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Helicobacter pylori Found Guilty of Obstructive Jaundice: A Pediatric Case Report

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Pediatric *Helicobacter pylori* infection represents a small proportion of disease that is otherwise decreasing in the developed world. Typical presentations have been well-described in the literature. We report a 15-year-old male who presented with jaundice, anemia, dark urine, and poorly characterized abdominal pain and was found to have obstructive jaundice secondary to a duodenal ulcer resulting from *H. pylori* infection. Obstructive jaundice is a seldom reported complication of duodenal ulcer, particularly in children. This report reviews *H. pylori* infection, outlines complications of peptic ulcer disease, and illustrates the rarity of obstructive jaundice as a presenting sign of duodenal ulcer in children.

Key Words: peptic ulcer disease, duodenal ulcer, common bile duct obstruction, pediatrics

INTRODUCTION

Pediatric *Helicobacter pylori* infection represents a small proportion of disease that is otherwise decreasing in the developed world. Typical presentations have been well-described in the literature. Herein, we report an adolescent who presented with obstructive jaundice and anemia due to an *H. pylori* duodenal ulcer.

CASE REPORT

A 15-year-old white male with autism spectrum disorder and intellectual disability was admitted for evaluation of jaundice and profound anemia. He presented with vague abdominal pain, jaundice, and dark urine 10 days after undergoing bilateral distal tibia and fibula varus derotational osteotomies, bilateral foot triple arthrodesis, and bilateral Achilles tendon lengthening. Postoperative pain was well-controlled with oxycodone, methocarbamol, and ibuprofen for two days. Examination was significant for a thin, ill-appearing male with scleral icterus, generalized jaundice, and a nontender, nondistended abdomen. Initial laboratory evaluation was significant for acute blood loss anemia, direct hyperbilirubinemia, elevated transaminases, elevated alkaline phosphatase, and elevated gamma glutamyl transferase. Further laboratory workup is detailed in Table 1. Hepatic ultrasound showed a 1.4 cm common bile duct (CBD) dilatation with abrupt distal tapering without choledocholiths (Fig. 1). Esophagogastroduodenoscopy (EGD), endoscopic ultrasound (EUS), and endoscopic retrograde cholangiopancreatography (ERCP) were planned to investigate the biliary obstruction. EGD revealed a 1.5-cm nonbleeding, deeply cratered duodenal bulb ulcer with visible gastroduodenal artery (Fig. 2); immunohistochemical stain of gastric biopsies highlighted *H. pylori*. EUS showed diffuse echogenicity and hyperechoic and hypoechoic foci in the pancreatic head and genu. ERCP was not performed due to the presence of the large ulcer impeding advancing the endoscope. Computed tomography of the abdomen was obtained to rule out other possible anatomic causes of biliary obstruction and showed reactive changes consistent with duodenal ulcer, including mild central periportal edema, central intrahepatic ductal dilatation, gallbladder wall thickening, and a prominent periportal lymph node (Fig. 3). After supportive management, he was discharged with 14 days of triple therapy consisting of pantoprazole, amoxicillin, and clarithromycin. Upon reassessment ~10 weeks after initial endoscopy, he was asymptomatic; repeat testing revealed normalization of previously abnormal laboratory results, as demonstrated in Table 1. Repeat EGD at that time showed moderate duodenal stenosis with superficial erosions but no ulcer or *H. pylori* on biopsy. Upper gastrointestinal series was ordered to assess the duodenal narrowing and was normal.

DISCUSSION

This case presents a multitude of learning points within the realm of pediatric *H. pylori*-associated peptic ulcer disease (PUD). The aim of this report is to review *H. pylori* infection, outline complications of PUD, and illustrate the rarity of obstructive jaundice as a presenting sign of duodenal ulcer in children.

