EPIDEMIOLOGICAL STUDY OF FOREIGN BODIES IN UPPER AERODIGESTIVE TRACT

Medicine

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ABSTRACT

Background: Foreign body aspiration may occur at any age, however most of these accidents occur in the children below age three years. The high incidence in young children reflects their tendency to explore their world using their mouths. Furthermore, these children have not yet developed a full posterior dentition, and neuromuscular mechanisms for swallowing and airway protection may not be fully mature.

Aim: To describe the common presenting signs and symptoms of foreign bodies among patients attending ENT department at TMH.

Material and methods: The present study was carried out in the Department of Otorhinolaryngology, R. G. Kar Hospital, Kolkata, West Bengal. Approval by the ethics committee of Hospital, Jamshedpur is taken and written informed consent of patients is obtained to conduct the study. The study was conducted from August 2014 to December 2015 for a period of 1 and half years.

Result: In our study, there was equal incidence of FB among the various socioeconomic statuses. We have clustered 1 and 2 socioeconomic status as upper status, and 3,4 and 5 as lower status. There were statistically no significant difference in the incidence of FB was seen according to their SES, with p -value = 0.7721 { $p > 0.05$ }.

Conclusion: Proper history and examination are the key components to diagnose foreign bodies. Otolaryngologists should categorise high risk patients on the basis of parity of mother, socioeconomic status and education of care giver, and they should be examined thoroughly.

KEYWORDS

Neuromuscular, Otolaryngologists, Foreign body.

INTRODUCTION

Foreign bodies are common problem in pediatric otolaryngology and are frequently associated with significant severe complications.¹ The early years of a child's life represent a phase of exploration and interaction with the environment. When they start moving independently, children start having access to a number of objects that they explore. This process encompasses, amongst other things, the placement of objects in orifices, such as the ears nose and throat.² Parent's laxness and lack of attention by leaving small objects at the reach of children contributes to this high incidence of foreign bodies. Ears, noses and throats are the most exposed orifices, hence the incidence of foreign bodies is also high in them.

Problem of dealing with aspirated foreign body either swallowed or aspirated are since antiquity. In such cases, no definitive treatment was available and hence, the morbidity and mortality were very high. Various forms of treatment like making the child inverted and patting the back or inserting fingers into the pharynx etc. were tried, further complicating the problem. Rational management for such cases started only after Gustav Killian also known as the —Father of bronchoscopy— performed the first bronchoscopy to remove a foreign body in 1897.³

It is reported to be the most common cause of accidental death at home in children under 6 years of age.⁴ More than 600 sudden deaths of children caused by foreign body inhalation are reported each year in the United States alone and there must also be an untold number of traumas and near fatalities. The problem is likely to be of higher magnitude in India. These unfortunate occurrences can stem from a long list of causes, including: inadequate supervision, poor judgment, unsafe product design, unwise personal habits, and cultural practices.

Adults may aspirate when alcohol, sedatives or head trauma alter their judgement or mental status, with cervicofacial trauma or when neurogenic disease or physical conditions, such as dentures, impair sensation or control of the food bolus.⁵

Variation in types of organic materials can be explained by cultural, regional and feeding habit difference. Surprisingly, however, plastic toys are not a frequent cause of FBA in developing countries but they represent more than 10% of those identified in the developed world.⁶

In developing areas the higher prevalence of illiteracy, the lack of proper health education, superstitions, negligence on the part of parents and lack of availability of timely and expert medical help results in higher chances of under reporting as well as delayed or inadequate management of the foreign bodies in upper aerodigestive tract which accounts to grave complications. Hence, with the above facts kept in mind we propose to carry out a study of the epidemiological variations, incidence, prevalence, effect of psychological status of caregiver and patient, parity of mother and socioeconomic status of the patients with foreign bodies attending ENT department of R. G. Kar Hospital, Kolkata, West Bengal.

