

Removal of a foreign body from the bronchial tree – a new method

N. UMAPATHY, M.B.B.S., J. PANESAR, F.R.C.S., B. F. WHITEHEAD, F.R.C.P.*, J. F. N. TAYLOR, F.R.C.P.†

Abstract

Tracheo-bronchial foreign bodies can be very difficult to remove. This may be related to the location and type of foreign body, the experience of the bronchoscopist and the availability of appropriate instruments.

We report a case of an uncommon foreign body in an unusual location in an adolescent in whom conventional attempts to remove it failed. The foreign body was eventually recovered using a flexible bronchoscope and an intravascular wire loop snare under fluoroscopic control. The patient was saved from thoracotomy and possible lobectomy.

To our knowledge, this combined fluoroscopic and endoscopic approach for the removal of a difficult tracheobronchial foreign body is the first reported case in the literature.

Key words: Foreign bodies; Bronchi; Bronchoscopy; Fluoroscopy

Case report

A 14-year-old girl inhaled a hairpin, that she had been holding between her teeth while combing her hair. She presented to the Accident and Emergency Department with constant left-sided chest pain worse on inspiration. She was not dyspnoeic but had a sensation of choking when lying supine. There were no other symptoms and she had no other significant past medical history. On examination she was not in distress. Vital parameters were within normal limits. There were no abnormal auscultatory findings. Chest X-rays (Figures 1a and b) showed the hairpin in the left lower lobe in an inverted position (open end proximally).

Rigid bronchoscopy failed to visualize the foreign body. Further attempts with both flexible and rigid bronchoscopes were unsuccessful at another institute. Therefore, she was transferred to the cardiothoracic department of a children's hospital for possible open surgical intervention.

Once again rigid bronchoscopy failed to visualize the segmental bronchus where the foreign body was located. The patient was prepared for thoracotomy the next day. But, prior to surgery, flexible bronchoscopy (Olympus BF-P20, 4.9 mm diameter, Keymed, Southend-on-Sea, Essex, UK) was performed in the cardiac catheterization laboratory to utilize biplane-screening facilities. This enabled accurate positioning of the bronchoscope and visualization of the hairpin which was found to be in the posterior basal segment of the left lower lobe.

After many unsuccessful attempts at retrieving the hairpin with bronchoscopic forceps, an intravascular wire loop snare, normally used for removing intravascular foreign bodies, was employed. A size 4.0 French, 102 cm snare catheter (Microvera Corporation, Whitebear Lake, MN, USA) was introduced through the suction channel of a flexible bronchoscope. The loop of the snare was placed

around the hairpin (Figure 2a), tightened at the 'neck' of the hairpin (Figure 2b) and was pulled with some force to the distal end of the bronchoscope. Then the scope, snare and the hairpin were all removed together.

The bronchial tree was re-examined and there was no evidence of any laceration or bleeding. Since the interval between inhalation of the foreign body and its removal was over four days, the patient was commenced on prophylactic antibiotics. Steroids were not used. Subsequent chest X-rays showed no evidence of atelectasis, collapse, consolidation or pneumothorax and the patient was discharged on the following day.

Discussion

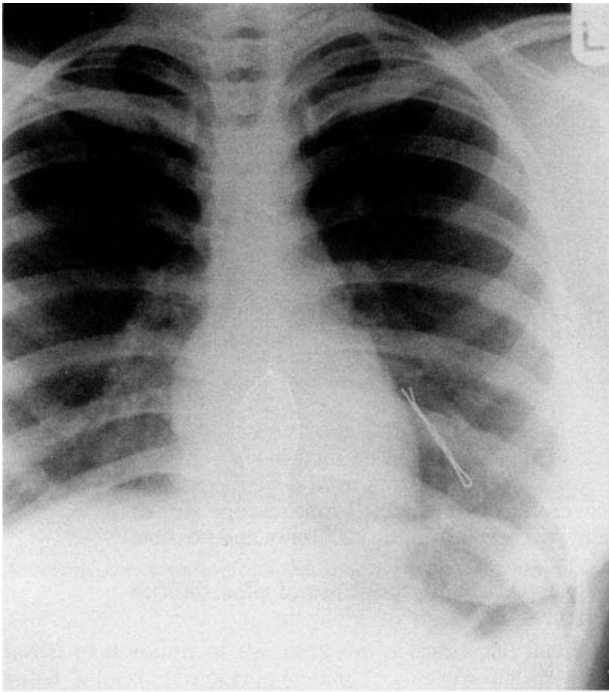
Although inhalation of foreign bodies is more common in the two to five year age range, it may be seen in all age groups with a second peak in adults over 50 years (McGuirt *et al.*, 1988; Hughes *et al.*, 1996). Interestingly, many studies show it to be more common in males (Rothman and Boeckman, 1980; Weissberg and Schwartz, 1987; Puhakka *et al.*, 1989).

