

Prevalence of Foreign Body Aspiration in a Mozambican Quaternary Care Hospital

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Abstract: The presence of a foreign body in the airways results in a stressful situation for the patient, family and doctors due to the serious symptoms it can cause and, if not handled correctly, can have a fatal outcome. The objective of this study is to characterize the profile of patients treated at the Mozambican quaternary hospital with foreign bodies in the airways. This is a retrospective cross-sectional study based on 5 years of hospital records of all patients diagnosed (or suspected) of the presence of foreign bodies in the airways. 88 patients were observed, the majority of whom were male (70.45%). The most common location of foreign bodies was in the bronchial tree (75%). The majority of bronchial FBs were located on the right side (75.76%). The most common symptoms were dyspnea (96.59%), followed by a sensation of foreign bodies in the throat (3.40%). In the presence of sudden dyspnea in a child, without a history of upper respiratory tract infection and without leukocytosis, it is necessary to consider foreign body.

Keywords: Foreign Body; Bronchi; Trachea; Prevalence; Mozambique.

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1. Introduction

A foreign body is considered to be any object that is lodged in the airway tract, which causes symptoms and signs in the patient depending on its size, nature, consistency, shape and surface [1]. Foreign body aspiration is the fourth main cause of death in children (preschoolers and schoolers) and accounts for a substantial number of emergency Department visits in the United States of America and worldwide [2]. The presence of foreign bodies (FB) in the airways causes increased morbidity and mortality despite the great progress in the anesthetic and surgical field. The sudden aspiration may result in acute dyspnea and can lead to pulmonary complications and even death [3]. The aspiration of foreign bodies is often misdiagnosed as pneumonia, asthma, or other airway pathology [3].

The exploratory spirit and curiosity of children to put objects in their mouths, associated with incomplete teething, immaturity of neuromuscular apparatuses of swallowing and weakness of the cough reflex explains why foreign bodies are more common in children. In adults, the habit of placing needles and work instruments between the lips in tailors, shoemakers and carpenters and eating quickly is an important risk factor for FB aspiration. During dental treatments there may be aspiration of teeth, instruments and tissue fragments [4, 5].

The aspiration of foreign bodies in the airways is a typically pediatric problem [5] [1]. The symptoms of the presence of a foreign body in the airways is divided into 3 phases:

1) Initial period of asphyxiation, choking and wheezing that lasts for a short period of time. The FB may be expelled by cough or lodged in the larynx or in the tracheobronchial tree. 2) Asymptomatic interval; the respiratory mucosa adapts to the presence of FB and the initial symptoms disappear. This period varies according to the size and nature of the FB and 3) Late symptoms, caused by obstruction of the airways, inflammation or trauma induced by the FB and depends on the place where the FB is lodged [6].

Many cases are not recognized by the doctor and have been treated like asthma or other pulmonary pathology [3]. The burden of the FB extracted in the Mozambican Quaternary Hospital varies from 37.11% to 72.57% and makes the emergency Otolaryngology (ENT) doctor occupy a good part of their time extracting the FB [7]. The aim of this study is characterizing the profile of patients presented at the Mozambican Quaternary Hospital with airway foreign bodies.

2. Methodology

This study uses secondary data from a large study carried out as part of a doctoral thesis was used. The original study was a descriptive, retrospective study that used the collection and analysis of data available in the records of ENT offices, emergencies room, operating rooms, treatment rooms and minor surgery rooms at the SUR (Emergency Services) of the Maputo Central Hospital (HCM) of all patients with a diagnosis (or suspicion) of presence of an FB in the airways. The data was consecutively collected on the period between 01/01/2007 to 12/31/2011. The research was conducted in accordance with the required ethical standards - Resolutions 466/2012 - 510/2016 - 580/2018, of the Ministry of Health. The study protocol was approved by the National Bioethics Commission accordance with the Helsinki Declaration on clinical research involving human subject (128/CNBS/10) of May 6, 2010.