AIMS:

1. To determine the types and sites of foreign bodies among patients attending ENT department at R. G. Kar Hospital, Kolkata, West Bengal
2. To describe the common presenting signs and symptoms of foreign bodies among patients attending ENT department at R. G. Kar Hospital, Kolkata, West Bengal.
3. To determine the average time passed between foreign bodies Placement and removal with their related complications among patients attending ENT department at R. G. Kar Hospital, Kolkata, West Bengal.
4. To determine the epidemiological variations among patients attending ENT department at R. G. Kar Hospital, Kolkata, West Bengal.
5. To determine the variation of incidence according to parity of mother and socioeconomic status of the patients attending ENT department at R. G. Kar Hospital, Kolkata, West Bengal.

MATERIAL AND METHODS

PERIOD OF STUDY: - One and half years, from August 2014 to December 2015.

STUDY POPULATION:- All patients who were admitted in the ENT wards, ENT referrals and attended ENT outpatient clinic with history or symptoms and/or signs of foreign bodies insertion, ingestion or aspiration or diagnosis of foreign bodies and confirmed by Otorhinolaryngological examination and /or radiological examinations were included at R. G. Kar Hospital, Kolkata, West Bengal.

SAMPLE SIZE:- Taking the α at 0.05 and desired power of study is 80% the sample size needed is 140.

INCLUSION CRITERIA:

1. Patients with history of ingestion of foreign body or with history of dysphagia.
2. Patients with history of aspiration or dyspnea or with history of stridor.
3. Patients with history of aspiration or insertion of foreign body in the nose
4. Patients who accepted to sign the consent for study.

EXCLUSION CRITERIA:

Patients with any other cause of nasal discharge, stridor or dysphagia were excluded from the study.

RESULT AND DISCUSSION

Foreign bodies are common problem in pediatric otolaryngology and are frequently associated with significant severe complications. The early years of a child's life represent a phase of exploration and interaction with the environment. When they start moving independently, children start having access to a number of objects that they explore. This process encompasses, amongst other things, the placement of objects in orifices, such as the ears nose and throat.

AGE OF PRESENTATION

The highest incidence of FB in present study was in age group less than 10 years.

Nasal foreign bodies- 89.6 % of our patients were of age less than 10 years, most common age group was under 3 years. Only 6.49 % of FB nose were of age more than 41 years. Youngest patient was 1 year old and oldest was 75 years old and was a case of nasal myiasis.

Digestive foreign bodies- 41.8 % of our patients were of age less than 10 years,

27.9 % of FB digestive tract was of age group 11-40 years. While 30% of patients were older than 41 years of age.

Airway foreign bodies- 90 % of FB airway were of age less than 10 years; most common age group was under 3 years. Only 5 % of FB airways were of age more than 11 years.

Studies	Commonest age group	Percentage(%)
Rothmann BF et al(1980)	Less than 3 years	77
Siddiqui MA et al(2000)	Less than 5 years	85
Saki N et al ⁹ (2009)	1-3 years	54.8
Budensab et al ¹⁰ (2012)	1-3 years (74%)	74
Present study	1-10 years	89.6

The natural urge to explore the objects by mouth, lack of molar teeth to crush nuts, crying and playing while eating and lack of parental supervision contributes to this hazard in this age group

GENDER INCIDENCE:

In present study foreign body incidence is more common among male patients (60%) as compared to females (40%) with a M: F ratio of 1.54:1. This male preponderance in patients with foreign body aspiration is widely reported in literature.

In cases of nasal and airway foreign bodies the incidence of males is around 63%. While in digestive foreign bodies our incidence percentage dropped to 53% and females 46%. The ratio was 1.15:1. This may be due to high incidence of fish bone foreign bodies in females of this area.

Studies	Male patients no.	Female Patients no.	M:F ratio
Aliakbar R(2008)	31	14	2.21:1
Saki N et al ⁹ (2009)	644	371	1.73:1
Budensab et al ¹⁰ (2012)	75	40	1.87:1
Present study	30	20	1.5:1

The exact reason for this however, remains unclear, but it is probably attributed to the fact that male children spend more time playing outside, unsupervised by the guardians as compared to the girls.

Somanath BP et al¹² attributed to this high incidence in boys, to their inquisitive nature.

TYPES OF FOREIGN BODIES:

Nasal foreign bodies: In our study, Peanut 12.98% and stone 7.89% were the most common foreign bodies in the nasal cavity. However we encountered a wide range of foreign bodies ranging from plastic whistle to sand stones. 36.6% of the cases were vegetative and 63% were non-vegetative.

