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Foreign Bodies in the Respiratory and Gastrointestinal Tracts in Children

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Abstract

Infants' natural curiosity and experimentation often cause them to be patients in hospital emergency units with foreign bodies in their nose, ears, respiratory or gastrointestinal tracts. Such patients call for a careful assessment of their clinical status, the level of emergency as well as potential complications and require the attention of a host of medical specialists – an otolaryngologist, bronchoscopist, anaesthesiologist and intensivist, X-ray radiologist. Amongst the notorious variety of foreign bodies e.g. coins, buttons, small toys, seeds and nuts, safety pins etc., two stand out as particularly dangerous because of their chemical toxicity, namely batteries and small magnets and they have to be categorically urgently removed from whichever part of the body they happen to be in. Foreign bodies in the larynx and the trachea also require immediate action because of the high mortality rate in a short time following an incident where no adequate measures have been taken.

Keywords: *foreign body, children*

Foreign Bodies In The Respiratory Tract

It is children aged under 3 years who are most frequently patients with foreign bodies inhaled in their respiratory tract, the peak being the age between 10 – 24 months. A good 80 – 90% of the aspirations are located in the bronchi, while the ones in the larynx or trachea are considerably less[1-3]. The highest mortality due to aspirations, however, is to do exactly with the cases of a foreign body in the larynx or trachea. Some of the foreign bodies that are most frequently found in the larynx or trachea are small toys, fish bones, egg-shells, grape seeds etc. As for endotracheal foreign bodies it is predominantly seeds and nuts. Therefore, it is strictly forbidden to feed children under the age of 4 or even 5 with any kinds of seeds or nuts.

The clinical picture in cases of aspiration of a foreign body into the larynx or trachea is usually dramatic with cough, stridor, dyspnea, tirage, cyanosis, voice changes like hoarseness, dysphonia and even aphonia. Some laryngeal foreign bodies could be removed as early as the emergency unit with Magill forceps. Tracheal foreign bodies require urgent endoscopic intervention[4].

The clinical continuum of endobronchial foreign bodies covers three stages. The initial stage, which coincides with the moment of the incident, is characterised with choking, coughing and difficulties in breathing. Usually that is followed by a tolerance to the foreign body, an asymptomatic period with a varied continuation of hours or days. The late stage of complications is the result of an obstruction or infection which is manifested in the child developing atelectasis, pneumonia or abscess. The diagnosis of foreign body aspiration is a real challenge. In many cases there is no anamnesis of the moment of aspiration. The sensitivity and specificity of the anamnesis are comparatively low. A number of children are treated for respiratory infections over a long period of time with no success. After a carefully taken history, a physical examination and instrumental exams , the children are recommended for bronchoscopy which reveals that the underlying cause of the severe respiratory infection which was not overcome by standard treatment, is an inhaled piece of nut. In the cases where the anamnesis of the incident is based on witnesses' evidence, the gold standard is endoscopy. The clinical examination in the

cases of aspiration could vary from a normal finding to weakened breathing and wheezing/stridor.[5,6]

X-ray examination is categorical only in the cases of X-ray positive foreign bodies (80 – 96% of the cases are not such, however) while indirect indications vary from emphysema (17 – 69%), atelectasis (12 – 41%), reposition of the mediastinum, expanded intercostal spaces with air-trapping to normal findings (14 – 37%). An insignificant improvement of the specificity and sensitivity of X-ray graphs can be achieved by carrying them out with inspirium and expirium which are hard to impossible with the youngest infants. For the diagnosis of the condition CT displays a higher sensitivity and specificity 94 – 95%. Still if there is anamnestic, clinical or instrumental data or suspicions of aspiration of foreign bodies in the respiratory tract the infant should be opportunely referred to the bronchoscopy department[7].

Carrying out bronchoscopy under general anaesthesia for the evacuation of a foreign body from the respiratory ways is a difficult task requiring the full attention, knowledge and expertise of the performing anaesthesiologist. The procedure is highly risk. Its successful outcome will depend on a preliminary assessment of the pre-operative status of the infant, the drug premedication based on indications and preparation of the necessary mechanical ventilation. The fewest number of complications with the above mentioned manipulation are observed in the cases where the child is under deep anaesthesia which will suppress the tracheal and bronchial reflexes to a maximum[8].

