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# Flexible Bronchoscopic Removal of a Toy Whistle Component from the Left Main Bronchus Using a Modified Fogarty Balloon Technique: A Case Report

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**Case Report**

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# Abstract

**Background:**

Foreign body aspiration is a potentially life-threatening condition in children that requires prompt diagnosis and timely intervention. Clinical presentation may range from acute respiratory distress to subtle symptoms such as persistent cough, which can lead to delayed recognition.

Hollow plastic foreign bodies, such as toy whistle components, present additional challenges during bronchoscopic retrieval due to their smooth surface, cylindrical configuration, and tendency to slip, making secure grasping difficult.

**Case presentation:**

We report the case of a 7-year-old male child who presented with persistent cough following suspected foreign body aspiration. Chest radiography demonstrated left lung volume loss with compensatory hyperinflation of the contralateral lung, while high-resolution computed tomography (HRCT) confirmed the presence of an intrabronchial foreign body associated with lingular segment atelectasis. The discrepancy between imaging and the extracted size may be attributed to the orientation of the hollow object and partial visualization on CT imaging.

Flexible bronchoscopy was performed under general anesthesia in two stages. During the initial procedure, multiple small components of a toy whistle were removed using grasping forceps; however, complete clearance was not achieved due to surrounding granulation tissue and mucous secretions, which limited visualization.

A repeat bronchoscopy was performed after 48 hours. During this procedure, a residual hollow cylindrical component lodged in the left main bronchus was identified. Attempts at retrieval using grasping forceps were unsuccessful. A Fogarty balloon catheter inflated with air also failed to achieve adequate anchorage, resulting in repeated slippage. A modified technique using saline inflation of the Fogarty balloon was subsequently employed, providing improved anchorage within the lumen of the foreign body and enabling successful extraction.

Post-procedure imaging demonstrated re-expansion of the affected lung.

**Conclusions:**

Saline inflation of a Fogarty balloon catheter represents a simple and effective modification that enhances retrieval of hollow airway foreign bodies. This technique may improve procedural success in challenging cases and can be readily incorporated into routine bronchoscopic practice.


# Background

Foreign body aspiration represents a frequently encountered emergency in the pediatric population and continues to contribute significantly to morbidity in younger children [1, 2]. The clinical presentation can vary widely, ranging from acute respiratory distress to more subtle symptoms such as persistent cough, which may delay diagnosis. If not recognized and managed promptly, it can lead to complications including atelectasis, recurrent infections, and long-term airway damage such as bronchiectasis [2, 6].

Rigid bronchoscopy has traditionally been regarded as the definitive method for removal of airway foreign bodies [3, 4]. However, flexible bronchoscopy is increasingly being utilized in selected situations as both a diagnostic and therapeutic tool [3, 5]. Its advantages include improved access to distal airways, better visualization, and a less invasive approach. When performed by experienced operators, it has shown high success rates in appropriately selected cases [3].

The ease of foreign body retrieval is influenced by multiple factors, including the size, shape, and surface characteristics of the aspirated object. Hollow plastic objects, such as components of a toy whistle, pose particular difficulty due to their smooth surface and cylindrical configuration, which limits effective grasping. Fogarty balloon catheters are often employed in such scenarios; however, conventional air inflation may not always provide sufficient anchorage, especially in smooth or hollow structures [4, 8].

This case highlights a simple and practical modification—saline inflation of the Fogarty balloon catheter—which enhanced retrieval efficiency. Importantly, this approach allowed successful removal without the need to escalate to rigid bronchoscopy, thereby reducing procedural invasiveness.

## Case presentation

A 7-year-old male child presented with a history of suspected foreign body aspiration approximately two weeks prior, involving a toy whistle component. The child had a persistent cough for 15 days without fever, breathlessness, vomiting, or other systemic symptoms.

On examination, the patient was hemodynamically stable with normal oxygen saturation. Respiratory examination revealed reduced air entry over the left lung field along with bilateral harsh breath sounds.

