REVIEW ARTICLE

Foreign body ingestion in a pediatric patient: Report of case and review of ingestion\aspiration incident management

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Abstract
Foreign body, if struck in trachea during ingestion, is a life-threatening emergency situation. Sometimes these aspirated objects stick into larynx causing airway obstruction. Many dental objects have been reported to be ingested such as dental bridges and files. Precautionary measures have to be taken to avoid ingestion or aspiration of foreign bodies especially in children, which are used during dental procedures. The aim of this paper is to describe the accidental ingestion of orthodontic band material used for space maintainer and to draw attention about accidental foreign body ingestion/aspiration and its management.

Keywords
Band material, foreign body, management, pediatric patient

Introduction
During any dental procedure, aspiration or ingestion of foreign objects can accidently occurs causing an emergency, which may lead to life-threatening condition and cause pneumonia, damage to the digestive tract, mediastinitis peritonitis or sepsis. In some situations, it may be necessary to intervene in surgical procedure to remove these objects. Dentists should be alert to know the signs and symptoms of airway obstructions especially in case of aspirations and should be able to do immediate and appropriate treatment till they get emergency support.[1] Some of the risk factors for impairment of swallow reflex, neurological dysfunction, unconsciousness, aging, alcohol may increase the chances of foreign object aspiration in adults.[2] Special children who are mentally and physically disabled are at the higher risk of foreign body ingestion and aspiration.[1]

Incidence
Foreign body aspiration is rare in adults. Under the age of 15 years, it is seen around 18% of the cases. Approximately 500-2000 deaths occur each year from the foreign object in united states.[2] Studies suggest incidence to be around 0.004% of all accidental ingestion or aspiration of foreign objects, and ingestion is common than aspiration.[1,4] Common aspirated objects are the food items. Dental appliances are also documented after dental procedures. Around 27% of dental bridges have been reported to be aspirated.[2] Children who are been reported are of around 80% below 3 years. Orthodontic appliances or components loose dentures are the second most commonly ingested objects in adults.[5] Cast or prefabricated restorations, which are to be cemented have a higher chance of aspiration (Kurkciyan et al., 1996). Ingestion of foreign objects was observed during root canal treatment around 0.12 per 100000, whereas endodontic instrument ingestion was around 0.001 per 100000. Orthodontic appliances are less commonly aspirated but not less varied in types of involved appliances.[6] According to gross man, 13% of them are aspirated into respiratory tract 87% of foreign objects into the alimentary tract. Around 10-20% of the foreign object were non-surgically intervened and 1% required surgery were reported by Webb (1988).[7]

Types of dental objects commonly aspirated
Dental objects used during dental procedure and surgical procedures which are routinely used in the oral cavity can be swallowed and aspirated. These can range from teeth, instruments, the clamp of the rubber dam restorative materials, gauze packs,
and impression materials.\textsuperscript{[8]} Fixed prosthodontic appliances are the most common to ingest followed by orthodontic appliances among all dental specialties.\textsuperscript{[9]} An object that were ingested is lower spring retainer, fractured twin block appliances, expansion keys, a fragment of maxillary removable appliances, retainer, transpalatal arch, and pieces of archwire. Accidental ingestion of quad helix has been reported with boy affected by downs syndrome, which was surgically removed.\textsuperscript{[10]}

Management and prevention

Foreign bodies if not diagnosed may lead to unresolved pneumonia bronchiectasis, and lung abscess. In some of the instances, granulation tissue may be formed around the foreign body and resemble bronchogenic carcinoma.\textsuperscript{[2]} Ingestion or inhalation of materials and appliances poses a problem in dentistry and orthodontics in particular. Securing the orthodontic appliances during the procedure will prevent the risk of ingestion or inhalation during all procedures. All the necessary precautions have to be taken during dental procedures thus minimizing such incidents.\textsuperscript{[11]} Many methods have been suggested for prevention of aspiration or inhalation of the foreign objects. During endodontic therapy rubber dam placement is most advised as it prevents the inhalation and aspiration and also leave a stress free environment, which provides complete infection control.\textsuperscript{[11]} Some of the other methods where a rubber dam cannot be placed, throat packs, and retaining ligatures can also be advocated.\textsuperscript{[1]} A dental floss can also be glued to fixed restorations or posts and cores are the simple and cost effective methods to avoid accidental slippage into the oral cavity.\textsuperscript{[12,13]}