Foreign Bodies In The Gastrointestinal Tract

Foreign bodies in the gastrointestinal tract are found twice as often as those in the respiratory pathways. In the majority of cases they pass spontaneously along the physiological pathway (they usually remain in the esophagus for 8 – 16 hours) with only 10 – 20% requiring endoscopic interference and as few as 1% a surgical removal.

The clinical picture of esophageal foreign bodies is also divided into three stages. Foreign bodies in the esophagus are usually stuck at the levels of its three physiological narrowings.

The sudden and dramatic onset is characterised with choking, inability to swallow saliva, vomiting, odynophagia, dysphagia, chest pain and also, if the foreign body is big and there is a compression on the respiratory pathways, there could be difficulties in breathing and coughing. The next stage is adaptation to the foreign body and lack of complaints. Late complications feature perforation and infection, tracheoesophageal or aorto-esophageal fistula. If there is suspicion of a foreign body in the gastrointestinal tract, an X-ray will easily display the presence of X-ray positive bodies. Infants with a manifested clinical picture will be referred for endoscopy. Depending on the type of foreign body and lack of clinical symptoms, a delaying strategy stretching over 8 – 16 hours could be considered, with the condition of nothing per os in readiness for an eventual general anaesthesia. In 25 – 30% of the cases the body will pass spontaneously into the stomach and will be evacuated in a natural way. There are publications featuring the evacuation of a foreign body from the esophagus with the use of a Foley catheter through the nose which, however, is still not an established practice for the lack of direct inspection of the nose for trauma and a frequently occurring epistaxis.

Electronic Batteries

Electronic batteries are often easily accessible at home and that is why they easily become foreign bodies in children's orifices. The specifics of electronic batteries as foreign bodies is that they can not only cause a mechanical trauma but are chemically active as well. When swallowed, even used and exhausted batteries will cause damage. On entering the water-rich body environment electrolysis takes place and a hydroxyl anion is discharged which causes corrosive burn of the tissues. When the hydroxyl anions enter the stomach, they are dissolved in the stomach fluids and their quantity is comparatively small. When the battery is stuck (as is often the case with the anatomic narrowings of the esophagus, the ear canal and the nostrils) and it cannot change its place in the course of several hours, a local corrosive damage takes place leading to serious complications like esophagus perforation, mediastinitis, tracheoesophageal and even aorto-esophageal fistulas and even exsanguination. Stuck electronic batteries in any part of the body are an indication for urgent endoscopy. Batteries with a diameter of over 20mm present are serious risk for blockages. Present-day lithium batteries are of comparatively big dimensions and are heavily charged. Intranasally stuck batteries could lead to perforation

of the septum, chondritis and burning of the mucosa. Batteries in the ear canal will cause destruction or perforation of the tympanic membrane, necrosis of the outer ear canal, hearing malfunctioning, destruction of ear bones, facial nerve paresis etc[9].

The latest recommendations for dealing with batteries as foreign bodies in the body are for an X-ray localization the foreign body without delay. In the case of a battery in the esophagus, urgent endoscopy for the removal of the foreign body should be conducted. If the battery is in the infant's stomach and they are displaying symptoms, urgent removal of the forein body is required. There are categorical characteristic X-ray features that help differentiate between a battery and a coin of similar dimensions.

A battery in an infant's nose or ear canal is an indication for an urgent consultation with an otolaryngologist and subsequent removal of the foreign body in the next few hours.

Magnets

Over the past few years small magnets in the form of puzzle pieces, anti-stress devices for adults, piercing jewels etc. have often ended up as foreign bodies, children's noses or gastrointestinal tracts. Such magnets are usually made of metals with a strong level of magnetism. Their dimensions are often below 10 mm. When two or more magnets enter the human body they exercise magnetic attraction between the poles and that causes some tissue to get stuck in between leading to the subsequent damage of the tissue. A good example would be the presence of two magnets in the small intestine where due to their reaction the intestinal walls will be compromised and decubitus, necrosis, perforation, peritonitis and volvulus may ensue. That explains the morbidity and mortality of that kind of trauma. Rare metals are used for jewels for nose piercing. When two magnets are positioned opposite each other on the nostril that can cause compression and decubitus. Such jewels can easily be swallowed as well which poses further dangers[10,11].

X-ray graphy helps with localising the magnets as well as determining their number. If there is only one magnet, there is no danger but two or more of them call for immediate intervention, endoscopy – with localisation in the stomach and surgery when they have moved into the small intestines. A good number of publications have presented similar cases in which serious surgery was performed but there was a high level of morbidity and mortality.

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