A chest X-ray performed prior to intervention demonstrated features suggestive of left lung volume loss with compensatory hyperinflation of the right lung (Fig. 1).

High-resolution computed tomography (HRCT) of the chest revealed atelectasis in the lingular segment of the left lung along with a well-defined intrabronchial foreign body measuring approximately 4.1 × 3.9 mm. The discrepancy between imaging and the extracted size may be attributed to the orientation of the hollow object and partial visualization on CT imaging.

Flexible bronchoscopy was performed under general anesthesia. During the initial procedure, multiple small components of the toy whistle were visualized within the left main bronchus. Some components

were successfully removed using biopsy forceps; however, complete clearance was not achieved due to surrounding granulation tissue and mucous secretions, which limited visualization.

Following the initial bronchoscopy, the patient was managed with nebulized budesonide to reduce airway inflammation and promote resolution of granulation tissue and mucous secretions. This treatment was continued for 48 hours prior to the repeat bronchoscopy.

A repeat bronchoscopy was performed after 48 hours. During this procedure, a residual hollow cylindrical component of the toy whistle was clearly visualized in the left main bronchus. Initial attempts at retrieval using biopsy forceps were unsuccessful due to the smooth surface of the object. A Fogarty balloon catheter was then introduced distal to the foreign body; however, inflation with air failed to achieve adequate anchorage, resulting in repeated slippage during extraction attempts.

A modified approach was subsequently employed, wherein the Fogarty balloon was inflated with saline instead of air. The balloon was inflated with approximately 0.5–1 mL of saline, achieving firm but controlled expansion. Inflation was guided by tactile feedback to ensure adequate resistance without exerting excessive pressure on the bronchial wall. This modification provided improved anchorage within the lumen of the foreign body, allowing successful extraction.

The extracted toy whistle component measured approximately 6 mm and had a hollow cylindrical configuration.

Post-procedure bronchoscopy showed mild mucosal edema with minimal bleeding and no residual foreign body.

A repeat chest X-ray demonstrated re-expansion of the left lung with improved aeration (Fig. 2).

Bronchoscopic findings and retrieval attempts are shown in Figs. 3–5, demonstrating the difference between failed air inflation and successful saline-assisted extraction. The extracted toy whistle components are presented in Figs. 6 and 7, highlighting the smaller components removed during the initial procedure and the hollow cylindrical component retrieved during the repeat bronchoscopy.

## Discussion

Foreign body aspiration in children continues to be a challenging clinical problem [1, 2]. Although organic materials are more frequently encountered, inorganic objects such as plastic toy components are being increasingly reported and can be particularly difficult to retrieve due to their smooth surface and hollow cylindrical structure.

Flexible bronchoscopy has emerged as a useful modality in selected cases of airway foreign body removal [3, 5]. The Fogarty balloon catheter is especially helpful when direct grasping is unsuccessful; however, inflation with air may not always provide adequate traction, particularly in hollow or ring-shaped foreign bodies where repeated slippage can occur [4, 8].

In the present case, inflation of the Fogarty balloon with saline resulted in improved conformity and better contact with the internal lumen of the foreign body, thereby enhancing anchorage and facilitating successful extraction. The use of fluid, as opposed to air, likely contributed to a more stable interface between the balloon and the foreign body.

When conventional Fogarty balloon techniques fail, alternative approaches such as rigid bronchoscopy, cryoprobe-assisted removal, or retrieval baskets may be considered [4, 7]. However, cryoprobe use may be less effective in non-organic or non-vegetative foreign bodies such as plastic due to limited adherence properties. These approaches may also require greater expertise and may increase procedural complexity. In contrast, saline inflation represents a simple modification that can be readily implemented without additional equipment or changes in procedural setup.

To the best of our knowledge, the use of saline for Fogarty balloon inflation in airway foreign body retrieval has not been widely emphasized in the literature. This technique may be particularly beneficial in cases involving hollow or smooth foreign bodies where conventional methods are unsuccessful. Furthermore, it is especially relevant in resource-limited settings, where simple and effective modifications can significantly improve outcomes. Notably, in this case, the technique enabled successful removal without the need for escalation to more invasive procedures.