In contrast to our study, a retrospective review of 400 Chinese children who had inhaled foreign bodies was undertaken and in that about, 95% of the removed foreign bodies were organic in origin.

Airway foreign bodies: In our study, peanut 30% was the most common followed by seeds 20%.

In Banerjee A. et al's¹³ an analysis of the management of 223 children with laryngo-tracheobronchial foreign bodies 168 cases (66.4%) of the recovered foreign bodies were organic in origin, the majority of them being peanuts which is similar to our study.

SITE OF FOREIGN BODY:

Nasal cavity foreign bodies: 89% of the cases were unilateral cases in our study. Of these 77 cases, foreign body was in the right nasal cavity and in 49%, it was in left nasal cavity in 40%. Bilateral nostrils were involved in 10% of cases.

Airway foreign bodies: In our study, right main bronchus constituted 45% followed by trachea in 35% of cases, left main bronchus was involved in 5% of cases.

In a retrospective review of 400 Chinese children who had inhaled foreign bodies was undertaken., the majority of the foreign bodies were found most often in right bronchial tree (46%) which is similar to our study.

In Banerjee A. et al's¹³ analysis of the management of 223 children with laryngotracheobronchial foreign bodies it was found that in 105 cases (47.1%) were seen in right bronchial tree which correlates with our study.

SIGNS AND SYMPTOMS OF PRESENTATION

Nasal foreign bodies: 100% of the patients presented with complaints of foreign body in nose and in 83% cases there was history of nasal obstruction and nasal discharge.

On examination foreign body nose is seen in 98.7%, followed by nasal discharge 84% and epistaxis in 33% of cases. Maggots were very rare 3.8% only.

This is in very much similar to that of Anupam Mishra et al¹⁴ who quoted nasal obstruction as the main symptom. Foul smelling nasal discharge was seen only in 10% of cases. Bleeding was seen only in 2% of cases.

Airway foreign bodies: in our study, cough and dyspnea was the most common symptom 100% followed by wheeze in 75%, fever 40% and stridor in 35% of cases.

On auscultation 90% of patients had sign of decrease air entry, crepitus was present in 75% of cases. 45% of patients had respiratory distress at the time of presentation.

Clinical features	Srppnath J et al(2002)	Rahbarimanesh et al(2008)	Al-fahham FS et al ¹⁶ (2014)	Present study
Cough	50%	82%	78.74%	100%
Breathlessness	42%	23%	-	100%
Wheeze	45%	41%	70.86%	75%
Fever	24%	-	28.74%	40%
Stridor	04%	05%	12.99%	35%
Crepitus	25%	-	-	75%
Decrease air entry	72%	27%	-	90%

In our study, the classical triad - cough, wheeze and decreased breath sounds, was seen in 56% of cases of FB aspiration. Such triad has also been reported by Kaur et al¹ in most of their children.

SOCIOECONOMIC STATUS AND ITS EFFECT ON INCIDENCE FOREIGN BODIES.

We have clustered 1 and 2 socioeconomic status as upper status, and 3,4 and 5 as lower status.

In our study, there was equal incidence of FB among the various socioeconomic status. However, percentage of lower socioeconomic status patients is much higher mainly in nose and digestive foreign bodies. Lower SES with 32/72(44%) and High SES with 15/68(22%).

Complications after FB ingestion or removal are higher in lower SES group. Lower SES – 19/72(26.7%) while high SES with 10/68(14%). We also found that previous history of Nasal FB removal was more in Lower SES class with 34.2% while in Higher SES it is 25.6%.

We found that attempts to remove nasal FB in home were much higher among Lower SES group (63.1%) than Higher SES group (41%).

It was found that there is no significant difference in the incidence of organic and inorganic foreign bodies in aerodigestive tract.

However they have assumed that higher the SES, lower is the number of adult family members. But in our study population, we have all types of families (nuclear, joint, extended) and they are scattered in higher SES.

PARITY OF MOTHERS AND ITS EFFECT ON FOREIGN BODIES

We have clustered parities of mother into PRIMI (children's upto 2) and MULTI (having 3 or more childrens). In our study we found that incidence of FB was more in patients whose parity of mother (primary caregiver) is more than 3 mainly in FB Nose and Airway. While there was no significant difference in FB's of digestive tract.