A recent meta-analysis estimated the global prevalence of *H. pylori* infection in children to be about 32% (1). This figure was significantly higher in older children, rural areas, and in low- and middle-income countries. There was no difference between sexes. Overall prevalence differed slightly by testing method (serology, urea breath test, or stool antigen test); however, these noninvasive tests were used to study the prevalence of infection rather than diagnosing clinical disease, which should be done utilizing culture or histopathology **(1,2)**. The clinical spectrum of *H. pylori* infection can range from asymptomatic to nonspecific dyspepsia to ulceration with acute bleeding. The Gram-negative bacterium boasts a plethora of mechanisms that allow it to thrive in the gastric mucus layer and evade eradication. Of these, variable expression of cytotoxic factors such as cytotoxin-associated protein A (CagA) and vacuolating cytotoxin A (VacA) is known to create more virulent strains that promote increased interaction with gastric epithelial cells. Infections with these strains, known as type I *H. pylori* infections, have been associated with a heightened inflammatory response, ulcerogenesis, atrophic gastritis, intestinal metaplasia and gastric cancer when compared to strains lacking these features (type II *H. pylori*) **(3–7)**. While severe infection is of great concern, the literature also suggests *H. pylori* may function as a commensal organism **(5)** and could even confer health benefits **(5,8)**. With all this in mind, the most recent joint clinical guidelines agreed upon by the European and North American Societies for Pediatric

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TABLE 1. Diagnostic laboratory evaluation for direct hyperbilirubinemia and elevated transaminases

Test	Result	Reference range
Anti-HAV antibody IgM	Negative	Negative
Anti HBcAb-IgM	Negative	Negative
Anti-HBsAg	Negative	Negative
Anti-HCV	Negative	Negative
Anti-HEV IgM	Negative	Negative
Anti-EBV IgM	Negative	Negative
Anti-EBV IgG	Negative	Negative
Anti-CMV IgM	Negative	Negative
Anti-CMV IgG	Positive	Negative
Anti-nuclear antibody	Negative	Negative
Anti-smooth muscle antibody	Negative	Negative
Anti-liver-kidney-microsomal antibody	<5.0 U	≤20.0 U
Soluble liver antigen	<20.1 U	0–20 U
Alpha-1-antitrypsin mutational analysis	Negative	Negative
Acetaminophen level	<5.0 µg/mL	10–30 µg/mL
Ceruloplasmin	31 mg/dL	15–31 mg/dL
Serum IgA	199 mg/dL	47–249 mg/dL
Tissue transglutaminase IgA	0.3 U/L	<7 U/L
Hemoglobin	7.2 g/dL	11.0–14.5 g/dL
Hematocrit	21.8%	33.9%–43.5%
Mean corpuscular volume	89.7 fL	76.7–89.2 fL
Coombs test	negative	Negative
Haptoglobin	234 mg/dL	30–200 mg/dL
Prothrombin time	14.1 s	9.4–12 s
International normalized ratio	1.25	0.8–1.1
Lipase	77 U/L	10-195 U/L
Fecal occult blood test	Positive	Negative
Hepatic profile		
Test	Initial	Follow-up*	Reference range
Aspartate aminotransferase	548 U/L	35 U/L	15–40 U/L
Alanine aminotransferase	620 U/L	15 U/L	11–26 U/L
Alkaline phosphatase	510 U/L	310 U/L	88–315 U/L
Total bilirubin	4.50 mg/dL	0.42 mg/dL	0.6–1.4 mg/dL
Direct bilirubin	3.35 mg/dL	0.00 mg/dL	0.0–0.4 mg/dL
Gamma glutamyl transferase	441 U/L		10–71 U/L

*Labs obtained at follow-up 10 weeks after presentation.