## Conclusions

This case demonstrates that saline inflation of a Fogarty balloon catheter can significantly improve the retrieval of difficult airway foreign bodies, particularly hollow plastic objects such as toy whistle components.

This simple, safe, and reproducible modification may enhance procedural success and can be considered a useful adjunct technique in challenging bronchoscopic cases.

## Abbreviations

HRCT – High-resolution computed tomography

## Declarations

**Ethics approval and consent to participate**

Not applicable.

**Consent for publication**

Written informed consent was obtained from the patient’s parent/legal guardian.

**Availability of data and materials**

All data generated or analyzed during this study are included in this article.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors' contributions**

S.B. performed the bronchoscopic procedure and supervised the case. E.J. assisted during the procedure, collected clinical data, and drafted the manuscript. J.D. contributed to pediatric evaluation and patient management. C.S. and A.P.A. assisted in clinical management and manuscript revision. All authors read and approved the final manuscript.

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Not applicable.

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# Figures

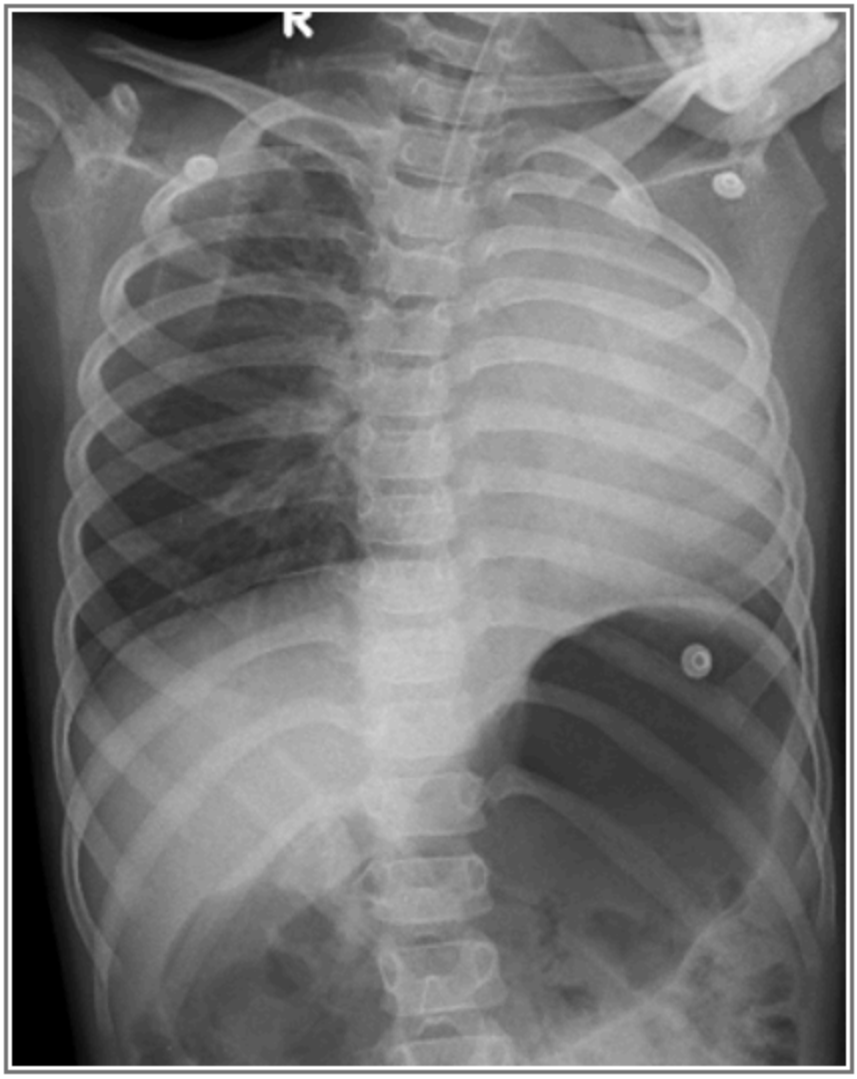



**Figure 1**

Pre-procedure chest X-ray showing left lung volume loss with compensatory hyperinflation