We found that among patients who presented to ENT OPD after 24 hours had a dominating part of mothers with parity of more than 3. That too in all types of foreign bodies.

We found that there is no difference in the incidence of organic and inorganic foreign bodies according to parities of their mothers.

We found that complications are frequent in the group of mothers who have parity of more than three. In nose it is 33.33% than 3%, in airway it is 38% than 14% and in digestive it is 22.7% than 4%.

We found that in case of nasal foreign bodies, previous history of foreign body removal is more in group of patients whose mother have parity of more than 3.

Mothers with parity of more than 3 are more likely to attempt nasal foreign body removal at home.

EDUCATION OF CAREGIVER AND ITS EFFECT ON FOREIGN BODIES.

In our study we found that incidence of FB is more in patients whose caregiver(father) has education level of 2, that is high school and intermediate.

Nasal foreign bodies- level 2 has incidence of 37%. Airway foreign bodies-level 2 has incidence of 30%. Digestive foreign bodies- level 2 has incidence of 31.8%.

We found that time elapsed till presentation to ENT OPD was more in patients whose caregiver had education of intermediate, high school or are illiterate.

Group 2- (Intermediate & High school) – 29.6% patients with nasal FB, 71.4% patients with airway FB and 27.7% patients of digestive FB had presented to ENT care after 24 hours.

Group 3- (illiterate)– 47% of nasal FB, 71.4% of airway foreign bodies and 100% patients of digestive tract who presented to ENT care after 24 hours were illiterate.

We found that patients whose caregiver had education level of group 2 and 3 showed a higher percentage of attempts to remove foreign bodies in home itself. Group 2- 70.37% and group 3 – 64.71%.

We found that there is no statistical difference between education

groups for previous history of foreign body removal. Although in nasal foreign bodies 47% of illiterates showed a positive history of previous foreign body removal.

Statistically there is no difference but we found that the percentage of complications increases with decrease in education level.

In our study we found that there is no difference in incidence statistically. But the incidence is quite high in nuclear families (51.9%).

ACTIVITIES DONE BEFORE FOREIGN BODIES INSERTION

We found that highest incidence of foreign body ingestion was during playing that is 78/140. (55.71 %).

Nose foreign bodies – highest incidence is during playing. Airway and digestive foreign bodies – highest incidence was during eating 11/20(55%) in airway and 25/43 that is 56.8% in digestive foreign bodies.

TIME ELAPSED AND ITS EFFECT ON FOREIGN BODIES

In our study 94/140 (67%) patients reported to ENT OPD within 24 hours. Nasal Foreign bodies – 74% reported within 24 hours

Airway Foreign bodies – only 40% reported within 24 hours Digestive Foreign bodies – 63% reported within 24 hours

MODE OF ENTRY OF FOREIGN BODIES

In this study 113/140 patients (80%) had accidental ingestion of foreign bodies. 64.9% in nasal, while 100% of cases of airway and digestive foreign bodies. Most self-inserted foreign bodies belong to nasal group 26/77 (33.7%).

DURATION OF HOSPITAL STAY

We found that 79 patients (56.4%) were discharged the same day, while 34(24.2%) patients were discharged within 3 days. 19.2% patients were discharged after 3 days. 100% patients with foreign body airway were admitted and 69.77% of digestive tract foreign bodies were admitted.

CONCLUSION

Foreign bodies in the upper aerodigestive tract are a common clinical problem in otolaryngological practice as evident in this study. Though many doesn't pose an immediate problem of airway, some of them are serious and life threatening emergencies.

Children account for most of the nasal and airway foreign bodies. Proper history and examination are the key components to diagnose foreign bodies. Otolaryngologists should categorise high risk patients on the basis of parity of mother, socioeconomic status and education of care giver, and they should be examined thoroughly. Educating the parents about keeping away the articles from the reach of children and to observe the activity of a child will prevent the higher incidence of foreign body in the children.

