

Removal of Foreign Bodies In Pediatric Airway- our experience

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Abstract: A retrospective study of 108 cases of tracheobronchial foreign bodies was analyzed. History, clinical findings, radiological features, type of material & location of foreign bodies were studied. In our study of the 108 children who underwent rigid bronchoscopy, 102 had tracheobronchial foreign bodies (94.4%). Foreign body aspiration happened mostly in children below 3yrs of age (84.3%), choking preceded the symptoms in 82 cases (80.3%). Very few, 9 patients reported within 24hrs of the event (8.8%). There was a delay of more than 2 weeks in 13 (12.7%) cases. In many cases referral was delayed as the diagnosis was missed initially. Vegetative foreign body, Groundnuts were present in majority of the cases (65.6%). Use of proper instrumentation, through training and teamwork is the key to achieve goal of zero mortality and no major complications.

Key words: Bronchoscopy, Foreign Body.

I. Introduction

Foreign body aspiration is the most common cause of accidental death, at home in children under six years of age. According to National safety council choking remained the fourth leading cause of unintentional injury death in the United States as of 2004. In 2006 a total of 4,100 deaths (1.4 deaths from 1000,000 population) from unintentional ingestion or inhalation of food or other objects resulting in airway obstruction was reported[1]. Paediatric bronchoscopic removal of foreign bodies is the most challenging task both for the paediatric surgeon and the anaesthesiologist. Most reports from both large and small series of foreign body removal from paediatric airway include at least one death, while aspiration pneumonitis, consolidation and laryngeal oedema do occur in small percentage of cases[2-5]. The challenge today is to avoid mortality at any cost and ways to overcome this are outlined in this original article.

II. Materials & Methods

This is a retrospective study of foreign body inhalation in children at tertiary paediatric surgical centre at Tirupathi. We reviewed the records of 108 pediatric patients admitted during the period April 2009 to March 2015 with the diagnosis of foreign body Inhalation. The following data was collected: sex, age, socioeconomic status, duration of illness, availability of definite history, site, type of material, bronchoscopy findings, duration of hospital stay after its removal and complications. All patients suspected of foreign body aspiration were subjected to rigid bronchoscopy under general anaesthesia with controlled ventilation, using karl storz pediatric ventilating bronchoscope with optical forceps and Olympus HD video processor and xenon light source.

III. Results

A total of one hundred and eight children were admitted with suspected foreign body aspiration during this period. No foreign body was found in 6 subjects and they were excluded from the study. Of 102 subjects with foreign body aspiration, 63 (61.7%) were boys and 39 (38.23%) were girls. Most patients 86 (84.3%) were below 3 years of age, the mean age of was 2.372 years with a range of minimum 3months to 14 years. Majority of children came from rural areas, 80 (78.43%) as compared to urban areas 22 cases (21.57%). Nine children (8.82%) reported within the 24 hours of the event, 13 children were brought after 1week (12.74%) duration but majority of children, 78 (76.47%) were reported within a week. A definitive history of choking following foreign body aspiration was present in 82 (80.3%) cases.

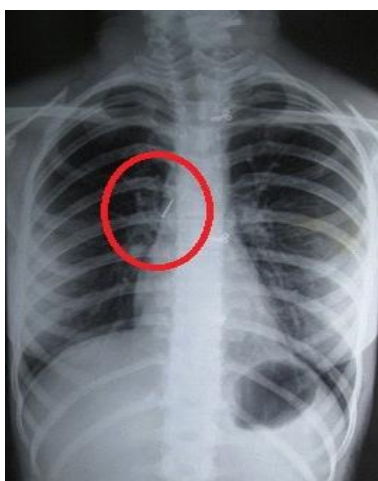
Chief clinical features included:

History of rapid breathing in 95 cases (93.1%), History of choking preceding the symptoms in 82 cases(80.3%), History of paroxysmal cough in 44 cases (43.13%), History of stridor in 38 cases (37.25%), wheezing in 26 cases (25.49%), fever in 17 cases (16.66%), cyanotic episodes requiring preop intubation occurred in 3 cases (0.029%), 20 cases were referred with finding of decreased air entry without history of foreign body aspiration (19.6%). Groundnut was the commonest foreign body seen in 67 cases (65.6%). Betel nut pieces, custard apple seeds, peanuts, led bulb, cork cap, coconut piece, ball point pen tip were some of the other foreign bodies noted in our study.

