ACCIDENTAL INGESTION OF AN ENDODONTIC FILE: A CASE REPORT AND CLINICAL REVIEW

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ABSTRACT

Foreign body ingestion or aspiration during dental procedure is a rare but serious mishap. Ingestion of blunt foreign objects is less hazardous, and the object is generally egested through the gastrointestinal tract uneventfully, but sharp objects like endodontic files may sometimes cause intestinal perforation. Safety during dental treatment of children cannot be overemphasized. The present paper reports a case of accidental ingestion of a file during pulpectomy and the retrieval by endoscopy. This article also discusses the management of such an untoward event.

KEYWORDS: Accidental ingestion, Endoscopy, Foreign body, Rubber dam.
http://dx.doi.org/10.19177/jrd.v7e4201966-65

INTRODUCTION

Foreign body ingestion or aspiration is a rare but serious endodontic mishap. Any object routinely placed into or removed from the oral cavity during dental or surgical procedures can be aspirated or swallowed. These items can include teeth, restorations, restorative materials, instruments, implant parts, rubber dam clamps, gauze packs, and impression materials.[2-3] Grossman reported that such iatrogenic errors occurred most frequently when treating posterior mandibular teeth.[4]

Ingestion of blunt foreign objects is less hazardous, and the object is generally egested through the gastrointestinal tract uneventfully, but sharp objects like endodontic files may sometimes cause intestinal perforation. Although complications are higher with sharp implements, reported rates of gastrointestinal perforation remain rare at less than 1%.[5] There are at present no clear guidelines whether foreign body ingestion in the gastrointestinal tract should be managed conservatively, endoscopically or surgically.[5-6] Foreign body ingestion may cause damage to gastric mucosa, septic abscess, intestinal perforations, partial or complete airway obstruction, post obstructive pneumonia, respiratory distress, pneumothorax or haemorrhage. Endodontic mishaps should be managed with timely and efficient intervention. Therefore, general dental practitioners should be aware of the prevention and management of such situations.[7]

This paper discusses a case of accidental ingestion of a K file in an uncooperative child during pulpectomy and its subsequent removal endoscopically & the measures that can be taken in routine dental practice to prevent such accidents.

CASE REPORT

A three-year-old healthy patient reported to the Department of Paediatric and Preventive Dentistry, Bangalore

Institute of Dental Sciences with a chief complaint of pain in the left and right lower back tooth region. Based on clinical and radiological evidence it was diagnosed as dental caries with furcal abscess in relation to right mandibular first and second molars and left mandibular second molar. Pulp therapy was planned and parental consent was obtained.

Even though behaviour management techniques like tell show do and euphemisms were implemented, patient remained uncooperative and apprehensive. Rubber dam isolation was attempted but owing to amount of tooth loss, the remaining fragile tooth structure and the presence of intraoral swelling, the clinician decided to proceed without rubber dam isolation. During the cleaning and shaping sudden unanticipated movement by the patient resulted in slippage of No. #25 K (21mm) file into the floor of the mouth. Before the clinician could retrieve it the using the finger sweep method, the child closed his mouth and swallowed the file. The clinician immediately made the patient sit upright and patted the back. However, both the procedures failed to retrieve the file.

FIGURE 1: CHECK X RAY OF NECK AND CHEST showing K file lodged in the throat

FIGURE 2: ERECT THORACIC- ABDOMINAL X RAY showing distal movement of file

The patient didn't show any signs of respiratory distress indicating the probability of the file being ingested rather than aspirated. Patient was rushed immediately to a nearby hospital. The plain anteroposterior x-rays of neck and chest taken immediately upon admission recorded that the file was initially lodged in the throat of the patient. As there were no attending surgeons or ENTs on call, the patient was referred to a multispeciality hospital. Considering the time lapse another erect anteroposterior thoracic-abdominal x-ray was made before discharge and distal movement of the file in the gastrointestinal tract was recorded (figure 1 and 2).The patient was admitted immediately on reaching the hospital and two treatment options were suggested: either to not intervene and wait for it to be expelled through the stool as the file was moving distally in the gastrointestinal tract or to retrieve the file endoscopically. Accordingly, the parents were informed about both the options and they opted for the endoscopy procedure.