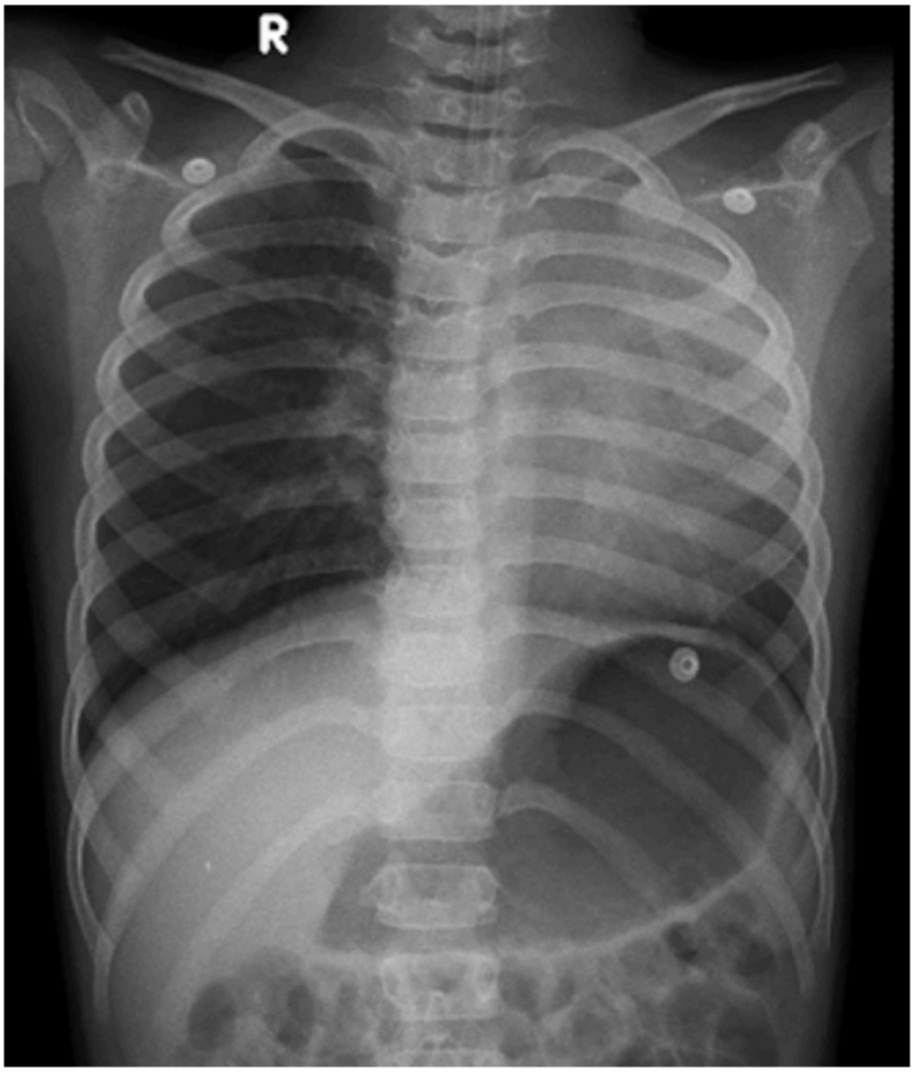



**Figure 2**

Post-procedure chest X-ray showing re-expansion of the left lung with improved aeration.