There are no consistent symptoms with foreign body inhalation. The classic triad of paroxysmal coughing, wheezing and diminished breath sounds is present in only a few cases (Kim *et al.*, 1973; Wiseman, 1984). The most common symptom (in about 40 per cent of the cases) is cough, for a variable length of time (Puhakka *et al.*, 1989). Most recovered foreign bodies are organic in origin, nearly 70 per cent being peanuts (Puhakka *et al.*, 1989; Hughes *et al.*, 1996). Metal clips and pins were reported in four to 11 per cent of cases (Banerjee *et al.*, 1988; Puhakka *et al.*, 1989; Hughes *et al.*, 1996).

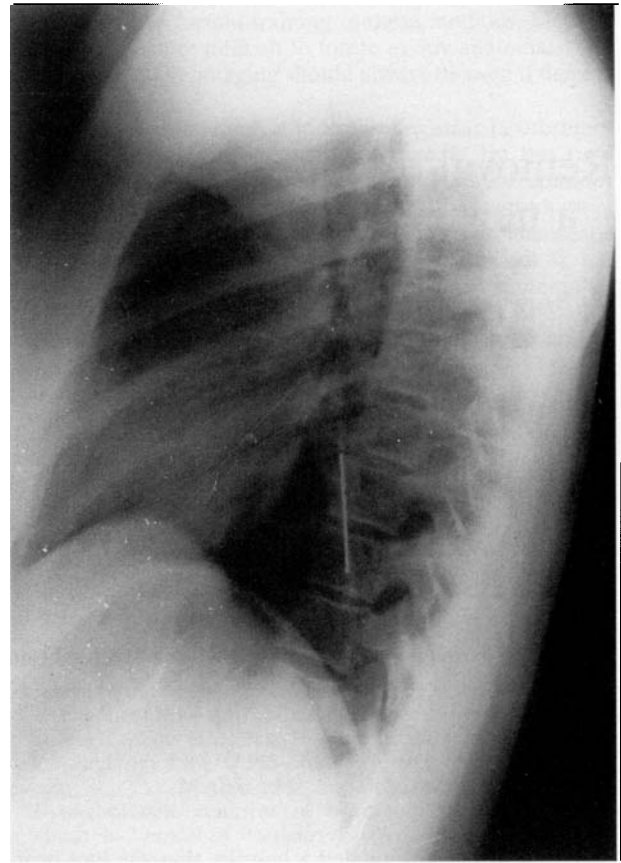
The most frequent location of foreign bodies is the right main bronchus followed by the right lower lobe bronchus. Less common locations are the left lower lobe bronchus

From the Departments of ENT, Basildon Hospital, Essex, and the Departments of Cardiac Transplant* and Cardiology†, Great Ormond Street Hospital for Children, London, UK.

Accepted for publication: 17 May 1999.



(a)



(b)

FIG. 1

Hairpin shown in chest X-rays: (a) AP view and (b) lateral view.

and left main bronchus. Occasionally the trachea and rarely, the left lower segmental bronchi are the sites of obstruction (Hughes *et al.*, 1996). Delay in the removal of the foreign body can lead to complications including atelectasis, collapse, consolidation, pneumonia and abscess (Linegar *et al.*, 1992).

Rigid bronchoscopy is used to remove the tracheobronchial foreign bodies on most occasions (McGuirt *et al.*, 1988; Puhakka *et al.*, 1989). With the rigid scope there is better airway control, better visibility and the use of instruments is easier (Linegar *et al.*, 1992). However, the flexible bronchoscope may be useful for the more peripherally situated foreign bodies (Hiller *et al.*, 1977; Wood and Gauderer, 1984). The choice depends on the location and the type of foreign body, the experience of the endoscopist and the availability of appropriate instruments.