IV. Clinical Features

Difficulty in breathing	95 (93.1%)
Fever	17 (16.6%)
Cough	44 (43.13%)
Vomitings	6 (5.88%)
Stridor	38 (37.25%)
Wheezing	26 (25.49%)
Cyanosis	3 (0.02%)
Referred with Decreased air entry	20 (19.6%)

Chest radiographs were helpful in providing evidence of possible foreign body aspiration in 82 patients (80.3%). Radiological features of air trapping were seen in 64 (78.04%) cases, while collapse/ atelectasis was seen in 10 (12.19%) cases and metallic object was seen in 8 cases (9.75%). Normal radiograph or one showing nonspecific findings was present in 20 cases (19.75%). In 48.1% (49) of cases foreign body was lodged in right main bronchus, 37.3% (38) in left main bronchus, 12.7% (13) in sub glottis. A check bronchoscopy was performed in all the cases in the same sitting to look for multiple or remnant foreign bodies. Majority of patients (92) 90% were discharged on the same day, while 10 patients (11.7%) stayed in the hospital for more than 2 days because of complication like fever, bronchospasm, poor nutrition and toxicity. Not a single mortality occurred due to teamwork of all the members which included two paediatric surgeons, two anesthetists, one pediatrician, one physiotherapist and trained nursing staff members. The monitoring included E.C.G., heart rate, N.I.B.P., SpO₂ r respiratoroty rate and endtidal CO₂.



Chest radiograph showing Metallic foreign body



Vegetative foreign body in right main bronchus



Metalic foreign body in right main bronchus

V. Discussion

In children though aspiration of foreign bodies occurs in all age groups, most patients in this study were below 3 years of age, which is similar to that reported in other series [6,7]. Psychology of tasting everything, lack of molar teeth to crush the nuts, the anatomic relation of larynx, crying and playing while eating and lack of parental supervision contributes to this hazard. The fact that about 11.7% of the patients arrived at the hospital more than 2 weeks after inhalation is of concern, bearing in mind that a positive history of aspiration was obtained in 80% patients, medical staff had often ignored the event of choking when the initial assessment was made. Factors, which delayed the diagnosis include Parental negligence, lack of clear symptoms, lack of suspicion of foreign body diagnosis in chronic cough cases, wrong diagnosis by the doctor, diverse clinical features due to inhalation of foreign body, low socioeconomic status. Chest radiography is an important tool for investigation for diagnosis, though fluoroscopy being a dynamic modality can be useful when chest skiagram in inspiratory phase is inconclusive. Since most foreign bodies are vegetative and thus radiolucent, their presence is usually suspected by the presence of indirect signs like atelectasis or air trapping due to partial obstruction[8]. In infants and very small children who may not be able to co-operate, assisted expiratory technique using pressure over the patient's epigastrium, applied during maximal exhalation, will result in a radiograph that is sensitive indicator of air trapping.

Vegetative foreign bodies are more common cause of aspiration in many studies[9] and are more dangerous as they swell up with bronchial secretions causing increased obstruction. In one of our case patient developed sudden bouts of severe cough and developed acute obstruction due to migration of foreign body to vocal cords. Though we have revived him from catastrophe he developed features of anoxic cerebral damage.

Groundnut cotyledons are the commonest culprits proper health education of parents regarding the hazards of foreign body aspiration, importance of avoidance of nuts and small toys can prevent occurrence this complication.

In our experience the foreign bodies difficult to remove are custard apple seeds as they are difficult to grasp and can be removed by gripping them in the gap between telescope and forceps tip and pulling them fixed to the surface. Opened safety pin in which case reversing the safety pin with sharp end facing distally will aid in its smooth extraction. Crocodile tip forceps will aid extraction of foreign bodies like pen cap ends and other plastic material objects.

After removal of foreign body from bronchus one must do 2nd look bronchoscopy so as to look for 2nd or multiple foreign bodies. Even at times part of foreign body may be left, which will be diagnosed and caught in 2nd look bronchoscopy. The anaesthetist and the pediatrician, who have seen patient preoperatively will play a crucial role to let you know about the improvement in air entry on the involved side after removal of foreign body. Fogarty balloon catheter is a useful tool for controlling unwarranted bleeding and for extraction of multiple small foreign bodies[10]. Dormia basket is also a useful tool for extraction of small foreign bodies[11].

Complications:

Key to success without any hazards during extraction of foreign bodies is proper meticulous technique, having good patent IV lines, awareness of procedure by all the team members and their coordination with surgeon and anaesthetist anticipating the complications not getting panicked for them and be prepared for it like having all emergency drugs and proper resuscitation facilities in hand and having good postop ventilation and nursing care facilities, in otherwords a team job. Some of the complications we encountered are injuries to oral cavity and vocal cords in the initial stages of learning. Subglottic and tracheobronchial tree edema leading to throat pain and hoarseness of voice, though these are temporary ones developed in cases of multiple foreign bodies due to repeated introduction of sheath and prolonged procedure, were treated with steroids and nebulizations. Laryngospasm due to trauma to vocal cords and due to secretions irritating supraglottis occurred

in some cases which was managed with 10% xylocaine spray of supraglottic region and extubation while the child is in deep sedated status and keeping the child in lateral decubitus with head low posture immediately after extubation. Subglottic impaction of foreign body occurred in some cases but could be removed by negotiating them from posterior part of glottis, as it is wide.

VI. Conclusion

Since foreign body aspiration is a dramatic event with potentially lethal sequelae health education is the best preventive measure for decreasing the incidence of this problem.

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