

Pin Needle Incidence as Foreign Bodies in Tracheobronchial at Emergency Room (ER) of Dr. Soetomo General Academic Hospital Center

Original
Article

Arifjean Erlangga, Sri Herawati Juniati

Department of Otorhinolaryngology - Head and Neck Surgery, Faculty of Medicine Universitas Airlangga, Dr. Soetomo Academic Medical Center.

ABSTRACT

Background: A tracheobronchial foreign body (FB) is a case often found in children. In the last two decades, there has been an increase in adolescents and adults and in Muslim-majority countries.

Objective: The purpose of this study was to describe patients with a pin needle as tracheobronchial FB who went to otorhinolaryngology's Emergency Unit at Dr. Soetomo General Hospital Surabaya.

Patients and Methods: Descriptive observations using retrospective data. The data taken from medical records in the Broncho-Esophagology (BE) division of Otorhinolaryngology ER unit at Dr. Soetomo General Hospital, Surabaya. It was taken during the period 2016-2018. The patients were divided into two groups by age, namely group A (≥ 10 year old) and group B (≤ 10 year old).

Results: Among 40 tracheobronchial foreign bodies, there were 24 patients (60%) with pin needle aspirations; consisting of five male (20.83%) and 19 female (79.17%). The youngest in group A was 2.5 year old (average 5.38 ± 3.25 years, median 4.5 years) and the oldest in group B was nineteen year old (average $14.1 \pm 2, 40$ years, median fourteen years). All pin needle FB appear on the thorax X-ray (100%).

Conclusion: There was an increase in the incidence of pin needle aspiration over the last three decades. Most of the patients were teenage girls. Thorax X-ray provided a good diagnostic imaging. Extraction using rigid bronchoscopy is the first choice treatment of aspirated tracheobronchial pin needle.

Key Words: Healthy lifestyle, pin needle aspiration, rigid bronchoscopy, tracheobronchial foreign bodies.

Received: 1 October 2021, **Accepted:** 21 December 2021

Corresponding Author: Sri Herawati Juniati, MD, Department of Otorhinolaryngology, Head and Neck Surgery, Faculty of Medicine, Universitas Airlangga, Jalan Mayjen Prof. Dr. Moestopo 47, Surabaya 60131, Indonesia **Tel.:** +6282231220250,

E-mail: Prof.Sriherawati12@gmail.com, sri-h-j@fk.unair.ac.id

ISSN: 2090-0740, 2022

INTRODUCTION

Foreign body aspiration (FBA) is an entry of objects from outside the body or from the body into the airways.^[1] The type of FBA depends on the area, food, and even the habits of how to dresses. A pin needle is an FBA that are often encountered in Muslim-majority countries.^[2] Foreign body in the tracheobronchial are commonly happened in children and rarely occur in adolescents and adults.^[2-6] However, in the last two decades, there has been an increase that it happened in the population of adolescents and adults.^[4] Research conducted at Dr. Soetomo General Hospital Surabaya on one hundred and six patients (106) during the period in 1991-1997 showed that FBA of a pin needle has found in six patients (5.66%). Subsequent studies at Dr. Soetomo General Hospital in 77 patients during 2000-2004 showed an increase in the incidence of FBA in pin needle was eleven patients (11.28%).^[7]

Foreign bodies can cause partial or total obstruction. The symptoms include chronic cough, hemoptysis, fever, shortness of breath, pain chest, suffocated, or wheezing.^[5] Tracheobronchial symptoms of FBA are coughing, wheezing and shortness of breath.^[8] If the diagnosis is late, complications such as obstruction pneumonia, atelectasis, bronchiectasis, and lung abscess can occur. Knowledge of proper diagnosis and management can help patients and reduce the above complications.^[5]

The diagnosis suspected that there are an aspiration history and clinical symptoms in the respiratory tract, however in children is not known yet.^[3,6,8] The aspiration of the FBA tracheobronchial tract is an emergency situation that required bronchoscopic action immediately to prevent worse complications.^[1] Thorax radiography and computerized tomography scan (CT-scan) can provide information about the location and characteristics of foreign body and help in making a diagnosis.^[9] FBA

management involves confirmation by bronchoscopy, both diagnostic and therapeutic.^[3] Rigid bronchoscopy is the gold standard for the management of FBA aspiration in the tracheobronchial which can be seen directly.^[1,9] Rigid bronchoscopy guarantees ventilation because it has a connector to oxygen. Early intervention is using rigid bronchoscopy followed by extraction that applies forceps or extractors that possible to remove foreign bodies easily and safely.^[1] The extraction process with rigid bronchoscopy get better results than flexibility in the case of large FBA, FBA is embedded in granulation tissue or FBA with very fine edges.^[3] Whereas flexible bronchoscopy allows for more comprehensive and distal airway surveys. Flexible bronchoscopy is also an option in cases of trauma sufferers with neck immobilization.^[9] In some cases, the pins that are embedded in soft tissue cannot be reached by endoscopy, so patients must undergo extraction by using an external approach or thoracotomy.^[4]