2.1 Inclusion criteria

The study included patients with a complete history in clinical records.

2.2 Exclusion criteria

Were excluded patients whose history did not reflect the type of FB and/or its anatomical location. In this study, patients with suspected FB were included to calculate the weight of patients with FB or suspected FB seeking medical services. Patients with other complaints such as asthma or pneumonia, who had FB, were also included. This parameter is also important to calculate how many suspicions are actually true and thus, to draw the attention of the medical community that it is always necessary to think about FB in a child who suddenly becomes dyspneic.

2.3 Some definitions

The *workday* of the personnel who provide services in the HCM Emergency Service takes place in 3 shifts (from 7 to 14 hours, from 14 to 20 hours, and from 20 to 7 hours), therefore, we have adopted these time frames in order to distribute the HCM-assisted patients. *Evolution time* was considered as period between the incident and their care at the HCM). *Antecedent or history of FB* was considered positive if patient report FB incident or negative if the patient does not know about FB.

2.4 Informed Consent and Voluntariness

Taking into account that this is a retrospective study where secondary data were used, it was not possible to administer informed consent to the participants, however it was requested administrative authorization to HCM to use the data, which were collected and analyzed solely for the purpose of the study, anonymously. On the other hand, the results of this study will not direct implications for the participants from whom the information will be obtained.

2.5 Confidentiality

The data collected is secondary, with no relationship between the codes and patient identification and without the need for informed consent. The confidentiality of all information will be guaranteed through the confidentiality and anonymity of the records. The records will only contain a code consisting of the first 3 (three) digits, referring to the increasing number of records, followed by a slash, then two digits (01 or 02) corresponding to the identification of the area (ENT, SUR), followed by a slash and the year with the last two digits, following example (106/01/23).

2.6 Statistical analysis

All information collected within the scope of this study was entered into a database created specifically for this purpose. A database was created in an SPSS statistical package (version 26.0 for Windows) which was also used for the analysis carried out within the scope of this study, where the information collected was entered.

3. Results

During the five-year period of study, 88 cases of FB aspirated in the airways were observed in the Mozambican quaternary care hospital (Table 1). The Majority of patients was male (70.45%; 62/88). The most common localization of foreign bodies was the bronchial tree (75%; 66/88). Most of the Bronchial FB were located on the right side 75.76% (50/66). The ages of patients ranged from two months to 34 years, with 73.9% (65/88) below the age of four years and 21.6% (19/88) with 5 and 9 years of age. 62.50% (55/88) of the cases were attended in the first shift (7-14 hours) and 26.1% (23/88) of the cases in the next shift (14-20h). The most common symptoms were dyspnea (96.59%; 85/88), followed by sensation of the FB in the throat (3.40%; 3/88).

In 37.50% (33/88) of the cases the evolution time was less than 6 hours and only in two cases (2.27%; 2/88) was longer than one month. In 93.2% (82/88) of cases it was less than 24 hours. It is possible to verify that the number of patients treated decreases as the evolution time increases. In 64.8% (57/88) of the cases studied, patients did not report a positive antecedent (history) for FB and only 35.2% (31/88) reported this antecedent. There was no previous FB extraction attempt.

Table 1. Description of socio-demographic and clinical profile.

Socio-Demographic and Clinical Profile		n	%
Sex	Male	62	70.45
	Female	26	29.5
Age	0-4 Years	65	73.9
	5-9 Years	19	21.6
	10-14 Years	2	2.3
	30-39 Years	2	2.3
	Monday	16	18.2
Days	Tuesday	11	12.5
	Wednesday	22	25.0
	Thursday	8	9.1
	Friday	19	21.6
	Saturday	6	6.8
	Sunday	6	6.8
Months	January	5	5.7
	February	5	5.7

