

Intestinal Perforation by Ingested Foreign Bodies

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Seven cases with intestinal perforation by ingested foreign bodies (IFBs) were surgically treated in our hospital between January 2000 and August 2009. We reviewed the preoperative mental conditions, awareness of ingestion, preoperative diagnosis, the type of foreign bodies, perforation site, treatment and morbidity for these patients. The ratio of males to females was 4 : 3, and patient age ranged from 27 years to 85 years. Three of 7 patients had an abnormal mental condition, including neurosis with medication in 1, severe mental retardation in 1 and dementia in 1. Six patients were not aware they had IFBs. Preoperative diagnoses were perforative peritonitis in 6 cases and ileus in 1 case. The ingested objects consisted of fish bones in 4 cases, toothpicks in 2 cases and a press-through package in 1 case. Computed tomography (CT) showed the ingested fish bones in all 4 cases, while plain abdominal radiography demonstrated fish bone in only one of these cases. Toothpicks and a press-through package were not detected on CT or by plain abdominal radiography. The perforation sites were the small intestine in 5 cases and the large intestine (transverse colon) in 2 cases. Treatments were intestinal resection with or without omentectomy in 5 cases, suture alone in 1 case and omentectomy alone in 1 case. Postoperative complications were seen in 2 patients, including hepatic failure and bleeding from gastroesophageal reflux disease in 1 case, and removal and reinsertion of a V-P shunt tube in 1 case. The mortality rate was 0%.

ACTA MEDICA NAGASAKIENSIA 55: 1 - 5, 2010

Keywords: Intestinal perforation; Ingested foreign body

Introduction

Most foreign bodies, such as fish bones or chicken bones in dietary foods, may spontaneously pass through the alimentary tract without accident after ingestion. The frequency of ingested foreign bodies (IFBs) in Japan is not well known, but in the United States, 1500 people die yearly of IFBs in the upper gastrointestinal tract, such as coins, impacted meat pieces, sharp and pointed objects, button batteries and cocaine packets.¹ The most critical problems caused by IFBs are perforation and obstruction. The frequency of perforation from IFBs was reported to be less than 1% to 7%.^{2,3,5} The aim of this study was a clinical analysis of intestinal perforation by IFBs surgically treated in our hospital.

Subjects and Methods

The subjects were 7 patients (4 males and 3 females) with intestinal perforation by IFBs who were surgically treated at the Department of Surgery of Nagasaki Prefecture Shimabara Hospital between January 2000 and August 2009. For this study, we selected patients with intestinal perforation by IFBs and did not include patients with pharyngeal, esophageal, gastric or duodenal events. Patient ages at surgery varied from 27 to 85 years, with the median of 73 years. The clinical records of these patients were retrospectively analyzed.

Results

The individual clinical details are summarized in Tables

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Received October 16, 2009; Accepted January 25, 2010

1 and 2, including age, sex, preoperative mental conditions, basic disorders, awareness of ingestion, symptoms, duration of symptoms before surgery, radiological findings, preoperative diagnosis, types of foreign bodies, perforation sites, treatment and postoperative complications. Preoperative mental conditions consisted of neurosis with medication in 1 case,

severe mental retardation in 1 case and senile dementia in 1 case, while the remaining 4 patients had no abnormal mental conditions. The patient with mental retardation suffered meningitis at 5 months after birth, and a V-P shunt tube had been inserted because of hydrocephalus. Six of 7 patients had some underlying disorders. Six of 7 patients were unaware

Table 1. Intestinal perforation by ingested foreign bodies

Case	Age	Sex	Mental condition	Underlying disorder	Awareness of ingestion	Symptoms	Duration of symptom before surgery
1	57	Male	Neurosis with medication	Diabetes mellitus Hypertension	No	Abdominal pain	9 days
2	79	Male	None	Hepatic cirrhosis with hepatoma	No	Abdominal pain	10 days
3	27	Female	Severe mental retardation	V-P shunt to relieve hydrocephalus	No	Vomiting & abdominal pain	1 day
4	71	Male	None	Hypertension	No	Abdominal pain	1 day
5	73	Female	None	None	No	Abdominal pain	1 day
6	74	Male	None	Diabetes mellitus	Yes	Abdominal pain	3 days
7	85	Female	Dementia	Hypertension	No	Abdominal pain	3 days