The adequate time interval between the patient's last meal and the proposed endoscopy procedure was a favourable factor to facilitate the endoscopy procedure as gastric emptying had already taken place. Taking the age of the patient into consideration, the procedure was decided to be done under general anaesthesia. The potential complications of the procedure were explained to the parents and consent obtained. An analogical K file was provided to the gastroenterologist for the easy identification and analysis of the file to assist in easy and safe retrieval process.

Endoscopy showed the K file to be in the D2 segment of the duodenum, impacted in the mucosa making the removal of the file endoscopically the apt decision. It had pierced the mucosal folds tangentially and was embedded in the mucosa. Using rat tooth forceps, the

FIGURE 3: REMOVAL OF THE FILE ENOSCOPICALLY USING RAT TOOTH FORCEPS.

FIGURE 4 POSTOPERATIVE CHECK XRAY

FIGURE 5: POSTOPERATIVE INTRA ORAL

ingested endodontic file was grasped by the handle, gently pulling it out of the mucosal fold. (figure 3). The site of penetration was inspected for bleeding and perforation. The file was retrieved along with withdrawal of the endoscope, under full visualisation throughout the retrieval process.

Post endoscopy, erect x rays of the abdomen and chest were again taken to rule out bowel perforation. After confirmation, the patient was started on liquids followed by normal diet. The patient was discharged 24hours post procedure and prescribed an antibiotic course for three days and recalled for review (figure 4).

The patient reported back for the remaining dental treatments and extraction of lower left first molar and pulpectomy was done for lower right first and second primary molars and followed by placement of the stainless-steel crowns. Pulpectomy was done for the right lower second primary molar and crown and loop placed with respect to the primary lower first molar (figure 5).

DISCUSSION

The reports of ingestion or aspiration of burs, posts, tooth impression materials, implant screws, orthodontic brackets, and endodontic instruments are prolific in literature.[6-7] The reasons, however valid they may be, cannot mitigate the legal issues against the operator, simply because these mishaps are easily preventable. In addition to the morbidity that ensues and the psychological trauma it causes for the patients, it can be life-threatening too making prevention the first line of treatment.

Application of rubber dam is a prerequisite in endodontic therapy but often pretermitted while treating children due to various reasons. In the present case report the child was uncooperative (Frankl's behaviour negative) owing to which the operator chose to proceed without the application of rubber dam ensuring that the child was seated in upright position.[8] Yet another reason for the ingestion of the needle in this patient could be attributed to the anaesthetized tissues which caused the abolition of the gag reflex.[9] Lack of quick reflex could also be attributed to the age factor of the patient. In addition, contact with saliva makes the instruments slippery and difficult to handle, posing an increased risk for aspiration or ingestion.[9-10] The ergonomic position preferred by dentists being the supine or semi-recumbent position makes the patient more prone to aspiration or ingestion of foreign body.[11]

When an accidental event occurs, it is very important to remain calm and composed. The patient must be reassured, carefully evaluated and seated in an upright position. Asking the patient to cough forcefully, patting the child between the shoulder blades with the patient bending forward were performed as non-invasive procedures. If not resolved, Heimlich manoeuvre is performed.[12] In present case the non-invasive protocols, though implemented weren't successful.