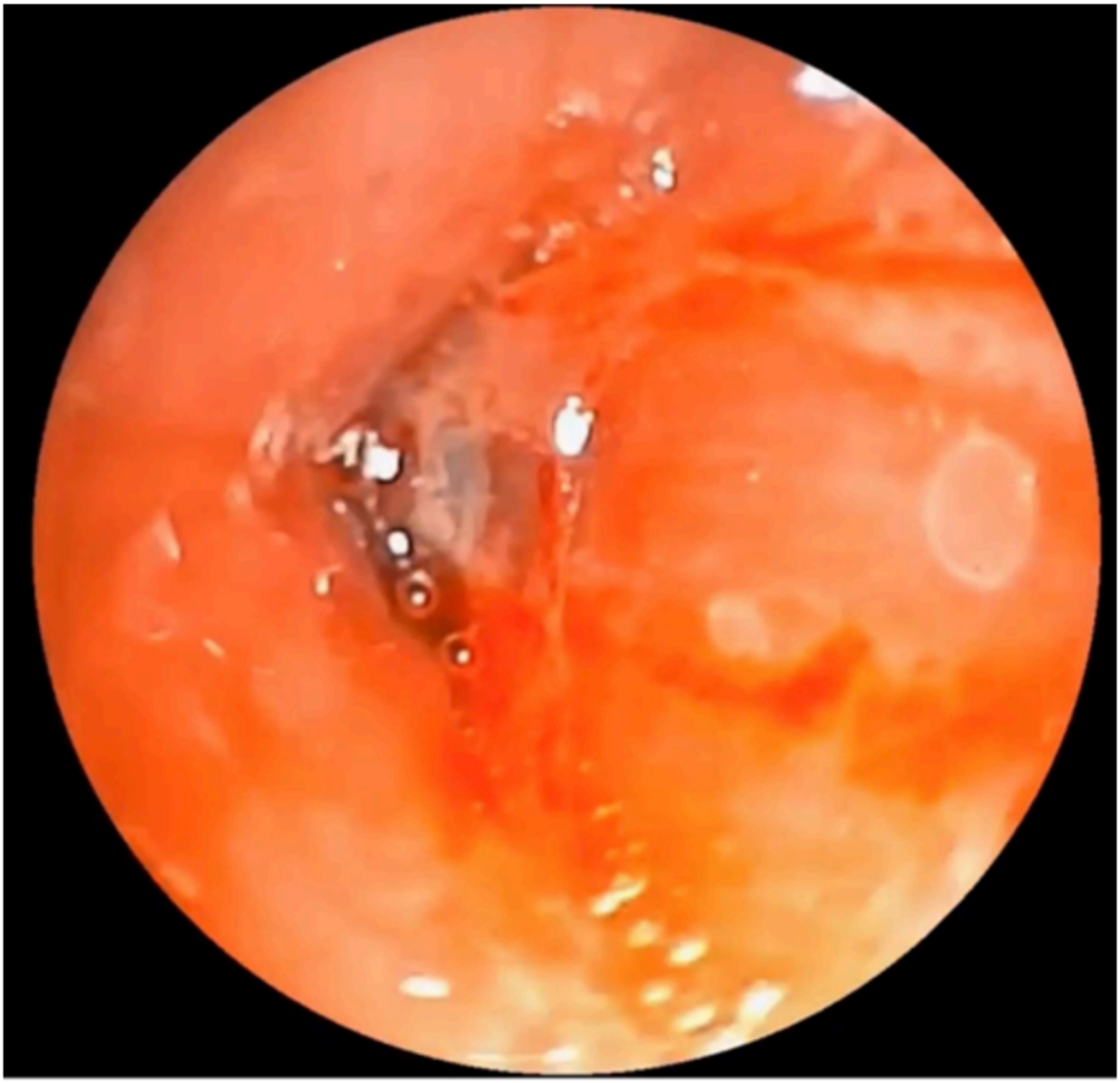


**Figure 3**

Bronchoscopic view of toy whistle component lodged in the left main bronchus

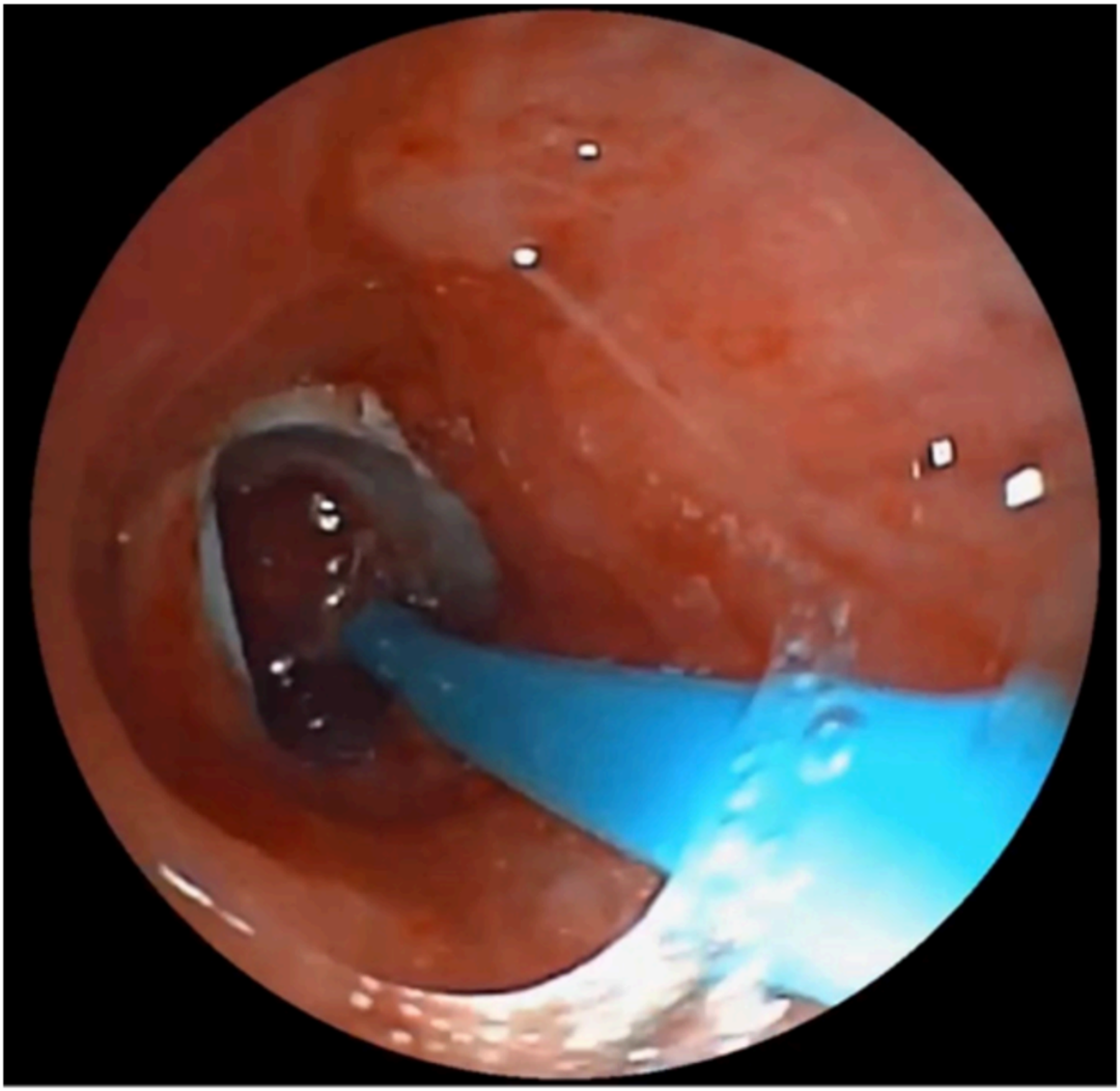