Since false negative results in cases of tracheobronchial foreign body are as high as 35 per cent with standard X-rays, Strome (1997) advocated routine use of fluoroscopy to increase the diagnostic accuracy. However, fluoroscopy alone is not helpful in all the cases (Weissberg and Schwartz, 1987). Therefore, in every case of suspected foreign body inhalation, diagnostic endoscopy should be considered.

In our case the initial attempts to remove the hairpin were unsuccessful due to the fact that it was situated more peripherally than could be visualized by the rigid bronchoscope. Flexible bronchoscopy also failed to locate the foreign body at the initial attempts. Fluoroscopy was

necessary to guide the bronchoscope accurately to locate the foreign body. Attempts to remove the hairpin with the flexible scope proved unsuccessful because of the lack of appropriate forceps to grip the hairpin. Eventually, it was grasped firmly by the intravascular wire loop snare.

There are a few remarkable aspects in our case. Firstly, the location of the foreign body in the posterior basal segment of the left lower lobe is rare. Secondly, the position of the hairpin with open end proximally compounded the problem. Thirdly, considering the age and sex of the patient, the bronchial tree allowed only restricted endoscopic access. Finally the use of biplane fluoroscopy, in a cardiac catheterization laboratory (which allowed use of additional equipment) to retrieve the foreign body was unique. We conclude that combined use of multiplane fluoroscopy with either the flexible or rigid bronchoscope is worth considering in difficult cases of tracheobronchial foreign bodies, particularly before proceeding to thoracotomy.

Acknowledgements

The authors would like to acknowledge the help received from Secretaries to the ENT department Angela Case, Janet Meadows and Tracy Booth, as well as Karen Mulock and Margot Lindsay in the medical library of Basildon Hospital.

