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## Stricture of the duodenum and jejunum in an abused child

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**Abstract** We report a case of abdominal injury secondary to child abuse in which the child had both a duodenal hematoma and contained perforations of the duodenum and proximal jejunum. These injuries were evaluated by both CT scan and upper gastrointestinal (GI) series. The child's nausea and vomiting persisted despite conservative treatment; after 3 weeks a repeat upper

GI series demonstrated high-grade duodenal obstruction. An exploratory laparotomy was performed and a calcified, fibrotic mesentery and strictures in the distal duodenum and proximal jejunum were found. To our knowledge, this unusual complication of blunt abdominal trauma has not been described in association with child abuse.

### Introduction

Small-intestinal perforation is a recognized but rarely reported feature of child abuse which occurs secondary to direct, blunt trauma to the abdomen. Most researchers believe that the few reports published to date underestimate the true incidence in child abuse of visceral trauma in general and bowel injury in particular [1–3]. While jejunal stricture formation after blunt abdominal trauma has been reported secondary to lap-belt injury [4, 5], to our knowledge this is the first report describing small-bowel strictures secondary to abdominal trauma in child abuse.

### Case report

A 15-month-old male child was brought to the emergency room by his mother because he had been vomiting for 1 week. He was noted to have multiple scalp and scrotal burns and anemia, and therefore underwent a skeletal survey and an abdominal CT scan. The survey demonstrated several fractures of the fifth thoracic vertebra, multiple bilateral rib fractures, and metaphyseal fractures of the left proximal humerus and right distal radius. Abdominal CT scan demonstrated a duodenal hematoma (Fig. 1 a) and normal solid organs, including the pancreas. Several days later, an upper gastrointestinal (GI) series, obtained to assess the extent of the duodenal

hematoma, demonstrated markedly abnormal second, third and fourth portions of the duodenum, with loss of the normal mucosal pattern and focal dilation; there were two contained areas of perforation (Fig. 1 b, c).

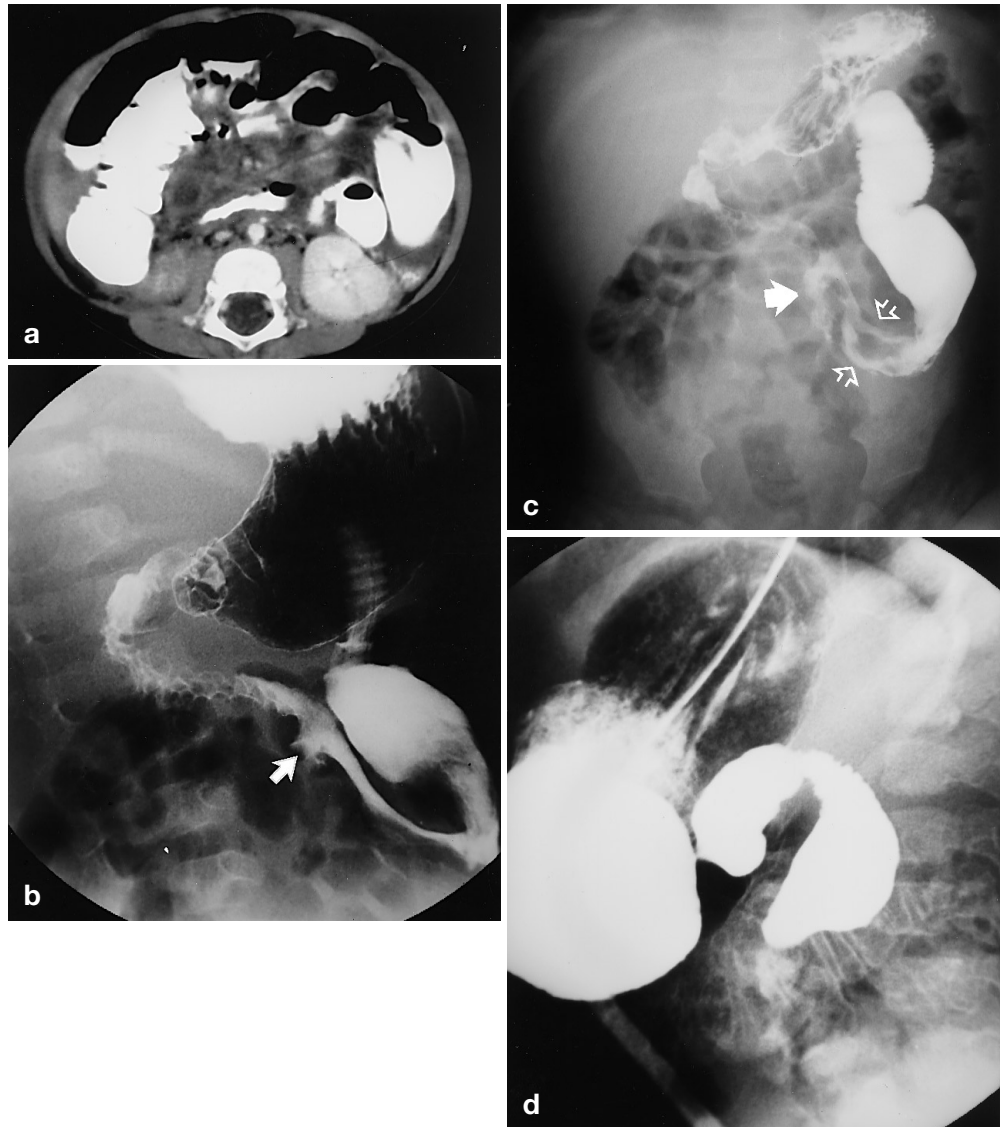
After 4 weeks of conservative treatment with nasogastric tube and intravenous hyperalimentation, a repeat upper GI series showed persistent distal duodenal partial obstruction and distorted anatomy (Fig. 1 d). Surgical exploration confirmed the presence of the contained perforations; portions of the distal duodenum and proximal jejunum were in continuity only by a mucosal sleeve. The root of the mesentery was fibrotic and calcified, with disruption of the ligament of Treitz. The surgeon removed strictures of both the distal third portion of the duodenum and the proximal jejunum.