Any signs of respiratory distress should be noted to ascertain if the foreign body is aspirated or ingested. Presence of these clinical symptoms and signs like pain, nausea and vomiting are indicators for the need for immediate evaluation and intervention.[12] If the patient is asymptomatic and comfortable, an expectant line of management may be safe, and time may be taken for planning further course of action. One must always remember that clinical signs and symptoms may occur late and all cases of accidental ingestion requires thorough clinical and radiological evaluation.[13] In the present case the patient did not have respiratory distress, but a mild gagging and a sensation of something stuck in his throat and had no signs of obstruction of oesophagus. Thus, it was construed that the needle was not aspirated but ingested.[9]

The ideal method to locate a swallowed object is by serial X-ray evaluation starting with an orthopantomogram followed by thoraco-abdominal X-rays. An X-ray helps to localize the site, show evidence of obstruction, onward progression and confirm passage of the swallowed object.[12]

Most (80–90%) swallowed objects usually pass through the gastrointestinal tract (GIT) and are expelled out per rectally without any need for intervention. Most clinicians recommend waiting for 48-72 hours after ingestion for foreign body expulsion. However, intervention may be required if the foreign body perforates or gets impacted within the GIT(about 1%) especially in the stomach and duodenum.[9,12] The risk of perforation or of impaction and also the recommended management depends on the (a) anatomic location, (b) size and (c) shape. A swallowed object impacted within the oesophagus requires prompt removal as the oesophagus lies in close proximity with the thoracic great vessels, pericardium, pleura and tracheo-bronchial passages.[13] However, if the object has passed beyond the oesophagus into the stomach, it has a 90% chance of successful distal progression and passage, usually over a 7–10 day period.[14] If an impacted foreign body is left alone, over time, it can cause perforation, fistulation or intestinal obstruction.[14] Mucosal oedema occurs at the site of impaction, with ischemic pressure necrosis of the bowel wall, subsequently leading to perforation of the bowel or fistulation into an adjacent structure. Impaction within the lumen of the appendix can cause appendicitis.[15]

If the foreign body that has passed into the stomach and is less than 6 cm in length and 2 cm in diameter, there is 90% chance of passage through pylorus and ileocaecal valve.[16] Objects of length greater than 5 cm can get impacted in the 2nd or 3rd part of the duodenum,[9] as they will not be able to traverse the duodenal curve. Rounded foreign bodies of diameter greater than 2.5 cm cannot pass through the pylorus of the stomach easily and hence can get impacted there.[15-16] A blunt foreign body needs to be removed if it gets impacted and stays in the same place for greater than 7 days.[9,16]

Endoscopic removal of foreign bodies is a safe and effective mode of management of swallowed objects.[15] Ideally, a trial run or a simulation should be attempted on a similar shaped object prior to the actual attempt on the patient. Hence, while referring a patient for further management, it is advisable to send a sample of the swallowed object along

with the patient so that the treating doctor will have an idea of the size, shape and contour of the swallowed object. Removal should always be under direct endoscopic vision, grasping the head of the swallowed object.[17]

RECOMMENDATIONS FOR PREVENTION AND MANAGEMENT OF ACCIDENTAL INSPIRATION OR ASPIRATION

- Use a rubber dam with flexible frames, which can facilitate radiographs during treatment without removal of frame.[13]
- Endodontic files can be tied with floss to prevent ingestion;[18]
- Use of electronic apex locators and rotary instrument can help preventing file ingestion; [4,18]
- Use high-velocity suction;[19]
- Work in a dry field;[18]
- Use a more upright position if possible.[10]
- Early location of an aspirated or ingested foreign body facilitates appropriate and timely treatment management and referral. [11]
- Non-invasive procedures for managing airway obstruction include back blows in infants, the Heimlich manoeuvre, abdominal or chest thrusts in pregnant or obese patients, and finger sweeps when the object is in the oral cavity.[20]
- Whenever a foreign body passes into the gastrointestinal tract, clinical symptoms and signs should be monitored closely until it is excreted or removed. Clinical follow ups with serial abdominal radiographs should be obtained.[11]
- Foreign bodies lodged in the esophagus should be removed endoscopically, but some small, blunt objects may be pulled out using a Foley catheter or pushed into the stomach using bougienage. [20]
- Once they are past the esophagus, large or sharp foreign bodies should be removed if reachable by endoscope. Endoscopic or surgical intervention is indicated if significant symptoms develop or if the object fails to progress through the gastrointestinal tract.[20]

