Editorial

Aspiration of Foreign Bodies in Children

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Foreign body aspiration in children is a serious medical problem, with clinical manifestations ranging from acute asphyxiation, resulting in anoxic cardiac arrest to insidious lung damage. Most of the time, this accident is unobserved. Five percent of paediatric deaths under 3 years occur due to this cause in developed countries and probably, the incidence is much more in developing countries. It is an easily preventable accident in small children. Unobserved aspiration of foreign bodies by small children especially less than three years is a global problem even today.[1] The male-to-female ratio as reported in medical literature is 2:1. Younger children are at the highest risk for accidental foreign body aspiration. This increased incidence has been attributed to several factors including the tendency to put small objects into their mouths, crying, shouting, running and playing with small objects in their mouths and absence of molars to chew certain foods adequately. According to different studies, 15% of foreign body aspirations occur among children older than 5 years of age.[7]

The most common eatables which are aspirated by small children are like popcorns, peanuts, fried lentils, fried nuts, raisins and grapes. The other items which can be aspirated by children are toy parts, crayons, pen tops, tacks, pins, nails, screws, bullets and casings. In Southeast Asian countries, pieces of betel nuts are other common foreign bodies. Small children pick up these objects and put them in their mouths or other older children put these items in the mouths of smaller children while the mothers are busy attending to their household affairs.[2]

These days, the incidence is on the increase as more working mothers have to leave their children in day care centers and it is a known fact that the day care personnel are at times not very vigilant.

The history of foreign body aspiration in children in most cases is not available for the reasons stated above.

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The clinical events depend on the size, shape and surface of aspirated foreign body and site of impaction in the respiratory tract. The more difficult cases are those in which aspiration is not witnessed, unobserved or are unrecognized and, therefore, is unsuspected. In these situations, the child may present with persistent or recurrent cough, wheezing, persistent or recurrent pneumonia, lung abscess, focal bronchiectasis or hemoptysis. Unexplained pulmonary pathologies in small children should have bronchoscopy done for suspected aspiration of foreign bodies.[3]

Apart from aspiration some foreign bodies may be ingested. Objects that travel past the esophagus generally do not cause symptoms, unless rare complications such as bowel perforation or obstruction occur. If the object passes into the stomach, the child is usually asymptomatic but may exhibit clinical manifestations if the esophagus was injured during transit of the object. Uncommon complications of objects that travel through the pylorus relate to bowel obstruction. Symptoms may include abdominal pain, distention, vomiting, and feeding intolerance. Bowel perforation is another rare but significant complication that is characterized by abdominal pain, distention, vomiting, and fever. Subacute or chronic complications of an esophageal foreign body may include damaged mucosa or strictures of the esophagus, decreased oral intake, failure to thrive, or recurrent aspiration pneumonia.[6]

The identification of a patient with an aspirated foreign body can be quite subtle. Often parents or attendants have not observed that a choking event has occurred, which is the initial and diagnostic symptom of aspiration of foreign bodies in small children. If the aspirated foreign body is not large enough to cause acute respiratory obstruction of the trachea with acute asphyxia and hypoxic cardiac arrest, it will pass down to smaller bronchi, and in these situations in later days, the child may present with persistent or recurrent cough, wheezing, persistent or recurrent pneumonia, lung abscess, focal bronchiectasis, or haemoptysis.

Standard radiographic examinations may not reveal the foreign body as 70 percent of aspirated foreign bodies is radiolucent.

The main diagnostic problem faced by the paediatrician in cases of unwitnessed radiolucent aspirated foreign

bodies in small children is when a child presents with recurrent migratory pulmonary infiltrates. Because many different pulmonary disorders clinically present in the same way, including cystic fibrosis, various immunodeficiency syndromes and congenital anomalies of respiratory tract; these very pathologies have to be excluded through investigations.