**Figure 4**

Attempted retrieval using air-inflated Fogarty balloon showing slippage

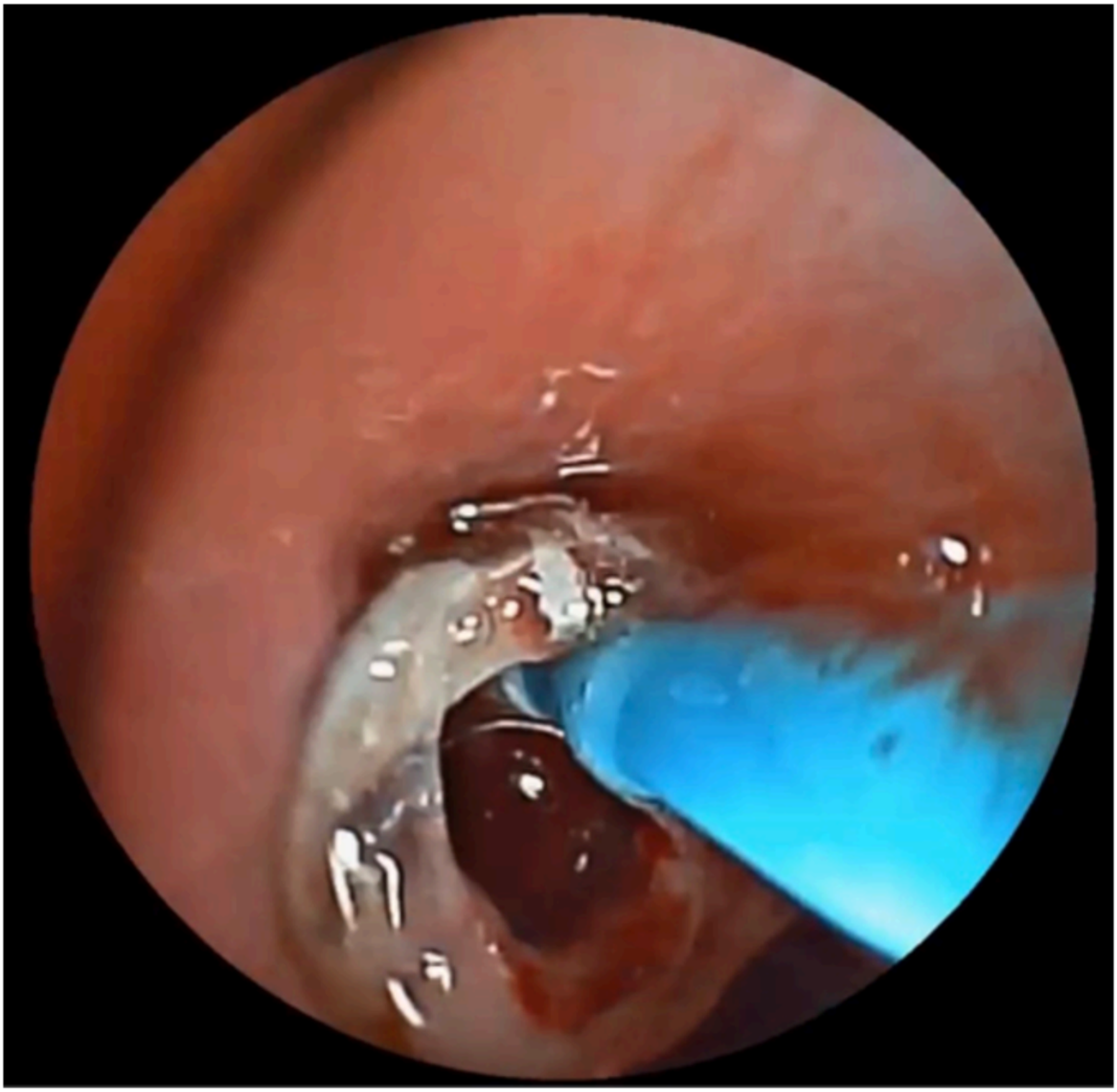


**Figure 5**

Successful retrieval using saline-inflated Fogarty balloon




**Figure 6**

Extracted smaller components of the toy whistle removed during the initial bronchoscopy, shown alongside a measurement scale.