REFERENCES

1. Dhandapani RG, Kumar S, O'Donnell ME, McNaboe T, Cranley B, Blake G. Dental root canal treatment complicated by foreign body ingestion: a case report. Cases J. 2009 Feb 3;2(1):117.
2. Yadav RK, Yadav HK, Chandra A, Yadav S, Verma P, Shakya VK, et al. Accidental aspiration/ingestion of foreign bodies in dentistry: A clinical and legal perspective. Natl J Maxillofac Surg. 2015 Jul-Dec; 6(2): 144–151.
3. Thakral A, Sen S, Singh VP, Ramakrishna N, Mandlik VB. Aspiration of an endodontic file. Med J Armed Forces India. 2015 Dec;71(Suppl 2):S509-11.
4. Grossman LI. Prevention in endodontic practice. J Am Dent Assoc. 1971 Feb;82(2):395-6.
5. Bondarde P, Naik A, Patil S, Shah PH. Accidental Ingestion and Uneventful Retrieval of an Endodontic File in a 4-Year-Old Child: A Case Report. J Int Oral Health. 2015;7(Suppl 2):74–76.
6. Bains R, Loomba K, Sinha S, Bains VK. Accidental swallowing of endodontic instrument: Could be a medical emergency. European J Gen Dent. 2014 Sep-Dec;3(3):202-204.
7. Susini G, Pommel L, Camps J. Accidental ingestion and aspiration of root canal instruments and other dental foreign bodies in a French population. Int Endod J. 2007 Aug;40(8):585-9.
8. Ahmad IA. Rubber dam usage for endodontic treatment: a review. Int Endod J. 2009 Nov;42(11):963-72.
9. Milton TM, Hearing SD, Ireland AJ. Ingested foreign bodies associated with orthodontic treatment: Report of three cases and review of ingestion/aspiration incident management. Br Dent J. 2001 Jun 9;190(11):592-6.
10. Tiwana KK, Morton T, Tiwana PS. Aspiration and ingestion in dental practice: A ten-year institutional review. J Am Dent Assoc. 2004 Sep;135(9):1287-91.
11. Kuo SC, Chen YL. Accidental swallowing of an endodontic file. Int Endod J. 2008 Jul;41(7):617-22.
12. Mohan R, Rao S, Benjamin M, Bhagavan RK. Accidental ingestion of a barbed wire broach and its endoscopic retrieval: Prevention better than cure. Indian J Dent Res. 2011 Nov-Dec;22(6):839-42.
13. Almuthhin M, Aljahdali A, Alzahrani M, Alhusain B, Algamdi Y. Accidental ingestion of the endodontic instrument: a case report. Eur J Case Rep Intern Med. 2017 Jul;1(3):148–151.
14. Chung YS, Chung YW, Moon SY, Yoon SM, Kim MJ, Kim KO, et al. Toothpick impaction with sigmoid colon pseudodiverticulum formation successfully treated with colonoscopy. World J Gastroenterol. 2008 Feb 14;14(6):948-50.
15. Thomsen LC, Appleton SS, Engstrom HI. Appendicitis induced by an endodontic file. Gen Dent. 1989 Jan-Feb;37(1):50-1.
16. Govila CP. Accidental swallowing of an endodontic instrument. A report of two cases. Oral Surg Oral Med Oral Pathol. 1979 Sep;48(3):269-71.
17. Henderson CT, Engel J, Schlesinger P. Foreign body ingestion; Review and suggested guidelines for management. Endoscopy. 1987 Mar;19(2):68-71.
18. Hill EE, Rubel B. A practical review of prevention and management

of ingested/aspirated dental items. Gen Dent. 2008 Nov-Dec;56(7):691-4.

19. Saraf HP, Nikhade PP, Chandak MG. Accidental Ingestion of Endodontic File: A Case Report. Case Rep Dent. 2012; 2012: 278134.

20. Ji Hyuk Lee. Foreign body ingestion in children. Clin Endosc. 2018 Mar; 51(2): 129–136.