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Case Reports

Abdominal pain in a child associated with dental amalgam ingestion

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Abstract We present the case of a child with abdominal cramping found to have radiopaque matter in his gastrointestinal tract on plain radiography. The parents denied ingestion of a foreign substance but specific questioning revealed a visit for dental care the previous day. This may serve to illustrate the benefits of taking a careful goal-directed history as opposed to the often recommended open-ended approach.

1. Introduction

One of the more common forms of pediatric injury is that associated with ingestion of toxic or potentially toxic substances. The crucial issue initially is whether the incident is a tracheal-bronchial aspiration or an esophagogastric ingestion. The former is associated with a choking hazard, whereas the latter is an ingestion or absorption risk.

Tracheal-bronchial foreign body aspiration in children has been reviewed in 155 cases by Burton et al [1]. They found that most cases (63%) occurred in the 1- to 2-year age group, with peanuts being the most common (34%) object, most often lodged in the left main stem bronchus in a child presenting with cough (54%).

Likewise, Rimell et al [2] evaluated 165 children who had undergone endoscopy for foreign body ingestion or aspiration. Most children (69%) were younger than 3 years, with the most common items removed from the airway being food (59%) and coins from the esophagus (57%) and with balloons being responsible for most fatal cases (29%).

Although coin ingestion is most common, most recommendations for serious metallic foreign body ingestion emanate from the experience with battery ingestion. Litovitz et al [3] described the first large series of 2382 cases of cylindrical and button battery ingestion, with 9.9% developing symptoms, most of which were minor. However, this ingestion can be dangerous, and often requires removal.

This case explained a possible relationship between an ingested metallic substance and a patient's symptoms of abdominal pain and cramping.

2. Case report

A 7-year-old patient presented with his mother stating that he had abdominal pain and cramping for 3 to 4 days. The pain was in the periumbilical region, "above my belly button," and was not associated with nausea, emesis, or diarrhea. He had begun to feel sick the previous day, had no fever, and was able to eat normally. The patient had no past medical history or pertinent social or family history.

The patient had a slight fever with a temperature of 100.7°F, a heart rate of 100 beats/min, and a respiratory rate of 20/min. The physical examination (including the abdo-

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Fig. 1 Radiograph of ingested dental amalgam.

men, which was nontender) and rectal examination (heme negative) essentially yielded normal results.

The laboratory data were also essentially unremarkable with complete blood count, electrolytes, and amylase within normal limits. However, an abdominal series demonstrated multiple small radiopaque objects located within the stomach (Fig. 1).

Repeat historical questioning about the possibility of foreign body ingestion or poisoning was again negative. A radiology consultation was again uncertain of the etiology of these radiopaque findings. The family was then questioned again concerning the possibility of ingestion, yet again with no likelihood stated.

On shift sign-out, the incoming emergency department physician then questioned the possibility of recent dental work. The family affirmed that indeed the patient had multiple teeth drilled and filled with dental analgesia when asked in a goal-directed fashion. He was then discharged without incident.

3. Discussion

Clearly in this case, this medical enigma was solved by a practitioner with many years of experience and by a goal-directed history taking fashion rather than by an open-ended inquiry. The patient suffered no obviously long-lasting sequelae and apparently presented with gastroenteritis accompanied by this occult ingestion presenting as the proverbial "red herring."

Survey data examining pediatric foreign body ingestion allow us to predict some trends. Dokler et al [4] examined 86 children with esophageal foreign bodies. Most children (65%) were younger than 3 years, with coins being the most common radiopaque foreign body (70/75) and meat the most common nonradiopaque foreign body (60/68) ingested and with x-ray evidence of edema in 13% of patients. Likewise, Papsin et al [5] reviewed 137 children, 18.2% of whom had airway or esophageal (81.7%) foreign bodies.

The most helpful diagnostic approach with suspected foreign body ingestion or aspiration is plain radiography. Rothrock et al's [6] report of x-ray detection of a major disease or those requiring procedural intervention in 354 children found a foreign body incidence of 17%. They found x-ray reliability of prediction high, with a 93% sensitivity and 40% specificity for the likelihood of a major disease. High-risk criteria for filming included previous abdominal surgery, foreign body ingestion, abdominal distention, peritoneal signs, and abnormal bowel sounds.

Mu et al [7] evaluated aspirated foreign bodies in children, localizing the object to the right main stem bronchus in 38%, left main stem bronchus in 25%, larynx in 12%, and 12% in the trachea. Interestingly, most (94%) of the foreign objects were organic and therefore not radiopaque.

The chest x-ray was positive in 67% of patients demonstrating obstructive emphysema (62%), mediastinal shift (55%), pneumonia (26%), atelectasis (18%), and a radiopaque foreign body incidence (3%). Timing was important, with 44% of cases diagnosed 24 hours after aspiration progressing to 60% in 1 to 3 days and 95% in 3 to 365 days after aspiration.

Silva et al [8] evaluated the efficacy of conventional radiology in foreign body diagnosis in 93 children who underwent both x-ray study and endoscopy. The symptom complex includes history of aspiration (88%), wheezing (82%), decreased breath sounds (51%), cough (42%), respiratory distress (18%), fever (17%), pneumonia (15%), and stridor (8%). The overall sensitivity and specificity of plain radiography were 73% and 45%, respectively, but improved to 83% and 50%, respectively, 24 hours after the event.

Perhaps the most successful noninvasive diagnostic approach may be computed tomography (CT). Lue et al [9] evaluated the diagnosis of fish bones lodged in the laryngeal area, a particularly difficult foreign body to locate. Clearly, spiral CT scanning was superior to plain films with a sensitivity of 90% compared with 39% for x-ray.

A logical progression of care finds that even with an initial plain x-ray negative for foreign body in 47%, fiberoptic bronchoscopy was successful in 91% of cases in localizing an occult tracheal-bronchial foreign body.

On the other hand, an esophagogastric foreign body is extremely well tolerated. Conners et al [10] evaluated 67 pediatric patients, finding only 1.5% on a single patient who developed symptoms requiring mechanical removal. Interestingly, there is a wide variety of clinical approaches to manage smooth blunt gastric foreign bodies in asymptomatic patients. Bendig et al [11] surveyed 609

patients in whom an 8-week observation period was suggested, which is recommended mostly by 50% of pediatric surgeons and 30% of pediatric gastroenterologists but least by only 16% of family practitioners and 13% of pediatricians.

This is a pervasive problem. Ingestion of a toxic substance is the most common cause of injury to children younger than 6 years [12]. Fortunately, an ingested agent has no adverse clinical effects. The x-ray appearance of a radiopaque substance in the gastric area often indicates a high-density compound. Items found include metals such as multivitamins with iron, which was the concern here, lithium (Li^{2+}), a psychotropic agent, or Pepto-Bismol (bismuth-subsalicylate).

There has been extensive recent discussion concerning amalgam or silver-colored fillings being possibly associated with Alzheimer's disease or autism [13]. However, at this point, no adverse effects caused by the mercury component of this alloy have been noted in the pediatric age group.

A proper evaluation protocol should begin with a goal-directed history taking of foreign body ingestion, higher suspicion for tracheal-bronchial aspiration than gastrointestinal ingestion, and beginning with a plain radiograph evaluation followed by CT and bronchoscopy or endoscopy if necessary.

4. Summary

Clearly in this case, the radiopaque foreign body ingested had minimal impact on the patient's symptoms but was isolated as the proverbial "red herring." However, remaining cognizant of the potential effect of occult foreign substance ingestion especially in a pediatric or obtunded patient is warranted.

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