Emergency situations of ingestion of orthodontic appliances or aspiration in Dentistry: A Review

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Abstract

Among various emergencies in the dental clinical setting, foreign body aspiration or ingestion can be one of the serious emergencies. Ingestion or aspiration of dental materials, smaller appliances or instruments comes in this category. Even though scanty literature is available on orthodontic appliances ingestion or aspiration, now a days foreign body ingestion or aspiration episodes are recognized as potential complications. This article reviews the complications, management and prevention of aspiration or ingestion of foreign bodies of orthodontic origin.

It is evident from the literature that the dentists must be able to manage the emergency situations of this foreign body ingestion or aspiration of orthodontic origin, as it can happen with anyone.

Keywords: Aspiration, foreign body ingestion, orthodontic appliances

Cite this article as:

Source of Support: Nil, Conflict of Interest: None declared
Introduction
Accidental aspiration or ingestion of orthodontic appliances is a serious emergency situation, especially in case of young children. In adults, it occurs accidentally, more commonly among those with mental retardation, psychiatric disorder, use of local anesthesia, and altered consciousness associated with intravenous sedation. Swallowing of dental materials and devices may lead to serious complication during dental treatment. Any object can be aspirated or ingested which are routinely placed into or removed from the oral cavity during dental or surgical procedures [1-3]. These items may include teeth (artificial), crowns, removable dentures, bands, files, reamers, restorations, restorative materials, instruments, implant parts, rubber dam clamps, gauze packs and impression materials [4-6].

In most of the cases, the foreign bodies that reach the gastrointestinal tract pass spontaneously. But, 10–20% of cases require nonsurgical intervention, while 1% or less may require surgery. Patients swallowing foreign bodies are usually asymptomatic but symptoms may arise later. Foreign body aspiration or ingestion may cause damage to gastric mucosa, intestinal perforations, septic abscess, partial or complete airway obstruction, respiratory distress, post obstructive pneumonia, pneumothorax or hemorrhage. If these cases are not managed properly and timely intervention is not carried out, it can be lethal [1, 5,7].

Hence, it is very much required that general dental practitioners should be aware of a protocol of management and prevention of swallowing or aspiration of dental objects.

Foreign body aspiration or ingestion of orthodontic origin
As the orthodontic components are usually small, and in combination with saliva, the handling of such appliances can sometimes be difficult. Also risk increases with the patients in supine or semi-recumbent position. The patient may also be prone if components become detached or fractured during service [8].

Apart from the physical strain involved, such events are also a source of emotional distress to patients and their families. Accidental ingestion or aspiration of orthodontic appliances or their component parts can create problems, especially if they obstruct the airway or gastrointestinal tract [9].

Reported incidence in the literature
Foreign body aspiration is an acute emergency situation and it occurs more frequent in children than adults [2,3,5]. Retrospective and longitudinal studies of accidental ingestion and aspiration in large populations have reported that its incidence is around 3.6% to 27.7%, and that ingestion is more common than aspiration [5]. Among all dental specialties, fixed prosthodontic therapy had the highest incidence of adverse outcomes followed by orthodontic treatment [9,10].

In a study by obinata et al, two cases of orthodontic appliances ingestion were found out of 23 cases studied [10], while, study by susini and camps, eight cases of
orthodontic bracket ingestion were detected [11].

**Types of appliances ingested or aspirated in orthodontics**

Although the actual incidence of this complication in orthodontics is speculative, there is considerable variation as to the types of appliances involved. The reported objects include a lower spring retainer, fractured twin block appliance, expansion keys, fragment of maxillary removable appliance, retainer, transpalatal arch, and pieces of archwire [9,12]. Orthodontic wires may break in two situations. First, when the patient is sitting on the dental chair and orthodontist is cutting the end of a newly placed arch wire [13].