	March	7	8.0
	April	13	14.8
	May	15	17.0
	Jun	10	11.4
	July	5	5.7
	August	9	10.2
	September	5	5.7
	October	3	3.4
	November	7	8.0
	December	4	4.5
Hospital Care Shifts	7-14h	55	62.5
	14-20h	23	26.1
	20-7h	10	11.4
Place of Assistance	Adult Emergency Service	10	11.4
	Otolaryngology Office	10	11.4
	Pediatric Emergency	68	77.3
Time of Evolution	< 6 Hours	33	37.5
	6-12 Hours	22	25.0
	12-18 Hours	20	22.7
	18 24 Hours	7	8.0
	24 48 Hours	2	2.3
	3 Days To 1 Week	2	2.3
	>1 Month	2	2.3
Anatomical Location	Without FB History	57	64.8
	Larynx	10	11.4
	Trachea	12	13.6
	Bronchi	66	75.0
Intervention	Direct Laryngoscopy	6	6.8
	Laryngoscopy With Blades	4	4.5
	Bronchoscopy	77	87.5
Nature of FB	Spontaneously Left	1	1.1
	Organic	61	69.3
	Inorganic	27	30.7
	Plastic	14	15.9
Type of FB	Metal	13	14.8
	Seed, Stem, Leaf and Fruit	50	56.8
	Fishbone, Bones and Meat	10	11.4
	Rubber	1	1.1

Legend. n. Absolute number.

In 87.5% (77/88) of cases, bronchoscopy was performed to extract the foreign body from the airways (12 in the trachea and 66 in the bronchi) (Table 2). One case was spontaneously expelled from the bronchus. All interventions were performed under general anesthesia. The majority of objects extracted were organic (69.3%; 61/88) (90% larynx, 33%

tracheal and 72.7% bronchial). Botanical foreign bodies (seeds, stem, and fruits) were the most common (56.8%; 50/88), followed by plastics (15.9%; 14/88) (Table 1).

Table 2. Distribution of negative and positive endoscopes in the airway.

Anatomical Site	Presence of FB		Total
	With FB	Without FB	
Larynx	9	1	10
Trachea	11	1	12
Bronchus	41	25	66
Total	61	27	88

In this study the presence of an FB in 69.3% (61/88) of the patients was verified, although in 30.68% (27/88) this relationship could not be demonstrated. Regarding to negative endoscopies due to the absence of FB, there were more cases of these in bronchus (37.8%; 25/66) and only 1 case of laryngoscopy (10%) and tracheoscopy negative (8.3%). Almost all the patients were hospitalized 94.3% (83/88). In this study there were 11.36% of complications (11/88). The most frequent complication was the atelectasis that appears in 7 patients (7/88) and one of them ended up in death.

4. Discussion

This study is part of a large study carried out as part of the author's PhD thesis. The data, despite being relatively old, are very useful because another study has never been carried out again. The present study presents an analysis of the data of patients with airways foreign bodies treated in HCM, from 2007 to 2011, with important results, particularly if we consider the lack of evidence on the topic in the country.

The aspiration of FB is almost exclusive to children, as shown by our results and the literature consulted [6, 8-12]. At these ages, FB aspiration accidents often occur because children eat while jumping on swings, jumping ropes, and playing other games. Aspirated foreign bodies are basically a pediatric nosologically entity, however, 2 cases of fish bone aspiration were found in adults aged 30 to 39 years old, which lodged in the larynx as in other studies [5, 8-11] it was a predominance of males, because of the typical adventurous spirit of boys.

This study permitted us to verify that the emergency from FB is produced more in workable days than weekends, as in other studies like [13], because probably at weekends the parents are at home and more vigilant of the children and also because there are some cases of aspiration of FB in kindergartens that are closed at this time.

