrower than that of the right bronchus. As a result, the foreign body, aspirated during inspiration, creates negative pressure due to the Bernoulli phenomenon. Rigid bronchoscopy and flexible forceps can be used as a diagnostic and therapeutic management of choice in cases of aspiration and a headscarf pin foreign body in the left bronchus. If there are postoperative complications such as laceration and perforation of the bronchus accompanied by air leakage and massive bleeding, immediately consult the Department of Cardiothoracic Vascular Surgery for further management.

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