**Sites of foreign body lodgement of orthodontic origin**

**Along the gastrointestinal tract (ingestion)**

The majority of foreign bodies entering the oropharynx will pass through the alimentary canal uneventfully. Although complications are higher with sharp components, reported rates of gastrointestinal perforation are very less [9]. The most common sites for perforation are the ileocecal junction and the sigmoid colon. The symptoms vary among abdominal pain, fever, nausea, vomiting, and abdominal distension and diagnosis can be difficult. The usual time taken for a foreign body to traverse the intestinal tract is 2 to 12 days [14].

**Along the respiratory tract (aspiration)**

Despite being less common than ingestion, aspirated foreign bodies are emergency situations. The presenting symptoms are dependent on the site where the object becomes impacted. If it gets trapped above the level of the vocal cords, acute respiratory distress can result. Smaller objects tend to pass through the vocal cords and do not cause upper airway obstruction. The most common symptoms of laryngo-tracheal foreign bodies are dyspnea, cough, and stridor; while bronchial foreign bodies are associated with cough, decreased air entry, dyspnea, and wheezing. Inability to talk and coughing forcefully with the patient’s hands clutched to the throat may be the earliest sign of choking [9, 13].

**Investigations**

History, physical examination and various types of radiographs are essential to aid in the detection of aspiration or ingestion of foreign body, its shape, composition and confirmation of diagnosis [2,12].

**Prevention**

Various methods can be employed to avoid the ingestion of foreign bodies. Some of them are

1. Use of rubber dams during routine orthodontic treatment [9].
2. Gauze throat screens can be used while bonding palatal attachments [9].
3. Floss may be tied to the molar tube to aid in quick retrieval [12].
4. Wax may be used to temporarily stabilize auxiliaries, such as coil springs on the arch wire [12,13].
5. Practitioners can make patients aware of the possibility of dental objects dropping in such cases, and instruct them to spit out any dropped objects [5].
6. Use of acrylic colors other than pink has been advised to avoid
problems in visualizing on bronchoscopy or endoscopy [12].

7. Patients should always be advised to avoid reinserting damaged, ill-fitting, or broken fragments of any appliance [12].

8. Keys for turning rapid maxillary expanders should be attached to the floss when used intraorally. A key attached to a plastic spatula is now available and is a preferable alternative [12].

9. The cut pieces can be prevented from becoming displaced in the mouth or embedded in the soft tissues by placing a cotton roll over the end of the arch wire before it is cut [12].

10. During impression-taking procedures, proper precautions such as selecting the proper size of trays, proper positioning of the patient, and accurate measurement of the impression material will prevent the accidental swallowing of the materials. The patient should be advised to breathe through the nose rather than the open mouth [12].

11. The use of a radio-opaque acrylic has been recommended for use in dental appliances. Radiolucent acrylics makes it difficult to locate swallowed appliances by using normal radiographic techniques [8,12].

Management
Positive history of orthodontic foreign body aspiration or ingestion should be taken seriously, if it occurs outside the confines of the clinic. However, in case of children a negative history with missing orthodontic appliance fragments or components should be noted [9,10].

Noninvasive procedures
For managing airway obstruction include back blows in infants, the 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 [11,14]. If a piece of appliance is accidentally swallowed, high-volume suction with a pharyngeal tip can help in quick retrieval [12]. Clinical retrieval done when the object is dropped into the mouth of a supine patient, the head may be turned to one side to encourage the object to fall into the cheek rather than the oropharynx [8,9,13]. Observation is generally indicated for asymptomatic patients with a positive history of non-threatening foreign body ingestion over periods of less than 24 hours and without any respiratory symptoms. A chest radiograph, although not mandatory, is recommended. Occasionally, patients are advised to supplement their diet with a large amount of cellulose, which theoretically could aid the passage of the object through the gut [9,10].

Invasive or surgical intervention:
It is advised for the symptomatic patients of foreign body aspiration or ingestion [9].

Conclusion
As in some cases, ingestion of orthodontic appliances or aspiration are the life threatening situations, it is important for the practitioners to know about the symptoms, prevention and management of the foreign body aspiration or ingestion of orthodontic origin as it can happen in day to day practice.
References