Accidental Ingestion of a Foreign Body in Orthodontics

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ABSTRACT

Accidental ingestion of the foreign body can occur during any orthodontic procedure. The majority of these episodes pass uneventfully but some have the potential of causing serious complications like peritonitis, perforation, abscess and even death. The case report of a young boy who ingested expansion key used to give turn to fixed maxillary expansion appliance is presented. This case report describes the management of such unfortunate accidents.

Keywords: Foreign body ingestion, Medical emergency, Expansion key.

INTRODUCTION

Accidental ingestion of the foreign body is a common clinical problem encountered during the dental treatment including orthodontics. Although it is a potentially avoidable risk yet there are many instances of accidental ingestion especially in children. Dentures and small orthodontic appliances account for the majority of accidental ingestion in the normal adults. Among the orthodontic appliances, those reported to have been swallowed includes a lower spring retainer, fragment of the maxillary removable appliances, a piece of archwire, a transpalatal arch, quad helix appliance, expansion key and fragment of twin block.

Accidental ingestion is more likely to occur in the mentally retarded individuals, patients who are nervous or restless, patient with excessive gag reflex, psychotics, prisoners and alcoholics. In addition, patients with difficult access sites secondary to anatomical restrictions (e.g. small oral cavity, short palate, macroglossia, large neck) and, patients with an increased intra-abdominal pressure, as in overweight and pregnant women are at increased risk of ingestion.

Majority of the episodes of the foreign body ingestion tend to pass uneventfully, but there may be complications like peritonitis, perforation and abscess formation. Although no deaths have been reported in the literature from ingestion of the orthodontic appliances, yet surgical intervention in the form of laparotomy and thoracotomy have been necessitated for the removable of quad helix and the fragment of fractured removable appliance respectively.

The morbidity and mortality risk associated with the complications of the accidental ingestion per se and of surgical procedures required in their management warrants that every orthodontist should have an adequate knowledge and the competence in handling such an unfortunate incident.

The aim of this article is to present a case where a patient accidentally ingested an expansion key and discuss in detail the management of such unfortunate accidents.

CASE REPORT

A 10 years old male patient reported to our clinic with a complaint of irregular teeth. He had Angle’s Class I malocclusion with crowded and narrow maxillary arch. The treatment plan consisted of the rapid maxillary expansion followed by the fixed mechanotherapy. Hyrax type of fixed expander was used to expand the maxillary arch. The parents of the patient were instructed to give one turn to the appliance in the morning as well as in the evening. They were duly instructed in using expansion keys properly and safely using safety device attached to their fingers. The patient’s parents started turning the screw properly. After giving turns for 3 days patient’s mother became overconfident in using the expansion key and started giving turns without the safety device attached to her fingers. On the fourth day she lost the expansion key in patient’s mouth while giving turns to hyrax. She panicked and could not retrieve the key from the mouth of the patient.

In the meantime patient started feeling discomfort in his throat. He was then taken to emergency department of a nearby hospital. At the time of the presentation in the hospital (approximately 2 hours after the episode), patient was asymptomatic but quite nervous. The attending physician immediately asked for the radiographs of the chest and the abdomen. The chest radiograph (Fig. 1) was clear but X-ray...
abdomen showed the object to be lying in the stomach (Fig. 2). Option of endoscopic removal was considered but since the patient was asymptomatic a conservative approach was preferred and it was decided to monitor the object by serial radiographs. He was reassured and sent home with special instructions for monitoring of stools for passing out of expansion key. Repeat radiograph taken after 8 hours showed that the key has progressed toward the first part of duodenum (Fig. 3). As the key was progressing in gastrointestinal tract (GIT) it was decided to again repeat radiographs the next day. On the following morning the abdominal radiograph showed that expansion key had progressed toward the rectum (Fig. 4). The same evening, approximately after 46 hours of ingestion, the patient noted the key to have passed out with the stools. X-ray abdomen was repeated to confirm and it was found to be clear.

**DISCUSSION**

An adverse outcome resulting from the aspiration or ingestion of foreign bodies can occur in any dental procedures including orthodontic treatment. Fatal outcomes from such an unfortunate incidences are low but the potential morbidity associated with even a single incidence is too high to ignore.

