Toothpick Perforation of the Intestines

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Toothpicks have been used since antiquity as instruments for mouth cleansing and as eating utensils. Toothpick injury to the gastrointestinal tract is often suspected only at the time of operation because patients rarely relate a history of swallowing toothpicks and most toothpicks are not radiopaque. The spectrum of toothpick injury to the gastrointestinal tract is illustrated by 5 patients who developed toothpick perforation of the gastrointestinal tract. Two patients died as a result of complications of toothpick injury, one of these presenting with recurrent gram negative sepsis with multiple organisms due to a duodenal-inferior vena caval toothpick fistula. In two instances the toothpicks were removed at operation and one that was penetrating the duodenum was removed with a fiberoptic duodenoscope.

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THE PRACTICE of daily mouth cleansing was not invented by modern man but has come down from antiquity. Refined foods, the modern toothbrush, and dental floss have all diminished man's reliance on a wooden splinter for the practice of oral hygiene, but the toothpick's place in history is secure. Toothpicks have been found in toilet sets discovered at Ur and dating from 2500 B.C.[1] Many different materials have been fashioned into toothpicks including bone, ivory, bird and porcupine quills, bronze and precious metals, osprey beak, and the woods of many different trees.[12] The modern, wooden toothpick offers advantages over other materials as it is gentle to the teeth, inexpensive, readily available, and disposable.

The swallowing of a foreign body is not usually associated with any untoward effects, and most items pass uneventfully through the gastrointestinal tract. Unfortunately, intestinal perforation is prone to occur with toothpicks because both ends are sharply pointed and their length creates difficulty in transversing the tortuous gastrointestinal passages. Toothpicks used for their primary purpose, mouth cleansing, are rarely swallowed. In most cases, the ingested toothpick has been used as an eating utensil or as a colorful decoration of food or drink.[3,10] The diagnosis of toothpick perforation of the gastrointestinal tract is rarely considered by either the patient or the physician as the patient does not relate the history of ingestion.[8] The radiologist is of little help in suggesting the diagnosis because the wooden toothpick is not radiopaque.

Toothpick perforation of the gastrointestinal tract is infrequently reported, but the consequences are often serious. In the past 3 years we have observed 5 cases. In no instance was the diagnosis considered prior to operation or death. The purpose of this paper is to report our experience with toothpick perforations and to direct attention towards this unusual and serious problem.

Case Reports

Case 1. A 51-year-old alcoholic Negro man was admitted to a local hospital in April, 1973, with complaints of cough, right sided chest pain, fever, chills, and epigastric cramping pain for two weeks. There was a diffuse infiltrate in the right lung; blood and sputum cultures grew *Proteus mirabilis*. Therapy with gentamicin, cephalothin, and steroids was begun, and he was transferred the Houston Veterans Administration Hospital (H.V.A.H.). Vital signs on admission were: temperature, 41°; pulse, 120/min; blood pressure, 130/70 mm Hg. He was confused, tachypneic, and icteric. The teeth were in good repair. Percussion and auscultation of the right chest revealed dullness and decreased breath sounds. The abdomen was distended and tympanitic but free of tenderness.

Laboratory evaluation included: hematocrit 32%, WBC count 24,300/cu mm with a left shift. Arterial blood gases were pH 7.58; Po_2 48 mm Hg; Pco_2 20 mm Hg. The total serum bilirubin was 4.3 mg/dl, direct fraction 1.5 mg/dl. The alkaline phosphatase was 150 IU/ml, SGOT 98 mu/ml; SGPT 116 mu/ml; LDH 390 mu/ml. The prothrombin

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time was 13 seconds (control 11.4 seconds). Sputum obtained by transtracheal aspiration grew *Pseudomomas* and *Proteus mirabilis*. Gentamicin and cephalothin were continued; bronchoscopy excluded tracheobronchial obstruction. Blood cultures grew *Klebsiella* and *gamma streptococci*. The patient remained febrile and expired on the 4th hospital day.

At postmortem examination, a fistula caused by a toothpick was found between the duodenum and inferior vena cava (Fig. 1). An infected thrombus was also noted on the surface of the inferior vena cava. There were multiple pulmonary emboli.

Case 2. A 40-year-old Caucasian man was admitted to the H.V.A.H. in September, 1974, with a two week history of right upper quadrant abdominal pain and watery diarrhea for one week. Alcohol intake was a six-pack of beer daily. Vital signs were: pulse, 118/min; blood pressure, 140/80 mm Hg; temperature, 38.3°. The examination was normal except that the teeth were in poor repair and the abdomen was distended with guarding and rebound tenderness. Laboratory evaluation included hematocrit 31% and WBC count 6,200/cu mm. The serum amylase, intravenous pyelogram and x-ray of the chest and abdomen were normal.

Abdominal exploration revealed widespread peritonitis and a toothpick protruding through the sigmoid colon about 15 cm above the peritoneal reflection. Resection of the perforated sigmoid colon and diverting colostomy were performed. The patient made an uncomplicated recovery.