Identifying the location of a foreign object either inhaled or aspirated helps in treatment planning and referral of the patient. Any signs and symptoms have to be closely monitored till it is excreted or removed. An ingested endodontic file is easily pass out atraumatically and asymptotically within a period of 3 days.\textsuperscript{[14]} During adjustment of any orthodontic appliances and cutting the distal end a gauze can be used as successful barrier.\textsuperscript{[15]} Components of the removable appliances such as cribs springs, stops, finger spring should be smooth, and rounded as far as possible.\textsuperscript{[10]} Availability of high suction with pharyngeal tip help in quick retrieval of a piece of any appliances or appliance, if accidentally dropped in the oral.\textsuperscript{[6]}

Swallowed object can be tracked, localized with the help of an x-ray and also it helps to know the progression and confirms the passage of swallowed objects.\textsuperscript{[15,16]} Effective and safe mode of management of swallowed objects can be done with an endoscope. If the object cannot be removed with endoscopy, surgery has to be planned either open or with laparoscopic technique. Laxative use is not proven, and there may be increased the chance of perforation.\textsuperscript{[6]} Removal of ingested objects depends on location and type of foreign body.\textsuperscript{[16]} Most of the time, these objects are evacuated without complications.\textsuperscript{[17]} Sharp foreign objects can be dangerous resulting in abscess, fistulas, peritonitis, appendicitis or septicemia, if it fails to pass through curves of the gastrointestinal tract and get lodged in stomach colon or cecum.\textsuperscript{[17]} Always an attempt to remove these objects should be made before it reaches the small intestine.\textsuperscript{[18]} Monitoring of the object through radiograph is advised throughout its progression, same time high fiber rich diet is useful, however, specific diet is not been evident for object passage.\textsuperscript{[7]}

Case Report

An 8-year-old boy visited our institute with a chief complaint of pain in upper right back tooth. On intra oral examination maxillary upper right first primary molar had occlusal caries, involving pulp. As most of the tooth structure was lost and inter radicular radiolucency was present. Treatment planned was extraction followed by placement of band and loop space maintainer. Tooth was extracted and after 3 days patient reported back for band adaptation. As preformed band was not suitable for the patient custom made band was planned. Band material was made into a loop and placed on the tooth. While adjusting patient moved his head suddenly due to which band slipped into patient mouth and he swallowed. Patient did not had any signs of aspiration like cough reflex or difficulty in breathing suggesting ingestion of band. Patient was immediately taken to medical college emergency to locate the band and for monitoring of patient. Chest radiograph and abdominal radiograph were taken to rule out the position of the band. Band material was located in an abdominal radiograph and it was in the stomach [Figure 1]. Patient was advised for follow-up instead of surgery to remove the band. Patient was kept under observation till band was excreted out. Patient was monitored for discomfort like stomach pain or vomiting. Radiograph was repeated 2\textsuperscript{nd} and 3\textsuperscript{rd} day. Third day abdominal radiograph showed no band, suggesting excretion of band material [Figure 2].

Discussion

When a foreign body passes into the gastrointestinal tract, clinical symptoms, and signs should be monitored closely until
it is excreted or removed. There may be complications such as intestinal obstruction, perforation with subsequent abscess formation, hemorrhage, fistulas or failure of the objects to progress through the gastrointestinal tract. Gastric erosion and perforation of the esophagus caused by ingestion of dental foreign objects have also been reported. In our patient, no such complications were observed after ingestion of band. There is a greater than 90% chance that it will pass through the gastrointestinal tract as a result of peristaltic movement without complications, usually after a 7-10 days period. Thus, the case was followed up and continues radiographs were taken. As a precaution, it is recommended that swallowed foreign objects be assessed by serial radiography until egested. If patients develop symptoms of perforation such as pain or vomiting, tenderness or abdominal guarding, and if objects remain lodged longer than 2 weeks, surgical intervention is required. As in our case, since patient did not show any symptoms and complication we waited for 2 days. After 2 days radiograph revealed egestion of band without any complication.

Conclusion

For foreign body ingestion, clinical signs, and symptoms are to be monitored closely till it passed through gastrointestinal tract and excreted out or removed. One of the ways to manage the ingestion of foreign body is to advice laxative and the wait and watch. Heimlich maneuver, abdominal or chest thrusts in pregnant or obese patients, and finger sweeps; when the object is located in the oral cavity in unconscious adults. Small foreign objects can be pulled with Foley's catheter and those in esophagus be removed with endoscopy. The patient can be made aware of the possibility of dental object droppings and instruct them to spit out any dropped objects.

References