Table: Age Of Patients

Age (in year)	Group-A (Nose)		Group -B (Airway)		Group-C (Digestive)	
	No.	Percentage	No.	Percentage	No.	Percentage
≤ 10 year	69	89.61%	18	90%	18	41.86%
11 - 40 year	3	3.90%	1	5%	12	27.91%
≥ 41 year	5	6.49%	1	5%	13	30.23%
Total	77		20		43	
Mean±s.d.	7.12 ± 14.68		6.75 ± 12.74		26.26 ± 22.28	

Table: Incidence of foreign bodies according to parity of mother.

Parity of mother	Group-A (Nose)		Group -B (Airway)		Group-C (Digestive)	
	No.	Percentage	No.	Percentage	No.	Percentage
Primi (1or 2) child	20	25.97%	7	35%	21	48.84%
Multi (3 or more) children	57	74.03%	13	65%	22	51.16%

Table: Complications happened when compared with parity of mother

Parity	Nose (n=77)		Airway (n=20)		Digestive (n=43)	
	No.	Percentage	No.	Percentage	No.	Percentage
< 3 child	1/29	3.45%	1/7	14.29%	1/21	4.76%
≥ 3 child	16/48	33.33%	5/13	38.46%	5/22	22.73%

REFERENCE

- Sharif S, Roberts G, Phillips J. Transnasal penetrating brain injury with a ball-pen. British journal of neurosurgery. 2000;14(2):159-60.
- J R. Pediatric aerodigestive F B injuries are complications related to timeliness of diagnosis. The Laryngoscope. 1997;17-20.
- Kaur K, Sonkhya N, Bapna AS. Foreign bodies in the tracheobronchial tree: A prospective study of fifty cases. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India. 2002;54(1):30-4.
- Khan AR, Khan NS. Management of Whistle as a Foreign body Tracheobronchial Tree. JPMI(YR). 2011;18(4):JPMI(YR);18(4):602-6.
- JNG. E. Foreign bodies in larynx and trachea. In: In: Kerr e, editor. Scott-Brown's Otolaryngology. 6. 6th edition ed. London: Butterworth-Heinemann; 1997. p. 1-11.
- AH B, Annigeri VM, Bagalkot PS, Gouda VR, Khan A, Radha R, et al. 3. Pattern of Foreign Body Aspiration in Children-An Experience at SDM College of Medical Sciences and Hospital. 2012.
- Rothmann BF, Boeckman CR. Foreign bodies in the larynx and tracheobronchial tree in children. A review of 225 cases. The Annals of otology, rhinology, and laryngology. 1980;89(5 Pt 1):434-6.
- Siddiqui MA, Banjar AH, Al-Najjar SM, Al-Fattani MM, Aly MF. Frequency of tracheobronchial foreign bodies in children and adolescents. Saudi Med J. 2000;21(4):368-71.
- Saki N, Nikakhlagh S, Rahim F, Abshirini H. Foreign body aspirations in infancy: a 20-year experience. International journal of medical sciences. 2009;6(6):322-8.
- Budensab.A.H AV, Bagalkot PS et. al. Pattern of foreign body aspiration in children- an experience at SDM college of medical sciences and hospital. Int J Health Sci Res. 2012;2(8):20-8.
- Aliakbar Rahbarimanesh, Elaheh Noroozi, Mansour Molaian, Piman Salamati. Foreign Body Aspiration: A five-year Report in a Children's Hospital. Iranian Journal of Pediatrics. 2008;2.
- Somanath BP, Singhi S. Airway foreign bodies in children. Indian Pediatr. 1995;32(8):890-7.
- Banerjee A, Rao KS, Khanna SK, Narayanan PS, Gupta BK, Sekar JC, et al. Laryngo-tracheo-bronchial foreign bodies in children. The Journal of laryngology and otology. 1988;102(11):1029-32.
- Mishra A, Shukla GK, Bhatia N. Aerodigestive foreign bodies. Indian J Pediatr. 2000;67(6):429-33.
- Srppnath J, Mahendrakar V. Management of tracheo bronchial foreign bodies-a retrospective analysis. Indian Journal of Otolaryngology and Head & Neck Surgery. 2002;54(2):127-31.
- Firas Shakir A-F, Khalid Khaleel AA, Hasan Mohammed Ridha ALQ. Foreign Body Aspiration in Children. Kerbala Journal of Medicine . مجله كربلاء للطب . ١٣٩٤;٩(١):٢٠١٤.