PATIENTS AND METHODS:

The research method was descriptive observational by using secondary data (retrospective data) from medical records in the Broncho-Esophagology (BE) division of Otorhinolaryngology ER unit at Dr. Soetomo General Hospital, Surabaya. It was taken during the period 2016-2018. Inclusion criteria were all the tracheobronchial FBA patients treated in the Emergency unit of otorhinolaryngology Dr. Soetomo General Hospital Surabaya with the pin needle FBA findings of bronchoscopic extraction. While the exclusion criteria were tracheobronchial FBA patients with findings other than pin needle. The patients were divided into two groups by age, namely group A (≥ 10 year old) and group B (≤ 10 year old).

RESULTS:

Based on medical record data, it was obtained 24 patients (60%) of pin needle aspirations from forty patients who came in the period 2016 to 2018 with a diagnosis of tracheobronchial FBA. The number of patients who came for treatment in 2016 was five patients (20.83%), in 2017 was eleven patients (45.83%) and 2018 was eight patients (33.33%).

Based on group A, the history of FBA aspirations was positive in three patients (75%) and negative for one

patient (25%). While group B, FBA aspiration history was positive in fifteen patients (75%) and negative in five patients (25%) (Table 1). The distance between the aspiration and diagnosis events was less than twelve hours in two patients (50%) from group A and in ten patients (50%) from group B (Table 1).

The youngest age of group A was 2.5 years (average 5.38 ± 3.25 years, median 4.5 years) and the oldest age of group B is nineteen years (average 14.1 ± 2.40 years, median fourteen years). The most age obtained group was twelve and fourteen years, which were four patients each (16.67%) (Table 1). Out of the four Patients in group A, two were male (50%) and female (50%) consecutively, while the total of twenty patients in group B was three (15%) male and seventeen (85 %) female. The ratio of male and female in group A was the same (1:1), much different when compared to group B which was more common in female (3:17) (Table 1).

The complaint that always appears in both groups is a history of cough after an aspiration event (100%). Complaints of chest pain were found in two patients (10%) from group B (Table 2). Clinical symptoms of cough were found in two patients (50%) from group A and six patients (25%) from group B. The decrease in breath sounds was only found in one patient (25%) of group A. The results of radiology FBA occurs in all patients from both groups (100%) (Table 2).

The type of FBA obtained in all patients from both groups was a pin needle (100%). From group A, FBA was found in the laryngotracheal in one patient (25%), right bronchus in one patient (25%) and left bronchus in two patients (50%). While from group B, FBA was found in the laryngotracheal in nine patients (45%), right bronchus in five patients (25%) and left bronchus in six patients (30%) (Table 3).

All FBA in both groups were extracted by using rigid bronchoscopy (100%). Extraction process more than one was (100%) in group A. One-time extraction process was in seven patients (35%), more than once in eleven patients (55%) and failed in two patients (10%) from group B. Laryngotracheal lesions were found in one patient (25%) from group A and three patients (15%) from group B. FBA migration to the distal direction was found in two patients (10%) from group B (Table 4).

Table 1: Characteristics of The Patients

	Grup A (A ≤ 10)	Grup B (B > 10)	Total
Age			
Range	2,5 - 10	11 – 19	2,5-19
Average \pm SD	5,38 \pm 3,25	14,2 \pm 2,40	12,65 \pm 4,15
Median	4,5	14	13

Sex			
Male	2 (8,3)	3 (12,5)	5 (20,83)
Female	2 (8,3)	17 (70,8)	19 (79,17)
Aspiration history			
Positive			
Negative			
Interval between the events of aspiration and admission			
<12 h	2 (50)	10 (50)	12 (50)
12 to < 24 h	0 (0)	2 (10)	2 (8,33)
24 to <48 h	1 (25)	4 (20)	5 (20,83)
>48 h	1 (25)	4 (20)	5 (20,83)