Most of the aspirated food particles are hygroscopic, they absorb moisture from the bronchial secretions and swell up and become friable and during their removal they fragment especially when metallic graspers are used for their extraction. Hence wire baskets (Dormia baskets) are safer and easy to use for their removal through the rigid/flexible bronchoscopes or laryngeal mask airway.[4]

Clinically, there are four scenarios in cases of aspiration of foreign bodies in children

A. The child has aspirated a foreign body which is either of the same diameter or bigger than the diameter of the larynx or trachea and the child gets acutely asphyxiated and develops hypoxic cardiac arrest. This is often diagnosed as unexplained sudden deaths in small children.

B. The second scenario is that the foreign body is smaller than the diameter of the larynx or trachea of the child and initially it produces choking sensation, this initial symptom is not usually witnessed and later passes distally where it gets lodged in the smaller bronchi. These very patients later on manifest the recurrent symptoms of chest infections, radiologically and clinically the symptoms and signs are those of atelectasis, pneumonia, obstructive emphysema of the segment, lobe or whole lung, due to partial obstruction of bronchi.

C. The third scenario is where the foreign body keeps on changing position (migratory), producing shifting pathologies in different parts of the lung parenchyma.

D. Unobserved aspiration of foreign bodies by small children pose a special problem as there is no history of observing by an adult of initial symptoms of choking, cough and cyanosis.[5]

The standard method of removing aspirated foreign bodies is with the rigid ventilating bronchoscope using a metallic grasper but the problem faced by the surgeon is that the foreign body disintegrates due to its hygroscopic swelling especially the peanuts and fried seed of vegetables or fruits. Hence it has to be removed piecemeal. It takes a long time to remove the whole of the foreign body, with its attended complications of hypoxia and bronchial mucosal damage by the metallic grasper and chemicals released by the foreign bodies.

We have adopted a safer method of removing aspirated foreign bodies in small children.

For removing the foreign bodies from the bronchial tree, constant communication, good cooperation and clear understanding between surgeon and anesthetist are essential.

The patient is anaesthetised without relaxation and ventilation of the patient is done through laryngeal mask airway. The patient is connected to the monitor, which constantly monitors oxygen level in blood, pulse rate and rhythm, blood pressure, and breathing rate. Latest versions of monitors even show the carbon dioxide level in the blood.

The following method is safe and is being practiced in most centers of the world.

Fiber optic flexible bronchoscope is passed through the laryngeal mask which is being used for administering anesthesia gases and a wire basket (Dormia catheter) is passed through the suction channel of the flexible bronchoscope; the foreign body is visualized and is engaged in the wire basket and the foreign body along with the fiber optic bronchoscope is removed. The laryngeal mask is replaced with an endotracheal tube, the bronchial tree is cleared of secretions through suction and the patient oxygenated. It takes a very short time and by entrapping the foreign body in the wire basket, it prevents fragmentation of hygroscopic items.

Referred by the paediatricians over the last ten years i.e. 1988 to 1998 we have removed about 124 foreign bodies from children aged 1 year to 5 years by this method with no complications. An experienced anaesthetist manages the patient during the procedure and if there is any slight evidence of hypoxia, the procedure is temporarily stopped to allow the anaesthetist to properly oxygenate the patient by passing an endotracheal tube.

Foreign body aspiration usually presents as an unwitnessed episode and a high index of suspicion by the surgeon, even in the absence of a positive history is necessary to prevent morbidity and mortality due to delay or misdiagnosis.

Bronchoscopy in children is now a safe procedure, bronchoscopy should be carried out in all cases where there is high degree of suspicion of aspiration of foreign bodies.[7]

Therefore keeping in mind, the risk of misdiagnosis of FB injuries due to nonspecific clinical presentation and the severity of complications to which a FB injury may be associated, it is essential to develop primary prevention strategies for foreign body injuries.

Educational programs should be carried out for parents and care takers to stress the importance that children eat food and play with toys that are appropriate for their age (e.g. avoiding nuts and seeds and, more generally, small round food items, as berries, in kids younger than 4 years of age, guaranteeing adult supervision when young children are playing or eating).

Primary prevention is also represented by the

involvement of manufacturers and consumer associations, providing strict regulation on manufacturing, packaging, quality control and commercialization of hazardous objects (particularly toys, magnets and batteries).

So, prevention is the best cure. Increasing public awareness is key to prevention of paediatric foreign body aspiration.

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