target zone. The most common site of embolization is the right atrium, where the fragment can cause complications such as perforation of the right atrial wall, cardiac tamponade, and myocardial infarction. Another common site is the pulmonary vasculature.[3,4]

The proper management of patients with intracardiac or intrapulmonary VCF migration remains speculative. Serious consideration should be given to filter removal whenever possible, regardless of the presence or absence of symptoms. Surgery should be the first option considered. Open thoracotomy has the advantage of allowing the operator to directly visualize the filter and have better control during retrieval. It also allows direct inspection of the cardiac chambers and immediate repair of any damage that has occurred. Whenever surgery is contraindicated, endovascular retrieval should be performed by an experienced endovascular team.[4,5]

References

1. De Gregorio MA, Guirola JA, Serrano C, Figueredo A, Kuo WT, Quezada CA, et al. Success in optional vena cava filter retrieval. An analysis of 246 patients. Arch Bronconeumol. 2018;54:371–7.
2. Hill DA, Goldstein N, Kuo EY. Vena cava filter fracture with migration to the pulmonary artery. Ann Thorac Surg. 2013;95:342–5.
3. Rao B, Duran C, Steigner ML, Rybicki FJ. Inferior vena cava filter-associated abnormalities: MDCT findings. AJR Am J Roentgenol. 2012;198. W605–10.
4. Grewal S, Chamarthy MR, Kalva SP. Complications of inferior vena cava filters. Cardiovasc Diagn Ther. 2016;6:632–41.
5. Owens CA, Bui JT, Knuttinen MG, Gaba RC, Carrillo TC, Hoefling N, et al. Intracardiac migration of inferior vena cava filters: review of published data. Chest. 2009;136:877–87.

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Tracheobronchial Foreign Body in Small Children: The Combination of Flexible Bronchoscopy and the Urology Stone Retrieval Basket

Cuerpo extraño traqueobronquial en niños pequeños: la combinación de la broncoscopia flexible y la cesta endoscópica para extracción de cáculos renales

Dear Editor:

Foreign body (FB) aspiration occurs in children less than 3 years old in 75.4% of the total cases of aspirations and bronchoscopic removal presents high potential risk for complications that can lead the patient to death.[1]

Rigid bronchoscopy has always been advocated as the main choice for tracheobronchial FB's removal[2] considering the possibility to provide adequate ventilation during the procedure and the variety of available instruments that can be inserted into the scope. However, in case of migration of the object, the flexible bronchoscopy easily allows exploration of the distal bronchi. For repeated procedures, rigid bronchoscopy might also cause swelling of the vocal cords and laryngeal edema and also for these reasons flexible bronchoscopy raised his popularity in the last years.[2–4]

In several cases it is difficult to remove FBs in toddlers with flexible bronchoscopy, due to the limited selections of grasping tools capable of passing through the 1.2 mm instrument channel of the ultrathin bronchoscope.[4,5] Most of the inhaled FBs in children are organic. Their fragility and shape, associated with the presence of inflammatory reaction, makes the use of grasping forceps difficult.[5]

The wire basket forceps has mainly been used in the urinary duct and biliary tract,[4] but we have found this device very useful for foreign body retrieval, in combination with flexible bronchoscopy, in small children aged ≤2 years (12 cases).

We performed the procedure in the operative room, under general anesthesia with an ultrathin flexible bronchoscope (Pentax FB8V 2.8 mm) that was introduced through the single-lumen tube. The retrieval basket (Zero Tip Nitinol Stone Retrieval Basket, Boston Scientific 1.9 Fr, 0.63 mm × 120 cm) was inserted through the 1.2 mm channel of the scope securely grasping the FB from beside. The basket was then retracted toward the tip of the bronchoscope extracting both through the endotracheal tube.

This tip-less basket allows close FB approximation in the tracheobronchial tree. The flat distal surface eliminates tissue-to-tip interface giving an atraumatic manipulation and the knotted wires give stability to the basket to hold firmly the FB during the extraction. However it is important not to push the device too distally in order to prevent perforation of the bronchi that might easily occur in infants.

Characteristics of our patients are reported in Table 1. The elapsed time between the aspiration and the endoscopic procedure varied from one to 48 days (mean 11.6 ± 12.8 days). All patients underwent bronchoscopy within few hours from the arrival at the Emergency Room.