Group A (n = 4 (16,67%)); Group B (n = 20 (83,33%))

Table 2: Complaints, clinical symptoms and radiological findings

	Grup A (A ≤ 10)	Grup B (B > 10)	Total
Complaint			
Cough history	4 (16,7%)	20 (83,3%)	24 (100%)
Shortness of breath	0	0	0
Chest pain	0	2 (100%)	2 (100%)
Clinical Symptom			
Decreased breathing sound	1 (25)	0	1 (4,17)
Cough	2 (50)	6 (25)	8 (37,5)
Respiratory distress	0	0	0
Normal	1 (25)	14 (58,33)	15 (66,67)
Radiological findings			
FB occur	4	20	24 (100)
Emphysema	0	0	0
Atelectasis	0	0	0
Normal	0	0	0

Group A (n = 4 (16,67%)); Group B (n = 20 (83,33%)); FB= Foreign Body

Table 3: Complaints, clinical symptoms and radiological findings

	Grup A (A ≤ 10)	Grup B (B > 10)	Total
Type of FB			
Pin needle	4 (16,7)	20 (83,3)	24 (100)
Other Foreign bodies	0	0	0
FB location			
Laryngotracheal	1 (25)	9 (45)	10 (41,67)
Right bronchus	1 (25)	5 (25)	6 (25)
Left bronchus	2 (50)	6 (30)	8 (33,33)

Table 4: The use of bronchoscopy and related complications

	Grup A (A ≤ 10)	Grup B (B > 10)	Total
Bronchoscope			
Rigid	4 (16,7)	20 (83,3)	24 (100)
Flexible	0	0	0
Extraction process			
1 x	0	7 (35)	7 (29,17)
> 1 x	4 (100)	11 (55)	15 (62,5)
Failed	(0)	2 (10)	2 (8,33)

Complication			
Laryngotracheal lesions	1 (25)	3 (15)	4 (16.67)
Distal migration	0	2 (10)	2 (8,33)
FB fragmentation	0	0	0
Arrest and resuscitation	0	0	0
Slipped FB	0	0	0
Pneumothorax	0	0	0

Group A (n = 4 (16,67%)); Group B (n = 20 (83,33%)); FB= Foreign Body, x= times

DISCUSSION

Foreign body aspirations (FBA) are a general medical emergency in all ages with serious and potentially deadly consequences.^[10] FBA aspiration is a serious condition that is common in toddlers and adults over the age of fifty who tend to experience swallowing disorders.^[2] Approximately 75-85% of foreign body aspirations occur in children under fifteen years. Then, more than two-thirds of cases occur in a toddler. An estimated one thousand children die each year in the United States because of FBA aspirations.^[11] In America, there were about 7% of mortality data for children under the age of four in 1986. Shivakumar *et al.* (quoted from Subkhan, 2018) stated that the average mortality rate in India due to foreign body aspiration was zero to 1.8%.^[5]

Mortality and morbidity of tracheobronchial FBA are much higher in children and adolescents. Toddler tend to find objects and put most of these objects into their mouths. The respiratory tract in children and adolescents is still relatively narrow and there is an immature protection mechanism.^[8,11] Darrow and Hollinger reviewed a number of serial cases and found that toddler patients was about 84% of cases of FBA aspirations. Eroglu *et al.* observed that FB aspiration was more common in adults than in children. This happens in the habit of wearing a headscarf using a pin because of certain beliefs and traditions.^[10] In a previous study conducted by Juniata in a period of seven years (1991-1997) for 106 tracheobronchial FBA patients, six cases (5.66%) of needle aspiration were obtained. The next study by Juniata, in a period of five years (2000-2004) for 77 patients with tracheobronchial FBA, eleven cases (11.28%) of needle thrust were obtained. In this study, according to the increasing trend by the use of headscarves, in just three years (2016-2018) for forty patients with tracheobronchial FBA, 24 cases (60%) of needle aspiration were obtained.

Pin of FBA syndrome is a new clinical symptom that afflicts young Moslem women who wear a veil. The pin is used to attach the end of the veil layer to each other and place it around the head. When wearing the

veil, pins were often placed between the lips and has a higher risk of choking or swallowing. The incidence of FBA on tracheobronchial thrusts increases with the trend of wearing a veil.^[4] The ratio of male and female was (1:1) in corresponding to the literature, that identifies the peak of cases was happening around the age of 4.5 years. Then, the second peak was shown in patients from group B around the age of fourteen with a ratio between male and female (3:17). The ratio difference between male and female from group B was due to the increased incidence of pin aspiration in the process when wearing the veil. Male patients was obtained in group B because of the children has a choking history due to playing blowpipe filled with a pin.