The introduction of sit-down, four-handed dentistry in which the patient is placed in a supine or semisupine position during the treatment increases the possibility of this occurrence. Should an object be lost in mouth a careful examination of the oral cavity should be performed as it might be lodged in the retentive areas inside the oral cavity like supratonsillar recess, epiglottic vallecula and the piriform recess. The patient’s head should be tilted to one side, so that this object falls on the cheek rather than going toward oropharynx or patient’s head could be turned down. The objects lodged in the mouth can be removed with high speed suction, forceps, tweezers and finger sweeps. If the foreign body cannot
be located the next step is to place the patient in reverse trendelenburg position (upper part of the body is raised 20° to 30°) and asked to cough, trying to regurgitate the object. The main objective is to maintain the patency of the airway. If there are signs of airway obstruction like choking, labored breathing and use of accessory musculature to aid respiration then noninvasive procedures like back blows, Heimlich maneuver and abdominal or chest thrust (in pregnant or obese patients) should be tried. If this is not successful then the patient should be transferred immediately to the emergency meanwhile cardiopulmonary resuscitation is carried out including cricoidotomy if necessary. However, such procedures require high level of training. If the patient is asymptomatic he should be informed, reassured and immediately sent for medical consultation.

Fortunately, chances are that any object lost in the mouth will be ingested or will be coughed out due to strong coughing reflex, so that actual incidence of acute airway obstruction is quite low. The management of an ingested foreign body is determined by the size, shape and location of the object. Small and blunt objects, such as the brackets may pass through GIT completely and uneventfully usually over a 7 to 10 days period. Large or sharp objects such as quad helix, fractured large removable appliance can become impacted and cause complications. The foreign body impaction usually occurs at sites of anatomical or physiological narrowing such as the lower esophageal sphincter, ileocecal valve or in areas of stricture formation. Patient with previous history of gastrointestinal surgery or congenital gut malformation are at increased risk of perforation which usually occurs at lower esophagus and the terminal ileum. If the object has passed into the stomach and is less than 6 cm in length and 2 cm in diameter, there is a 90% chance of the spontaneous passage through the pylorus and ileocecal valve.

The main presenting symptoms are the difficulty in swallowing, acute onset of pain, dysphagia, choking and excessive salivation. However, the patient may be asymptomatic.

It is very important to first localize the position of this object. Radiopaque foreign bodies are the most commonly identified with plain radiographs which include lateral neck plain radiographs and posteroanterior view of oropharynx, neck, chest and the abdomen. For nonopaque objects indirect findings such as larynx and tracheal deviation, as well as computerized tomography, can aid in the diagnosis. Contrast studies are not routinely indicated owing to the risk of aspiration. Upper and lower GIT endoscopy can be used diagnostically or therapeutically.

The majority of the foreign bodies that cause obstruction lodge in the upper esophagus. This can lead to esophageal perforation with secondary mediastinitis and esophageal obstruction with the risk of aspiration. The swallowed foreign bodies retained in the esophagus should be removed urgently using endoscopes. If this fails then clinical follow-up with serial abdominal radiographs should be obtained. If the position of the object does not change, surgical intervention has to be considered.

Once the foreign body has reached the stomach, there is greater than 90% chance of the object being passed from the GIT without problems. When the object leaves the stomach, in most cases, it will pass through the small bowel. The most common subsequent site of perforation or obstruction is the ileocecal valve. Removal can be attempted colonoscopically. Small, smooth objects and all the objects that have passed the duodenal sweep should be managed conservatively by the radiographic surveillance and the inspection of stools. Sometimes high bulk diet is given to the patient, however, there is no scientific evidence of the benefit of any special diet to support such objects passage. Purgatives should be avoided because they increase the effect of the peristaltic contractions and thus make intestinal perforation more likely. Endoscopic or surgical intervention is indicated if significant symptoms develop or if the object fails to progress through the GIT.

On the other hand localization of the foreign objects in the respiratory system warrants an emergency action as the studies have shown that a delayed removal beyond 24 hours may be associated with an increased morbidity and a longer hospital stay. The complication of the foreign body inhalation includes dyspnea, asphyxia, perforation, laryngeal edema, cardiac arrest and death. Bronchoscopy is used to retrieve aspirated foreign body failing which a thoracotomy is required.

The unfortunate accidents involving the foreign body inhalation or ingestion can occur during any orthodontic procedures starting from the impression taking to the appliance placement. Adequate precautions as reported in the literature must always be taken without an exception. Expansion keys should always be used with safety device or thread like device attached to operators hand so that it may not slip in the mouth and can be recovered safely if it is lost in oral cavity (Fig. 5). Orthodontist must be capable of the diagnosis and trained in the management of the medical emergencies.
risk of medical emergencies and their complications in certain groups again emphasizes the need for detailed history taking which orthodontist often tend to skip. Orthodontists like any other health professionals must learn and continuously update their knowledge regarding the management of medical emergencies.

CONCLUSION

Medical emergencies may happen during any orthodontic procedure but what is important are the precautions taken and the preparedness on the part of orthodontists in managing these episodes. Should such an unfortunate accident happen, orthodontist must be capable of providing basic life support measures. Any foreign object suspected of being ingested or inhaled should be localized radiographically and the decision to manage it conservatively or surgically must be taken on the basis of its size, shape, nature and location.

REFERENCES