Case 3. A 56-year-old Caucasian, alcoholic man entered H.V.A.H. in November, 1972, complaining of progressive dyspnea on exertion and anterior chest pains. He stated that he had been jaundiced for at least one year. Past medical history included rheumatic fever, myocardial infarction, congestive heart failure and mitral insufficiency.

Vital signs were: Pulse, 120/min and irregularly irregular, blood pressure, 115/70 mm Hg and temperature, 37.5°. He was jaundiced and in moderate respiratory distress. Ten teeth remained and were in poor repair. The jugular venous pressure was elevated; moist rales were heard in the lung bases. A S_3 gallop and a grade 3/6 murmur of mitral insufficiency were described. The abdomen was soft without tenderness. The liver edge extended 8 cm below the right costal margin. The spleen was not palpable and there was no ascites. Rectal examination suggested a mass on the left.

Laboratory data included hematocrit 41% and leukocyte count 8,300/cu mm. The urinalysis was normal except for the presence of bilirubin. The stool was positive for occult blood. Arterial blood gases were pH 7.30, Po_2 43 mm Hg, Pco_2 32 mm Hg. The serum amylase was 43 Somogyi units, the albumin 2.2 gm/dl, total protein 6.0 gm/dl, bilirubin 21 mg/dl with 6.2 mg/dl in the direct fraction, alkaline phosphatase 120 IU/ml, SGOT 85 mu/ml, SGPT 15 mu/ml, prothrombin time 14.4 seconds (control 12.4 seconds). An EKG revealed atrial fibrillation with a rapid ventricular response. A chest roentgenogram showed consolidation of the right upper lobe and cardiac enlargement. A sputum culture revealed Pneumococci. Blood cultures were negative.

Therapy with intravenous furosemide, digoxin, aqueous penicillin G, and oxygen was initiated. Signs of cardiac failure persisted and three days after admission the patient was noted to be lethargic, febrile, and confused. A liver-spleen scan was normal. There was a progressive rise in the serum creatinine and a prolongation of the prothrombin time. He expired 9 days after admission. At autopsy, a toothpick was found impacted near the rectosigmoid junction with bowel perforation and localized pelvic abscess. Pulmonary infarcts and pneumonia were present in the right upper lobe. The liver revealed chronic passive congestion with centrilobular atrophy.

Case 4. A 68-year-old Caucasian man was admitted to the H.V.A.H. in November, 1974, because of hemoptysis, fever, and chills for one week. He also complained of productive cough for 8 months and increasing shortness of breath. He denied the use of ethanol.

The vital signs were: temperature, 37.7°, pulse, 88/min, blood pressure, 110/80 mm Hg. He was alert and oriented and wore dentures. The breath sounds were decreased over the left upper lobe and wheezing was noted. The abdomen was diffusely tender with marked rebound. No bowel sounds were heard. Laboratory data revealed: hematocrit 35%, WBC count 15,200/cu mm with a left shift; the urinalysis, serum amylase, albumin, bilirubin, and SGOT were normal. The serum alkaline phosphatase was 126 IU/ml. Gram stain of sputum obtained by transtracheal aspiration showed many polymorphonuclear cells but no bacteria. A chest x-ray revealed a mass lesion in the left upper lobe with associated infiltrate. The blood gases were pH 7.45, Po_2 40 mm Hg, Pco_2 31 mm Hg.

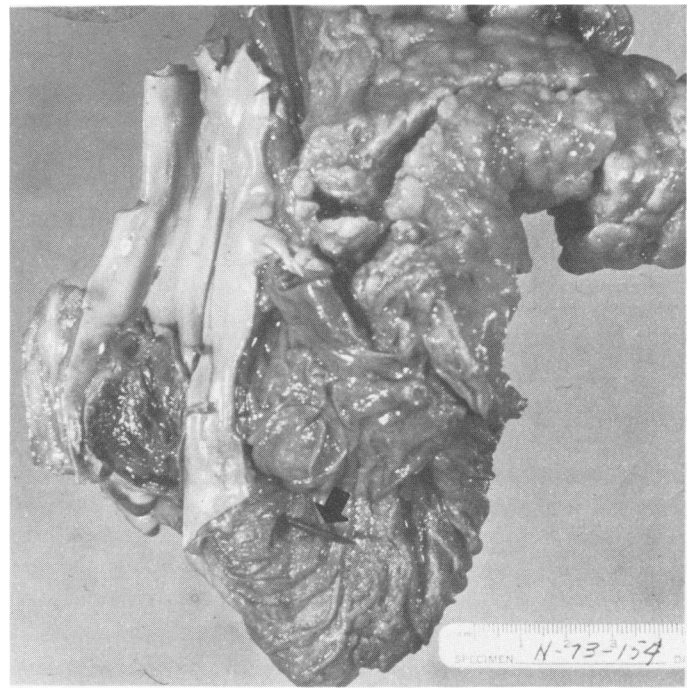

FIG. 1. Toothpick (arrow) in duodenum and penetrating into inferior vena cava.