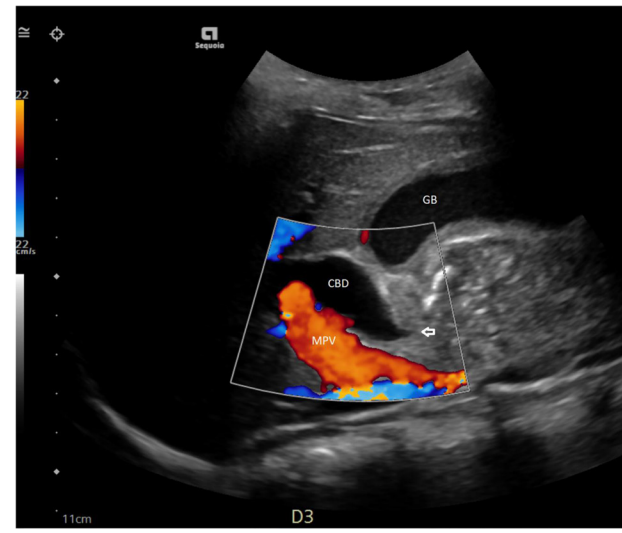

FIGURE 1. Ultrasound image demonstrates dilated common bile duct (CBD) with distal tapering indicated by the open white arrow anterior to the main portal vein (MPV). Gallbladder (GB) is shown with mild edema and sludge.

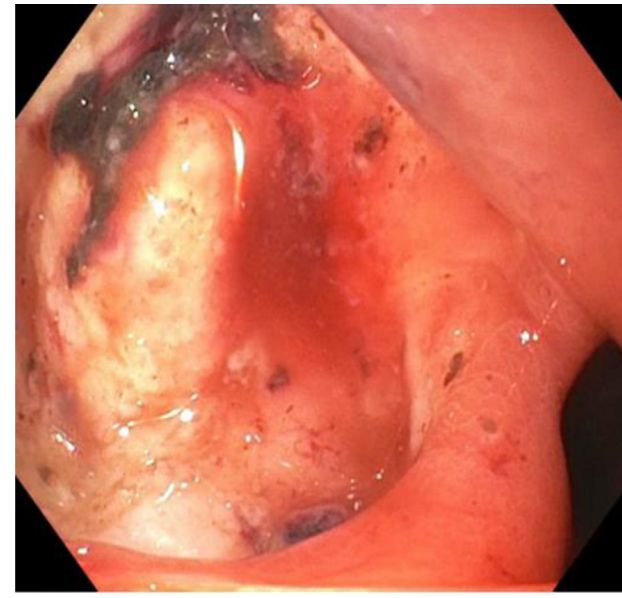

FIGURE 2. Endoscopic image of cratered duodenal bulb ulcer measuring 1.5 cm in the largest dimension by ~1 cm deep with significant surrounding inflammation causing luminal narrowing, preventing distal passage of the endoscope.

Gastroenterology, Hepatology and Nutrition recommend against noninvasive, "test and treat" management **(2)**.

PUD, regardless of etiology, appears far less common in children. In Belgium, Turkey, and Hong Kong, retrospective reviews of pediatric EGD reports showed rates of PUD ranging from 3.4% to 12.1%, with *H. pylori* infection identified in 35%–61% **(9–11)**. Complications of pediatric PUD including perforation, hemorrhage, and gastric outlet obstruction are rare, but further studies addressing their frequency are needed. Analysis of 2 US databases estimated the annual incidence of peptic ulcer bleeding in the pediatric population between 0.5 and 4.4/100 000 **(12)**. Edwards et al conducted a review of children requiring surgery for PUD over a 23-year period at a large, American institution. Twenty-nine children required surgery, including 37% due to bleeding, 45% for perforation, and 7% with gastric outlet obstruction; one patient had *H. pylori* **(13)**. Perforation was observed in 52 children at a Taiwanese center; approximately 7% had *H. pylori* infection **(14)**. Tam et al found 70% of children with PUD presented with acute gastrointestinal bleeding, while 7% presented with perforation. No significant difference was found between