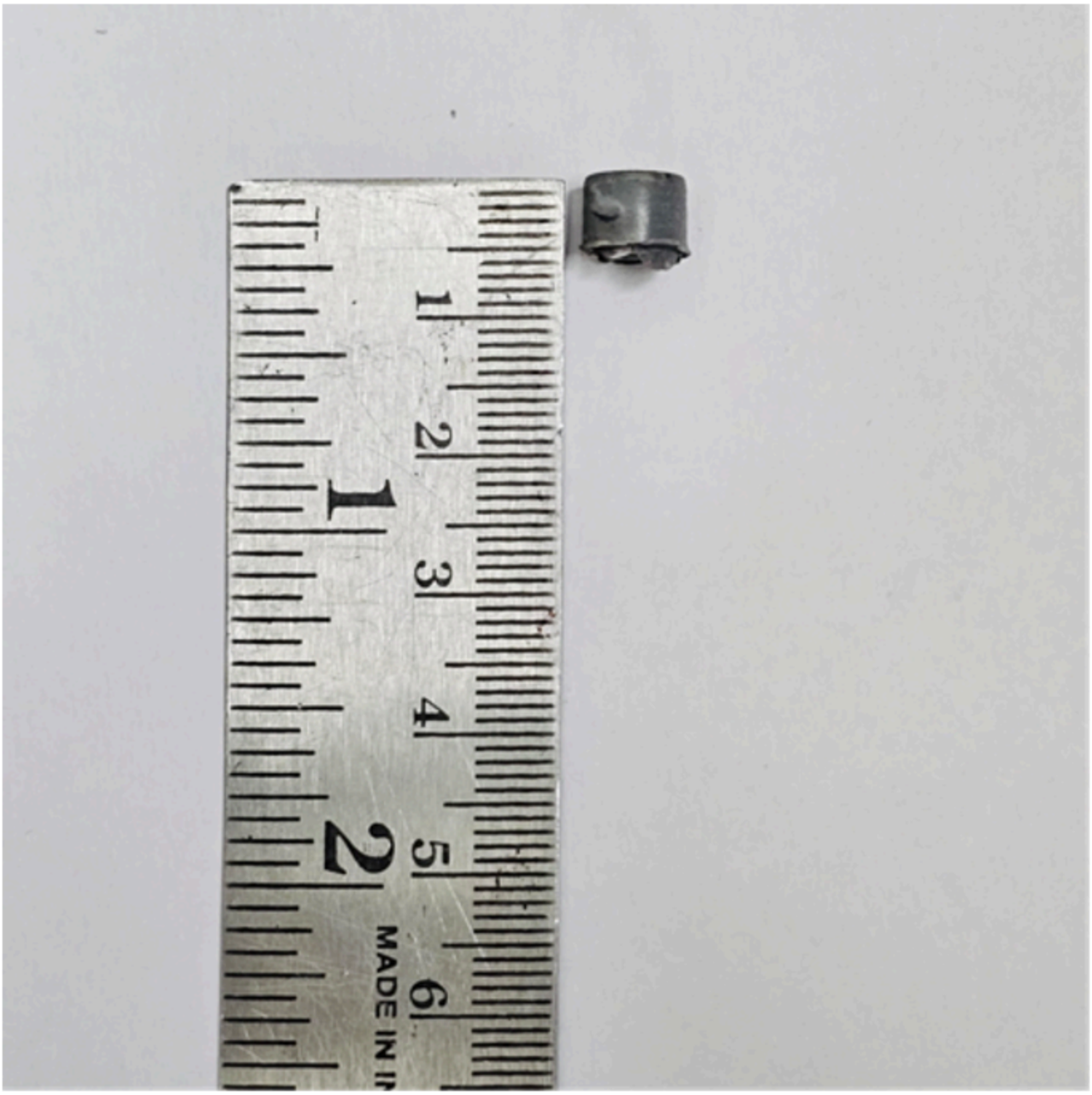



**Figure 7**

Extracted hollow cylindrical component of the toy whistle with measurement scale. The retrieved component measures approximately 6 mm and demonstrates a hollow, ring-shaped structure. The smooth surface and internal lumen contribute to the difficulty in grasping and the tendency for slippage during conventional bronchoscopic retrieval.