Additionally, 50% of patients from group A and B immediately came to the emergency room at the Dr. Soetomo General Hospital in less than twelve hours. Factors that influence the patients to check-up immediately were negligence, ignoring and hiding stories for fear of punishment in children. While in adolescents and adults, patients were more afraid of aspirated pins and awareness the importance of health was higher.^[4]

In literature was written that the number of patients who showed clinical symptoms in tracheobronchial FBA aspiration was increasing to 90% and the main symptom was coughing. In this study, the symptoms that always appeared in both groups were coughing, whereas chest pain was only obtained in two patients from group B. The study showed that non-asphyxic FBA became asymptomatic after passing an intense cough period. In the case of veil aspiration, coughing was very disturbing when the proximal tip of the pin moves freely and stimulates the airway mucosa, after the tip of the pin is embedded in the mucosa, a calm phase occurs and the cough decreases.^[10]

Clinical symptoms depend on the characteristics and diameter size of FBA, location, and complications. Foreign bodies that were located quite long in time in the airway, even though they were very small it still can cause a total obstruction due to edema or secretions caused.^[10] In this study, there was a decrease in breath

sounds in one patient (25%) from group A who were patients with an onset of incidence in one month. While decreased breath sounds were not obtained from group B because of the short onset distance between the event and when coming to Dr. Soetomo General Hospital.

CT-scan of posterior-anterior and lateral in children were the gold standard when suspicious of FBA aspirations exist. Vane *et al.* reported 90% of FBA showing radiolucent CT-scan photos.^[10] In this study, all FBA appeared on the CT-scan because it was a pin made from metal needle so that it will show as a radioopaque image.

The types of FBA was reported in various studies that differ from one country to another according to their lifestyle and eating habits. Limper and Prakash found the most common types of FBA were vegetable ingredients. Mu *et al.* reported in China almost 95% of FBA aspirated by children were from organic. Industrial countries have a higher incidence of FBA aspirations in plastic types due to the high use of plastic components in the toy industry. Pin aspiration was a common occurrence in Turkey and the Middle East, including in Indonesia because pins were widely used to wear a veil by women in Islamic countries. In Egypt, as an Islamic country, girls start wearing a veil when they start puberty. The pin was used to fix the veil layer to remain stable around the head. The length of the pin was three to four centimeters. Since both hands were busy in styling the veil around the head, four or five pins were placed between the teeth. This age group has lower attention than teenagers and adults. The age group also tends to be joking, laughing or talking while biting the pin and resulting in loss of concentration and increasing the risk of aspiration events.^[10]

The right main bronchus in adults is shorter than the left. The right main bronchus forms a 25-degree angle from the median line, while the left forms a 45-degree angle.^[5] In children under the age of 14-15 years, this is not valid applied because the size of the right and left bronchi is relatively the same, with the left bronchial branching not as close to the right bronchus.^[5,10] Inspired FBA locations can be found in various places in the tracheobronchial, starting from the larynx to the bronchioles. The location depends on the age and physical position of the patient when the FBA is aspirated.^[10] Angles formed from the main bronchus and trachea tend to be the same until the age of 14-15 years.^[5,10] Until that certain age, FBA can be found on both sides with almost the same frequency. After the age of 14-15 years, the growth of the right bronchus becomes deeper in the direction of the trachea and is relatively more straight from the larynx to the right bronchus. Foreign bodies aspirated in adult patients tend to be located in the right bronchus.^[10]

In this study, FBA locations in patients from group A were obtained according to those reported in the literature. In group B, the tracheal location was most commonly found, followed by left bronchus. This can be explained by the possibility that FBA can move freely in the bronchus because of the process of coughing and trapping in the left bronchus. This hypothesis may not be persuasive and still needs further research related to the physical position of the patient when wearing the veil and the position of the head slope when biting the pin.