The patient had a slow recovery which was complicated by distal small-bowel obstruction for which he underwent surgical lysis of adhesions.

### Discussion

Blunt abdominal trauma secondary to child abuse may cause intramural hematoma of the duodenum, typically in the lateral aspect of the descending duodenum, as well as small-bowel perforation, often located in the jejunum. Duodenal hematoma is the most common injury to the abdomen documented radiologically in children who have been abused. The majority of patients suffer-

**Fig 1** **a** CT scan of the upper abdomen at the level where the duodenum crosses the midline shows fluid density in the medial right upper quadrant which did not opacify either initially or on delayed images. Note the small amount of fluid in both paracolic gutters. **b** Left posterior oblique view of the duodenum on upper gastrointestinal (GI) series demonstrates mucosal irregularity, featurelessness with focal dilatation and at least one contained perforation (*arrow*). **c** Anteroposterior view on upper GI series again demonstrates distorted duodenal anatomy with a contained perforation (*arrow*) and two channels (*open arrows*). **d** Four weeks later the upper GI series shows high-grade obstruction of the third portion of the duodenum on a lateral view



ing from abdominal trauma are toddlers with an average age of 20 months. When visceral injuries in child abuse are identified, the mortality rate can be as high as 50% [1]. The mechanism of injury is felt to be direct, involving blunt trauma such as from a fist blow, a kick, or sudden deceleration after a child has been thrown. Recognized stigmata of abuse, such as skin burns or ecchymoses, may not be present, making the diagnosis difficult. It is not surprising that most researchers believe visceral trauma in abuse is underrecognized [1].

There are relatively few reports of bowel perforation in child abuse. Generally, the area of perforation is in the small bowel; 60% of all intestinal perforations occur in the proximal jejunum just beyond the ligament of Treitz. The proposed explanation of this injury is that while the relatively thick duodenal-jejunal junction can

withstand a blow to the abdomen, the thinner proximal jejunum is more vulnerable to perforation. Blunt abdominal trauma secondary to child abuse may cause multiple small-bowel perforations; it may also cause perforation accompanied by intramural duodenal hematoma [1]. In 1978, Wooley et al. [5] described eight children with duodenal hematoma. Three of the eight had associated small-bowel perforation, one case involving distal duodenum and two cases involving jejunum. All were asymptomatic at follow-up, 3 months to 6 years later [5].

Shalaby-Rana et al. [6] described delayed intestinal stricture found several weeks after lap-belt injury and proposed bowel ischemia secondary to mesenteric injury as the etiology. No reports have described stricture formation in the duodenum after blunt abdominal in-

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jury in child abuse. We believe the severe abdominal trauma resulted in mesenteric injury with ischemia and eventual stricture formation. Our case suggests that abdominal trauma in child abuse should be added to the differential diagnosis of intestinal stricture in children

which includes Crohn's disease, radiation therapy, ischemia such as necrotizing enterocolitis, cystic fibrosis, tuberculosis, Henoch-Schönlein purpura, Kawasaki disease, and postoperative stricture formation.

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