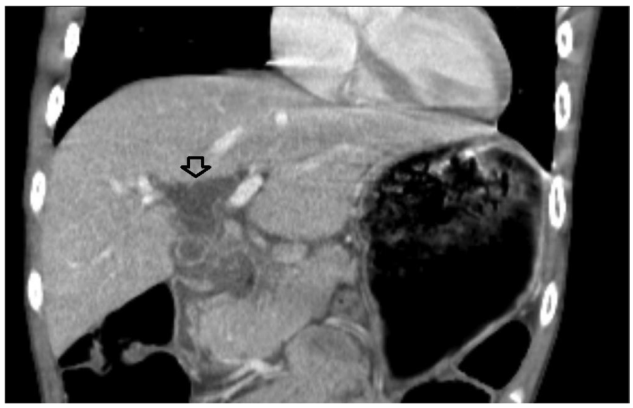

FIGURE 3. Computed tomography image with open dark arrow demonstrating central intrahepatic biliary ductal dilatation.

the frequency of acute gastrointestinal bleeding and *H. pylori* infection **(11)**. Fewer observed complications from pediatric *H. pylori* PUD could be due to differences in the host response to infection. Reduced inflammatory response via downregulation of pro-inflammatory T-helper 17 cells was observed in pediatric *H. pylori* compared to adults **(15)**.

Obstructive jaundice is a term used to describe the obstruction of biliary flow into the small bowel, which often manifests as jaundice. This can be due to a variety of etiologies, including mechanical, inflammatory, infectious, neoplastic, or as in our case, duodenal ulcer. The mechanism of biliary obstruction in PUD is secondary to inflammation causing impingement on the nearby CBD as it courses posterior to the first and second portions of the duodenum in the hepatoduodenal ligament until reaching the pancreatic head where it terminates as the ampulla of Vater **(16)**. Duodenal ulcer causing obstructive jaundice has been reported since the 19th century but has remained a rarity despite improved diagnostic techniques and a better understanding of PUD. In 1942, Levine and Gordon reported an adult male who presented with jaundice, dark urine, and light stools after being previously diagnosed with duodenal ulcer via fluoroscopy. His ulcer perforated and laparotomy was performed, confirming perforation and surrounding edema causing biliary obstruction **(17)**. Neiman reported an adult male who presented with mid-epigastric pain, jaundice, dark urine, and clay-colored stools. Fluoroscopy showed duodenal ulcer, and the patient underwent laparotomy due to suspected choledocholithiasis; however, it revealed an inflamed duodenal ulcer obstructing the CBD **(18)**. In a 1971 review of over 4000 patients with jaundice at the Mayo Clinic between 1950 and 1963, 155 patients had duodenal ulcer, which proved to be the cause of jaundice in 6 cases via laparotomy. All 6 of these patients presented with abdominal pain; none were children **(16)**. When exploring more recent literature, 2 separate reports describe adult male patients presenting with obstructive jaundice initially believed to be caused by malignancy until a final tissue diagnosis of ulcer was made **(19,20)**. Additional reports include cases of obstructive jaundice caused by scar tissue associated with a non-steroidal anti-inflammatory drug-induced ulcer, duodenal Crohn's disease, lenvatinib therapy, and off-target radioembolization therapy **(21–24)**. None of the aforementioned studies include pediatric patients and do not implicate *H. pylori* in the development of obstructive jaundice. A single pediatric case has been reported to our knowledge, a 16-year-old with CBD obstruction caused by a duodenal ulcer secondary to eosinophilic gastroenteritis **(25)**.

CONCLUSIONS

As it pertains to our patient, several contributing factors were likely at play. His intellectual disability made it difficult to ascertain symptoms. Therefore, it is reasonable to suspect his duodenal ulcer was longstanding, placing him at risk for complications as would have been the case in the era prior to *H. pylori* identification and the advent of acid blockade therapies. *H. pylori* antibody typing was not performed to determine if a more virulent strain was present, which could have contributed to the severity of his disease. This case draws attention to a seldom described complication of *H. pylori* PUD in the pediatric patient. It elucidates the need for further investigation of severe complications of PUD in children.

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