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Management of traumatic duodenal hematomas in children



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ABSTRACT

Background: Duodenal hematomas from blunt abdominal trauma are uncommon in children and treatment strategies vary. We reviewed our experience with this injury at a large-volume children's hospital.

Materials and methods: A retrospective case series was assembled from January 2003–July 2014. Data collected included demographics, clinical and radiographic characteristics, and hospital course. Patients with grade I injuries based on the American Association for the Surgery of Trauma Duodenum Injury Scale were compared with those with grade II injuries.

Results: Nineteen patients met inclusion criteria at a median age of 8.91 y (range, 1.7–17.2 y). Mechanisms of injury included direct abdominal blow or handle bar injury ($n = 9$), nonaccidental trauma ($n = 5$), falls ($n = 3$), and motor vehicle accident ($n = 2$). Ten patients had grade I hematomas and nine had grade II. Hematomas were most frequently seen in the second portion of the duodenum ($n = 9$). Five patients underwent a laparotomy for concerns for hollow viscus injury. No patients required operative drainage of the hematoma; however, one patient underwent percutaneous drainage. Twelve patients received parenteral nutrition (PN) for a median duration of 9 d (range, 5–14 d). Median duration of PN for grade I was 6.5 d (range, 5–8 d) versus 12 d for grade II (range, 9–14 d; $P = 0.016$). Complications included one readmission for concern of bowel obstruction requiring bowel rest.

Conclusions: This study suggests that duodenal hematomas can be successfully managed nonoperatively. Grade II hematomas are associated with longer duration of PN therapy and consequently longer hospital stays. These data can assist in care management planning and parental counseling for patients with traumatic duodenal hematomas.

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1. Introduction

Duodenal hematomas secondary to blunt abdominal trauma are rare in the pediatric population. Because of its retroperitoneal location, the duodenum is often protected, and therefore, injury of the duodenum occurs in only 3%–5% of all

patients with trauma-related abdominal injuries [1]. The majority (>70%) of pediatric duodenal hematomas result from blunt abdominal trauma, which differs from the adult population where penetrating trauma is a more common mechanism [1,2]. The anatomy of a child increases the risk of duodenal injury from blunt trauma because of decreased

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intraabdominal fat and less protection from the costal margin, which is more horizontal [3].

Treatment has traditionally been nonoperative, thus avoiding laparotomy and its associated morbidity. Therapy includes bowel rest and nasogastric decompression, peripherally inserted central catheter (PICC) placement, and parenteral nutrition (PN) [1,2,4,5]. Duration can vary substantially, and enteral nutrition is resumed when gastric aspirates are no longer bilious. There are few published studies examining this management approach in children. This limits the trauma surgeon's ability to counsel patients and families on the expected hospital course, need for PN, and complication profiles. The purpose of this study was to review this rare injury in children treated at a level 1 trauma center to better characterize the outcomes of this patient population.

2. Methods

2.1. Patient characteristics

After receiving approval from the institutional review board (H-31028), a retrospective chart review was conducted including patients treated from January 2003–July 2014 with duodenal injuries after blunt abdominal trauma at a level 1 children's hospital. The institutional trauma registry, which prospectively maintains data on trauma admissions, was used to identify our study population. This patient list was cross-referenced to a query of the hospital records by International Classification of Diseases, 9th Revision (ICD-9) code for duodenal injury. Children with duodenal perforations or deserosalization injuries without an associated duodenal hematoma were excluded.

2.2. Study design

Data collection included demographics, presentation and injury details, clinical and radiographic characteristics, hospital course, and complications. Resolution of the hematoma was defined as return of bowel function with the ability to tolerate an oral diet. Radiographic resolution was also documented, if available. When considering complications, pancreatitis was defined in this study as a discharge diagnosis of pancreatitis after having persistent symptoms and prolonged elevation of amylase. This diagnosis was then confirmed by evaluating the progress notes and laboratory results for the patients.

The American Association for the Surgery of Trauma (AAST) Duodenum Injury Scale was used to classify the grade of injury [6]. According to the AAST guidelines, a grade I injury is a hematoma involving a single portion of the duodenum; grade II injury involves more than one portion. Patients were stratified by their AAST injury score and further analyzed.

2.3. Statistical analysis

Statistical analyses performed included the Student t-test for continuous variables or the chi-square test for categorical variables. A *P* value of <0.05 was considered statistically significant. Data are presented as median with range.

3. Results

During the 11.5-y study period, 835 patients were identified with blunt trauma to the foregut and 27 patients were found to have a duodenal injury. Nineteen patients met inclusion criteria at a median age of 8.91 y (range, 1.7–17.2 y); 32% were female. The remaining eight patients had duodenal perforations or deserosalization injuries distinct from a duodenal hematoma. None of these patients were identified as having a duodenal hematoma before the perforation or deserosalization injury. The most common mechanism of injury was a direct abdominal blow, which included sports injury (*n* = 4), handlebar injury (*n* = 3), one patient who was struck in the abdomen by another individual, and one patient who was stepped on by a horse. Other mechanisms included non-accidental trauma (*n* = 5), falls (*n* = 3), and motor vehicle accident (*n* = 2).

The most common symptoms at presentation were abdominal pain (*n* = 17) and nausea or vomiting (*n* = 9) with a median duration of 1.25 d (range, 0.13–7 d) before admission to the Emergency Department. Patients were evaluated with our institution's blunt abdominal trauma laboratory panel. On admission, the median international normalized ratio (*n* = 9) was 1.2 (range, 1.1–1.7). The median lipase (*n* = 18) was 760 (range, 21–6714), and was elevated in 11 of 18 patients. Similarly, the median amylase (*n* = 18) was 120 (range, 32–3395), with 10 of 18 patients with an elevated level.

The diagnostic test of choice was a computed tomography (CT) scan, and all patients were scanned either on admission to our Emergency Department (*n* = 14) or at an outside hospital before transfer (*n* = 7); two patients were rescanned at our facility because of missing or poor quality imaging. Duodenal hematomas were most frequently noted in the second portion of the duodenum (*n* = 9). Nine patients had associated abdominal injuries, which included grade I pancreatic injury (*n* = 3), grade II pancreatic injury (*n* = 1), grade I liver injury (*n* = 1), grade II liver injury (*n* = 1), small bowel perforation (*n* = 2), small bowel hematoma (*n* = 1), and mesenteric injury (*n* = 2). The five patients with non-accidental trauma had additional nonabdominal injuries typical of child abuse, such as a hip fracture, bruising and contusions, scalp hematomas, intracranial hemorrhage, and one patient with a pneumothorax. Three of the five patients had concomitant abdominal injuries.

Five patients underwent an emergent laparotomy for concerns of hollow viscous injury. During each operation, the duodenal hematoma was noted but left intact. No patients ultimately required operative drainage of the hematoma. Twelve patients (63%) received PN for a median of 9 d (range, 5–14 d), which includes all but one of the operative patients (who expired within 2 d of admission secondary to traumatic brain injury).

Although no patient required surgical decompression, one patient received percutaneous drainage of the hematoma 2 d after admission. The decision to drain the hematoma was at the discretion of the surgeon and was due to the large size with signs of obstruction. Additionally, the size of the hematoma (6 cm fluid collection) and its accessibility through a retroperitoneal approach made the percutaneous drainage procedure feasible. Moreover, further diagnostic information

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