At exploratory laparotomy a toothpick was found lying free within the peritoneal cavity. There was mild peritonitis without abscess. The bowel was searched, but no site of perforation was discovered. Postoperative recovery was complicated by arrhythmias and pulmonary insufficiency. Later evaluation led to the diagnosis of squamous cell carcinoma of the left lung.

Case 5. A 63-year-old alcoholic, Caucasian man was admitted to Ben Taub General Hospital in July, 1973, with complaints of painful dysphagia for two months, a 9 kg weight loss, and chronic, burning, epigastric and substernal pain. In 1963, he had a proximal gastrectomy for gastric ulcer disease. In 1966, he underwent a distal gastrectomy and gastroduodenostomy and a year later, a gastrojejunostomy. He admitted to drinking one pint of whiskey daily.

Vital signs were: blood pressure, 80/60 mm Hg, pulse, 90/min, temperature 38.8° He was noted to be cachetic and edentulous. Chest and heart examination were normal. The abdomen was soft with mild epigastric tenderness. The liver was palpable 4 cm below the right costal margin. Laboratory data included: hematocrit 38%, WBC count 16,200/cu mm with a left shift. The serum sodium was 128 mEq/L, K 3.6 mEq/l, Cl 87 mEq/L, and CO_2 26 mEq/L. The blood sugar was 95 mg/dl and BUN 27 mg/dl. The serum alkaline phosphatase was 42 IU, SGOT 25 mu/ml, and SGPT 12 mu/ml. A sputum culture grew *D. pneumoniae* and *E. coli*. Blood cultures drawn on the second hospital day grew Bacteroides.

A chest x-ray showed old rib fractures and a right apical fibronodular infiltrate. A barium swallow revealed a sliding hiatal hernia, subtotal gastrectomy, and a persistent barium fleck in the distal esophagus. A colon x-ray was normal.

Gastroscopy revealed esophagitis and a sharp angulation at the gastroesophageal junction but no obstruction was found. The gastric pouch was small and there were three openings into the small bowel. A toothpick was found in the duodenal loop protruding through the bowel wall. It was removed with the biopsy forceps. The patient was treated with antibiotics for 21 days and was discharged in good condition.

Discussion

The main complications associated with the presence of intestinal foreign bodies are obstruction, perforation, or bleeding. Most indigestable foreign bodies pass through the gastrointestinal tract without incident, although their progress may be temporarily arrested at areas of intestinal narrowing. Objects remaining in the stomach frequently remain asymptomatic whereas those whose progress is arrested in the esophagus or small intestine may cause symptoms of dysphagia or intestinal colic. Foreign objects may be ingested either purposefully or accidentally. Most objects that are swallowed intentionally are ingested by small children, mentally deranged persons, or people attempting to avoid unpleasant situations. An example of the latter case is a recent patient from whom we endoscopically removed a 10 cm straighted safety pin that he had swallowed in a successful attempt to convince Mexican authorities to release him from jail.

The factors reported as predisposing to the accidental swallowing of foreign bodies include carelessness, rapid bolting of food, and decreased sensitivity of the palatal surface, i.e., dentures, ingestion of very cold liquids, or excessive ethanol use.[8,9,13] Alcoholism in 4 of our patients and the presence of dentures in one probably played a significant role in the accidental swallowing of the toothpick.

Toothpick injury to the gastrointestinal tract is often associated with considerable morbidity and mortality. Two of our 5 patients died as a result of complications of toothpick injury; two required emergency surgery. In only one instance could surgery be avoided, but prolonged hospitalization was required. The varied clinical presentation of toothpick intestinal injury includes generalized or localized peritonitis, intra-abdominal abscess, intestinal obstruction, or minor or massive hemorrhage.[8] There are no significant physical findings or laboratory studies which are of help in the diagnosis. Free air is rarely demonstrable on the abdominal roentgenographs. The toothpick may penetrate into adjacent structures, and initially, attention may be focused outside the gut as in a case of pyelonephritis caused by penetration of a toothpick.[7] In rare instances, toothpicks have been noted to migrate to distant locations. They have been found in the pleura,[4] the leg[11] and the heart.[2]

The presence of an acute abdominal condition occurring in an alcoholic or a patient with dentures might suggest the diagnosis. However, in the majority of instances, a more common diagnosis would be correct. Mixed septicemia as in Case 1 might suggest a communication between the gastrointestinal tract and an abdominal vessel.[5] In reality, mixed septicemias are usually seen in leukemic patients or alcoholic patients with hepatic and gastrointestinal diseases often associated with peritonitis.[6]

The diagnostic elusiveness of toothpick perforation undoubtedly contributes significantly to the morbidity and mortality linked with this problem. It is difficult to conceptualize any practical way to make the diagnosis more apparent. Perhaps manufacturers could round off or blunt one end in an effort to ease passage through the intestine and reduce the incidence of perforation.

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