Table 2. Intestinal perforation by ingested foreign bodies

Case	CT findings	Preoperative diagnosis	Type of foreign bodies	Perforation site	Treatments	Postoperative complication
1	Free air in the mesentery of the ileum end	Perforative peritonitis	Toothpick (35 mm)	Ileum	Partial resection of the ileum	None
2	Free air in the abdominal cavity	Perforative peritonitis	Press-through package (14x14 mm square)	Ileum	Partial resection of the ileum	Hepatic failure Bleeding from GERD
3	Ileus	Strangulation ileus	Toothpick (40 mm)	Jejunum	Partial resection of the jejunum	Removal and re-insertion of the shunt tube
4	Hyperdense object in abscess	Perforative peritonitis	Fish bone (length unknown)	Ileum	Partial resection of the ileum & partial omentectomy	None
5	Hyperdense object in abscess	Perforative peritonitis	Fish bone (30 mm)	Transverse colon	Partial resection of the transverse colon	None
6	Hyperdense object in abscess	Perforative peritonitis	Fish bone (46 mm)	Ileo-jejunal junction	Suture	None
7	Hyperdense object in abscess	Perforative peritonitis	Fish bone (18 mm)	Transverse colon	Partial omentectomy	None

of having ingested a foreign body. The initial symptom was abdominal pain in all patients. The duration of symptoms before surgery ranged from 1 to 10 days, with the median of 3 days. Intestinal perforation was caused by fish bones in 4 patients, by toothpicks in 2 patients and by a press-through package in 1 patient.

Plain abdominal radiography revealed a thin and sharp pointed object in Case 6 (Figure 1). Computed tomography (CT) showed a hyperdense thin and sharp pointed object in the intraabdominal abscess in all 4 patients with intestinal perforation by fish bones (Figure 2). The toothpicks and press-through package causing intestinal perforation in the remaining 3 patients could not be seen on CT. The preoperative diagnosis was perforative peritonitis in 6 patients, because the abscesses contained foreign bodies or air. The preoperative diagnosis in the remaining patient was ileus. Five of 7 patients had perforation of the small intestine, and the remaining 2 patients had perforation of the transverse colon. Treatment procedures consisted of partial resection of the small intestine alone in 3, partial resection of the small intestine with partial omentectomy in 1 and suture alone in 1. Of 2 perforations of the transverse colon, partial resection of the transverse colon was performed in 1, and partial omentectomy without colectomy was performed in 1. Postoperative complications occurred in 2 patients. One patient with hepatic

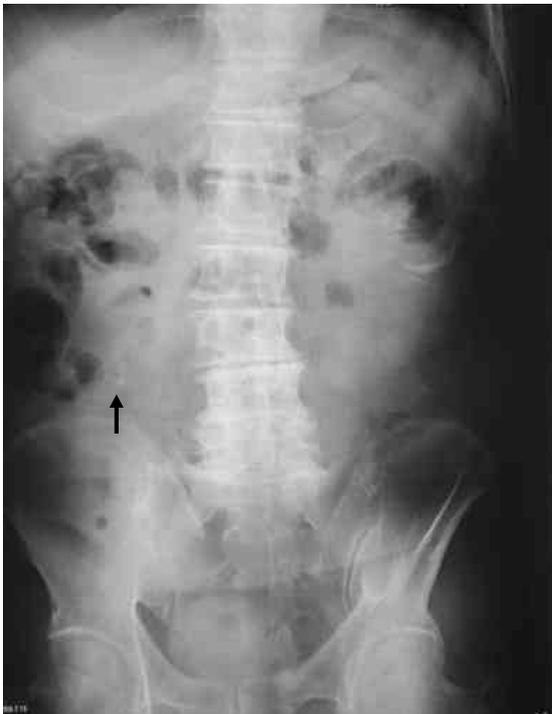


Figure 1. Case 6. A plain abdominal radiography shows a fish bone as a sharp and thin radiopaque object (arrow).



Figure 2. Case 5. CT demonstrates a fish bone as a hyperdense object in an intraabdominal abscess (arrow).

cirrhosis (Case 2) suffered hepatic failure and bleeding from gastroesophageal reflux disease, postoperatively, which were recovered by medication. The patient had lower esophageal varices but showed no portal hypertensive gastropathy. In another patient (Case 3) we had to remove and re-insert the V-P shunt tube because of peritonitis. The mortality rate was 0%.