The use of flexible bronchoscopy is increasingly widespread as management of FBA aspirations, but rigid bronchoscopy remains the preferred procedure for extracting FBA at all ages with a success rate more than 97% and very low morbidity and mortality. Rigid bronchoscopy instruments were stronger than flexible. The device can capture FBA perfectly and reduce the risk of loss or loss of FBA when extracted through the larynx and pharynx. Flexible bronchoscopy was only used under local anesthesia to manage FBA aspiration in patients with tracheotomy or FBA in the larynx from group B.^[10]

The extraction process in group A tended to increase the number of attempts to take FBA compared to group B. From group A, no FBA was successfully extracted in the first retrieval attempt, whereas from group B was 35% success in the first retrieval effort, 55% extracted with more than one attempt and two patients (10%) failed in the FBA extraction process. The failure of the extraction process was caused by the location of FBA which migrates distally towards the tertiary bronchus and bronchioles so that it cannot be reached by rigid bronchoscopy. The two patients who failed in the extraction process were then extracted FBA by flexible bronchoscopy by the Department of Lung Disease. One patient failed in the extraction process with flexible bronchoscopy which was then extracted by thoracotomy by the Department of Thoracic and Cardiovascular Surgery. Some serious complications such as mediastinal emphysema, atelectasis, pneumothorax, and tracheoesophageal fistula are reported after bronchoscopy in the literature. In this study, laryngotracheal lesions were obtained in 25% of group A and 15% of group B which could be treated with conservative therapy.

Most people with FBA aspirations from both groups resided outside Surabaya. This shows the tendency of socio-cultural status and lower levels of education and limited health facilities. The number of tracheobronchial FBA aspiration cases found in Dr. Soetomo General Hospital was influenced by several factors, including tertiary referral hospitals for Eastern Indonesia, low education, economy and coverage

of health facilities outside Surabaya as well as the phenomenon of wearing a veil with rapid pins in the last twenty years.

CONCLUSION

It has been reported the results of a retrospective descriptive study of FBA aspirations in the Emergency Room of Dr. Soetomo General Hospital during the period of 2016 to 2018. From the results of this study and previous studies, there was an increase in the incidence of pin aspiration in the last three decades. FBA patients were dominated by teenage girls. Chest radiograph provides a good diagnostic picture for the diagnosis of FBA pins. Rigid bronchoscopy yields good results in the tracheobronchial FBA extraction process. Health facilities outside Surabaya were still limited.

CONFLICT OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Zuleika P, Ghanie A. Karakteristik pasien benda asing trakeobronkial di bagian T.H.T.K.L Rumah Sakit Dr. Mohammad Hoesin Palembang. *ORLI* 2017; 47: 164-70.
2. Fenane H, Bouchikh M, Bouti K, Maida MEL, Ouchen F, Mbola TO, *et al.* Scarf pin inhalation: clinical characteristics and surgical treatment. *J Cardiothorac Surg* 2015; 10: 1-4.
3. Sehgal IS, Dhooria S, Behera D, Agarwal R. Use of cryoprobe for removal of a large tracheobronchial foreign body during flexible bronchoscopy. *Lung India* 2016; 33: 543-5.
4. Ilan O, Eliashar R, Hirshoren N, Hamdan K, Gross M. Turban pin aspiration: new fashion, new syndrome. *Laryngoscope* 2012; 122: 916-9.
5. Subkhan M, Pradjoko I. Seorang wanita dengan aspirasi jarum pentul hari ke-14. *Medika* 2018; 14: 55-62.
6. Baram A, Sherzad H, Saeed S, Kakamad FH, Hamawandi AMH. Tracheobronchial foreign bodies in children: the role of emergency rigid bronchoscopy. *Glob Pediatr Heal* 2017; 4: 1-6.
7. Juniati SH. Benda asing trakea - bronkus di RSU dr. Soetomo Surabaya. *Maj Kedokt Trop Indones* 2005; 16: 1-6.
8. Sircar M, Gupta R, Bhatia A, Singh S. Foreign body aspirations – retrieval of aspirated pin through flexible bronchoscope. *J Assoc Chest Physicians* 2018; 6: 26-9.
9. Hewlett JC, Rickman OB, Lentz RJ, Prakash UB, Maldonado F. Foreign body aspiration in adult airways: therapeutic approach. *J Thorac Dis* 2017; 9: 3398-409.
10. Albirmawy OA, Elsheikh MN. Foreign body aspiration, a continuously growing challenge: Tanta University experience in Egypt. *Auris Nasus Larynx* 2011; 38: 88-94.
11. Elkhayat H, Ayyad MAS. Outcomes of impaction of unusual foreign bodies in the aero-digestive tracts. *J Surg Clin Pract* 2017; 1: 1-4.