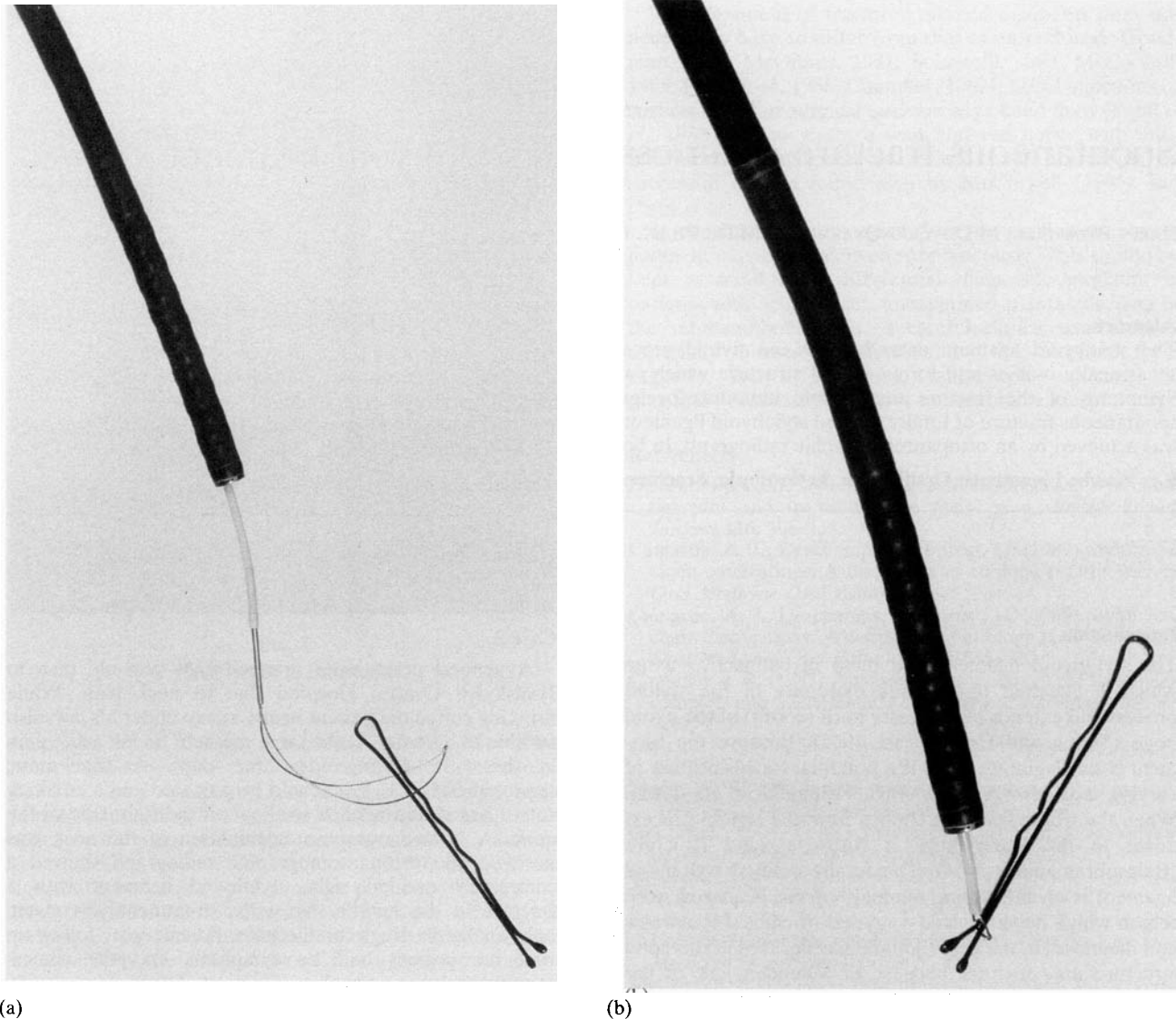


FIG. 2

(a) This shows the snare catheter protruding from the end of the suction channel of a flexible fibre-optic bronchoscope with the loop passed around the hairpin. (b) This shows the loop tightened around the neck of the hairpin for removal as described in the text.

References

- Banarjee, A., Subba Rao, K. S. V. K., Khanna, S. K., Narayanan, P. S., Gupta, B. K., Sellar, J. C., Retnan, C. R., Nachiappan, M. (1988) Laryngo-tracheo-bronchial foreign bodies in children. *Journal of Laryngology and Otology* **102**: 1029–1032.
- Hiller, C., Lerner, S., Varnum, R., Bone, R., Pingelton, W., Kerby, G., Ruth, W. (1977) Foreign body removal with the flexible fiberoptic bronchoscope. *Endoscopy* **9**: 216–222.
- Hughes, C. A., Baroody, F. M., Marsh, B. R. (1996) Paediatric tracheobronchial foreign bodies: Historical review from the John Hopkins Hospital. *Annals of Otology, Rhinology and Laryngology* **105**: 555–561.
- Kim, G., Brummitt, W. M., Humphrey, A., Siomra, S. W., Wallace, W. B. (1973) Foreign body in the airway: a review of 202 cases. *Laryngoscope* **83**: 347–354.
- Linegar, A. G., Von Oppell, U. O., Hegemann, S., de Groot, M., Odell, J. A. (1992) Tracheobronchial foreign bodies: Experience at Red Cross Children's Hospital, 1985–1990. *South African Medical Journal* **82(9)**: 164–167.
- McGuirt, W. F., Holmes, K. D., Feehs, R., Browne, J. D. (1988) Tracheobronchial foreign bodies. *Laryngoscope* **98**: 615–618.
- Puhakka, H., Svedstrom, E., Kero, P., Valli, P., Iisalo, E. (1989) Tracheobronchial foreign bodies: A persistent problem in paediatric patients. *American Journal of Diseases of Children* **143(5)**: 543–545.
- Rothmann, B. F., Boeckman, C. R. (1980) Foreign bodies in the larynx of children. A review of 225 cases. *Annals of Otology, Rhinology and Laryngology* **89**: 434–436.
- Strome, M. (1977) Tracheobronchial foreign bodies: an updated approach. *Annals of Otology, Rhinology and Laryngology* **86**: 649–654.
- Weissberg, D., Schwartz, I. (1987) Foreign bodies in the tracheobronchial tree. *Chest* **91(5)**: 730–733.
- Wiseman, N. E. (1984) The diagnosis foreign body aspiration in childhood. *Journal of Paediatric Surgery* **19**: 531–535.
- Wood, R. E., Gauderer, M. W. L. (1984) Flexible fiberoptic bronchoscopy in the management of tracheobronchial foreign bodies in children: The value of combined approach with open tube bronchoscopy. *Journal of Pediatric Surgery* **19(6)**: 693–698.

Address for correspondence:
Dr N. Umaphathy,
61 Grange Rd,
Birmingham B14 7RN.