Discussion

The ingestion of foreign bodies is frequently seen in children, prison inmates, psychiatric patients, alcoholics and denture-wearing elderly patients.^{1,3-6} The frequency of a history of psychiatric disorders in patients ingesting foreign bodies was reported to be 10% to 27%.^{3,5,6} These patients may be classified as at risk for foreign body ingestion. All our patients accidentally ingested the foreign bodies, and only one patient had awareness of ingestion of the foreign body. In a previous report, 12% of the patients had consciously or voluntarily ingested the foreign body.⁶

The most serious clinical problem resulting from IFBs would be perforation of the alimentary tract, the frequency of which has been reported to be 0.7% to 7%.^{3,5} The IFBs resulting in perforation of the alimentary tract were, for example, straightened paperclips, straight pins, toothpicks, toothbrushes, nuts and bolts, chicken bones, fish bones, bone fragments and shells.³⁻⁸ Of these IFBs, toothpicks and bones were the most common foreign bodies.^{4,6,8} The type of IFBs seemed to differ by geography and eating customs.^{4,9} According to the review of the esophageal foreign bodies in the Chinese population, 84% were reported to be fish bones.⁹ Japanese

people as well as Chinese people have the habit of consuming a lot of fish, and therefore, fish bones may also account for the majority of IFBs in the Japanese population.¹⁰⁻¹² The intestinal perforation by a press-through package included in our cases was an extremely rare occurrence.

The most common sites of intestinal perforation by IFBs are reported to be the ileocecal and rectosigmoid regions.^{6,8,13} These sites are narrow and acutely angulated areas. Compared with rectosigmoid regions, perforations of the transverse colon by IFBs are relatively rare.^{6,8,14} The frequency of perforation of the transverse colon including splenic flexure was reported to be from 10% to 28.5% in the colorectum.^{6,8}

Various treatment procedures are available.^{6,8} When the perforated lesions are fresh and there is not much inflammatory reaction, a primary suture should be chosen. With recent advancements in laparoscopic surgery, patients with intestinal perforation caused by an ingested foreign body are often candidates for laparoscopic management.^{15,16} If an extensive peritonitis is present, colectomy including segmental bowel resection or hemicolectomy should be done. Colostomy may be performed as an additional procedure in the high-risk group for anastomotic insufficiency.

The definite diagnosis of intestinal perforation by IFBs should be done by CT scan. Plain radiography may reveal pneumoperitoneum or intestinal obstruction when intestinal perforation occurred. Plain radiography had a sensitivity of only 32% in cases with fish bone ingestion lodged in the oral cavity, oropharynx, laryngopharynx, hypopharynx and esophagus.¹⁷ In contrast, CT has been helpful in the detection of nonmetallic IFBs such as fish bones.^{18,19} CT scans generally demonstrated a thickened intestinal wall, localized pneumoperitoneum, regional fatty infiltration or associated intestinal obstruction. Fish bone perforation typically appeared on CT scans as a linear calcified lesion surrounded by an area of inflammation, and the sensitivity of CT in the detection of intraabdominal fish bones was 71.4% (5/7) for initial reports but improved to 100% (7/7) on retrospective review of CT scans. In our cases, the sensitivity of plain radiography in the detection of intraabdominal fish bones was 25% (1/4) for initial reports and on retrospective review. CT had a sensitivity of 100% (4/4) in our cases with fish bones. It is, however, difficult to observe radiolucent materials such as toothpicks on a CT scan.

Ultrasonography may also be useful for the diagnosis of perforating foreign bodies of the alimentary tract.^{20,21} Rioux M et al.²⁰ reported that the sonographic appearance of a toothpick was a linear, hyperechoic or hypoechoic image of variable length with inconsistent posterior shadowing in the longitudinal axis, and a hyperechoic dot with clear, thin,

sharp, posterior shadowing in the transverse section. With this information of ultrasonographic findings, preoperative diagnosis of IFBs can be made easily. Intestinal radiographic studies using contrast media may be useful for the detection of the site and nature of the perforation. Guber et al.²² reported that the contrast radiograph was useful in the diagnosis of toothpick perforation of the small intestine. In our experiences, intestinal contrast radiograph was not need necessarily.

In conclusion, intestinal perforation by IFBs should be included in the differential diagnosis of acute abdomen, with or without awareness of ingestion of a foreign body.

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