Three patients underwent two bronchoscopies in seven days due to the strong inflammatory reaction around the FB that jeopardized its removal on a first attempt (patients 3, 6 and 11). Mean operative time was 45.3 ± 27.5 min (range 20–120 min). Patients undergoing a second procedure required a longer operative time, due also to different attempts of FB's removal with different grasping forceps, before being able to finally retrieve the objects by mean of the urologic basket. Number of attempts during the procedure varied from 1 to 8 (mean 2.5 ± 1.8). In one patient (patient 11) switch to rigid bronchoscope has been necessary due to the small dimension of the toy's piece of plastic that would slipper away from the urologic basket.

O_2 saturation was stable in all procedures (mean 93.2% ± 3.7 mmHg) and it fell below 90% in patient 1,2, 3 and 11, the last two requiring to be re-intubated during the FB's removal

Complications occurred in patient 3 and consisted of post-extubating bronchospasm controlled with medical therapy. The longest interval between FB's aspiration and its removal was correlated with the onset of postoperative complication in patient 3 and 11.

Although some authors prefer the association of rigid and flexible bronchoscopy,[2] our preferred choice is the flexible bronchoscopy through endobronchial tube, when FB aspiration is likely to have occurred more than 48 h before. This is due to the fact that

Table 1
Characteristics of the Patients and Intraoperative Data.

No.	Sex	Age (mo)	Weight (kg)	Pr no.	Site	FB	Days from aspiration	Operation time (min) [number of attempts]	ET tube size	Mean O_2 Sat% min–max	Switch to rigid
1	M	22	15.0	1	Trachea + RMB + DB	Peanut	1	35[2]	6	92 83–100	No
2	M	15	10.0	1	RMB + DB	Peanut	13	35[2]	4	95 85–100	No
3	M	18	11.8	2	IB + DB	Plastic	48	120[8]	5.5	85 72–91	No
4	M	24	11.3	1	LMB	Seed	15	40[3]	5	91 90–100	No
5	F	15	10.5	1	RULB	Peanut	10	55[3]	4	92 91–100	No
6	M	24	11.3	2	RMB + DB	Peanut	7	70[4]	5.5	91 90–100	No
7	M	11	10.0	1	RMB	Chestnut skin	1	20[1]	4.5	97 95–100	No
8	M	23	13	1	IB	Peanut	2	25[1]	6	97 95–100	No
9	M	18	12.4	1	RMB	Plastic	11	35[2]	5.5	96 94–100	No
10	F	22	13.2	1	LMB + DB	Peanut	3	20[1]	6.0	98 96–100	No
11	M	23	12.8	2	RLL	Plastic	25	64[3]	5.5	89 78–90	Yes
12	M	19	11.4	1	LLL	Peanut	4	25[1]	5	96 94–100	No

Legend: RMB = right main bronchus; RULB = right upper lobe bronchus; IB = intermediate bronchus; LMB = left main bronchus; DB = distal bronchi; LLL = left lower bronchus; Pr no. = number of procedures; FB = foreign body.

a strong inflammatory reaction in the bronchi might lead to the necessity of repeated procedures and though repeated intubations. Nevertheless, rigid bronchoscopy should be always available in the operative room (as in patient 11) and the surgical team should be qualified and ready also to switch to any surgical option.

We advocate this procedure in small children because the use of an ultrathin bronchoscope through the endotracheal tube allows more space ventilation and the combination with the tip-less urology stone retrieval basket increases the percentage of success reducing the risk of tracheobronchial tree trauma.

References

1. Salih AM, Alfaki M, Alam-Elhuda DM. Airway foreign bodies: a critical review for a common pediatric emergency. World J Emerg Med. 2016;7:5–12.
2. Mansour B, Elias N. Foreign body aspiration in children with focus on the role of flexible bronchoscopy: a 5 year experience. Isr Med Assoc J. 2015;17: 599–603.
3. Ramirez-Figueroa JL, Gochicoa-Rangel LG, Ramirez-San Juan DH, Vargas MH. Foreign body removal by flexible fiberoptic bronchoscopy in infant and children. Pediatr Pulmonol. 2005;40:392–7.
4. Hata A, Nakajima T, Ohashi K, Inage T, Tanaka K, Sakairi Y, et al. Mini grasping basket forceps for endobronchial foreign body removal in pediatric patients. Pediatr Int. 2017;59:1200–4.
5. Boufersaoui A, Smati L, Benhalla KN, Boukari R, Smail S, Anik K, et al. Foreign body aspiration in children: experience from 2624 patients. Int J Pediatr Otorhinolaryngol. 2013;77:1683–8.

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