As for the temporal distribution, there must be more cases in the winter months (April, May, and June), as opposed to the study from Portugal [14] where there are more cases in summer (August). The majority of patients were observed between 7 am and 2 pm, because at this time the mothers are busy with housework and field work and the child is left alone with another children and explores objects by putting them in their mouths, in the absence of elderly supervision and because it is a study basically with a pediatric age, these patients were more attended to in the pediatric emergency room. In winter, children spend less time outdoors, in parks or in backyards, increasing the risk of aspiration of small objects in the home.

The bronchial location is the most common among all airway locations [8, 11, 12, 14, 15], followed by the trachea and larynx. According to the literature [16], the setting of the FB in one of the bronchi depends on the oldness of the patient and the physical position of the patient at the time of aspiration (vertical position), knowing that the angle that is formed between the trachea and the two bronchi is similar until the age of 15, we can find a FB in either bronchus (if the patient is in an upright position) with the same probability.

However, from this age onwards, the main bronchi form different angles, with the right bronchus being more vertical than the left, which facilitates the right location of a FB.

The dyspnea is a most prevalent symptom due to partial or total obstruction of the airway lumen [8, 9, 14, 15, 17, 18]. Because of the most severe and dramatic symptoms and exposure to deep general anesthesia for endoscopy, all patients seek medical care in the first 24 hours, especially in the first 6 hours after the incident [8, 11]. In our study, 64.8% (57/88) of the cases did not report a for inhalation of FB, in contrast to the Honduras [8] and Egyptian study [12] where 93.3% and 73.3% of the cases respectively had a positive history for FB and this is one important data to be taken into account when assessing a patient with a dyspnea, because at the time of the incident, the child was alone at home or in the care of the older brother, who is also usually a small child.

Rigid bronchoscopy (under general anesthesia) was the method of choice for FB in the airways (12 in the trachea and 66 in the bronchus (87.5%; 77/88) as well as in other studies [12, 14], whereas a case of FB spontaneously left the bronchus during a coughing spell. This expulsion could be facilitated by the use of steroids, which reduces airway edema expulsion occurred in 4 cases in Portugal [14].

The complication rate of this study was high (11.36%) with the most frequent complication being atelectasis due to total bronchial intrinsically obstruction, same as the information contained in the anatomy book [6], unlike other studies where pneumonia was the most common complication [8, 15] or bronchospasm [14]. In our study there was one death due to FB in Bronchus, which became complicated with total obstruction and atelectasis and subsequent cardiorespiratory arrest (1.14%; 1/88). In Turkey the mortality was 0.21% [17] and in Nepal was 6.2% [11]

The nature of the FB varies from country to country and depends on the eating and cultural traditions of the inhabitants. Coastal populations are more likely to have accidents with fishbone-type FB. The predominance of organic FB coincides with the other published series [5, 8, 11, 12, 14, 17]. In our study, the Airways FB most found are seeds.

In this study, the presence of a FB in 30.7% of cases was not proven, a very high value, taking into account that they are small children with generally severe dyspnea who must undergo general anesthesia and in these cases there are no FB, they had another pulmonary pathology that made anesthesia more dangerous and, therefore, it is essential to have a good history and a good physical exam and request a blood test where you can look at whether or not you have leukocytosis and a chest x ray to discard others pathologies, but on many occasions the family was not present at the time of the incident and could not say what had happened and in these cases the anamnesis are of little help, but in these cases it is necessary to make use of the experience of the pediatrician and ENT doctors to decide to intervene .

Sometimes it is better to adopt a more conservative plan before attempting bronchoscopy, especially if there is very high leukocytosis and pathological chest X-ray. It is also important the ENT doctor to carry out his own evaluation before intervention. CT scan is a good non-invasive exam for differential diagnosis, but at HCM and poor countries hospitals, sometimes it is not accessible, and many cases require immediate attention and it is not possible to wait for a more detailed radiological investigation.

5. Conclusion

FB aspiration is a life-threatening clinical condition. In the presence of sudden dyspnea in a child, without a history of infection of the upper respiratory tract and without leukocytosis, it is necessary to think about a FB.

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