



HHS Public Access

Author manuscript

J Pediatr Gastroenterol Nutr. Author manuscript; available in PMC 2017 February 01.

Published in final edited form as:

J Pediatr Gastroenterol Nutr. 2016 February ; 62(2): 314–316. doi:10.1097/MPG.0000000000000942.

Prevalence, clinical, endoscopic and pathological features of duodenitis in children

Arik Alper, MD,

Division of Pediatric Gastroenterology, Department of Pediatrics, Yale University School of Medicine, New Haven, CT

Steven Hardee, MD*,

*Department of Pathology, Yale University School of Medicine, New Haven, CT

Danilo Rojas-velasquez,

Division of Pediatric Gastroenterology, Department of Pediatrics, Yale University School of Medicine, New Haven, CT

Sandra Escalera, MD,

Division of Pediatric Gastroenterology, Department of Pediatrics, Yale University School of Medicine, New Haven, CT

Raffaella A Morotti, MD*, and

*Department of Pathology, Yale University School of Medicine, New Haven, CT

Dinesh S. Pashankar, MD

Division of Pediatric Gastroenterology, Department of Pediatrics, Yale University School of Medicine, New Haven, CT

Abstract

Objectives—While gastritis and esophagitis are well studied in children, there is very limited literature on duodenitis in children. We aimed to assess the prevalence, etiology, clinical, endoscopic, and pathological features in a large cohort of unselected children with duodenitis.

Methods—We reviewed the pathology reports of all upper endoscopies performed at our institution over 5 years to identify children with duodenitis. Biopsy sections were reviewed to confirm the diagnosis of duodenitis. Demographic, clinical, endoscopic data and presence of associated gastritis and esophagitis were noted in all children with duodenitis. Etiology of duodenitis was correlated with the patient's clinical diagnosis.

Correspondence: Dinesh S. Pashankar, MD, Associate Professor of Pediatrics, Division of Gastroenterology, Department of Pediatrics, 333 Cedar Street, LMP 4091, New Haven, CT 06520, dinesh.pashankar@yale.edu, Tel: 203-785-4649, Fax: 203-737-1384.

Role of Authors in submitted work: Arik Alper, MD - Acquisition, analysis and interpretation of data, drafting of manuscript

Steven Hardee, MD - Acquisition, analysis and interpretation of data, drafting of manuscript

Danilo Rojas-velasquez - Acquisition, analysis and interpretation of data

Sandra Escalera, MD - Conception of work, acquisition of data, drafting of manuscript

Raffaella A Morotti, MD - Conception of work, acquisition, analysis and interpretation of data, drafting and revising of manuscript

Dinesh S. Pashankar, MD - Corresponding Author, Conception of work, analysis and interpretation of data, drafting and revising of manuscript

Conflict of interest and source of funding: None

Results—Out of 2772 children who had endoscopy, 352 had duodenitis with the prevalence rate of 12.7%. Gastritis was seen in 64% of children with duodenitis compared with 46% of children without duodenitis ($P < 0.001$). Common indications for endoscopy in children with duodenitis were abdominal pain, positive celiac serology and diarrhea. The most common etiology was celiac disease (32%), followed by Crohn's disease (13%), ulcerative colitis (3%), and *Helicobacter pylori* infection (6%). In 63% of cases, endoscopic appearance of duodenum was normal. Cryptitis, villous changes and cellular infiltration were noted on histology.

Conclusions—Prevalence of duodenitis is 12.7% in children undergoing endoscopy. Celiac disease and inflammatory bowel disease are common causes of duodenitis. Associated gastritis is common in children with duodenitis and correlation of endoscopic appearance with histology is poor.

Upper gastrointestinal tract endoscopies are commonly performed in children for evaluation of gastrointestinal symptoms. The procedure often includes obtaining biopsies from the esophagus, stomach and duodenum. Common histopathological findings seen in children include esophagitis, gastritis and duodenitis.

Gastritis and esophagitis have been well studied in children, as they are more common than duodenitis. Previous studies have described different types of gastritis with specific etiology and clinicopathological features (1). There is also an abundant literature on esophagitis, particularly reflux and eosinophilic esophagitis (2). However, there is limited literature regarding duodenitis in the pediatric population. We aimed to assess the prevalence, etiology, clinical, endoscopic, and pathological features in a large cohort of children with duodenitis.

Methods

At Yale New Haven Children's Hospital, pediatric gastroenterologists perform all upper gastrointestinal endoscopies in children. At all endoscopies, multiple mucosal biopsies from the esophagus, stomach and duodenum are obtained routinely. The biopsies are reviewed either by a pediatric pathologist with expertise in gastrointestinal pathology or by a gastrointestinal pathologist. Diagnosis of duodenitis is based on the presence of neutrophilic infiltrate for acute/active duodenitis, or chronic changes inclusive of villous/crypt architecture changes or excess of either intraepithelial lymphocytes or mixed cell infiltration in the lamina propria (3). Gastritis is diagnosed by the presence of mixed inflammatory infiltrate and esophagitis is diagnosed by the presences of eosinophils.

For this study we retrieved the pathology reports of all upper endoscopies performed in our institution over 5 years from January 2008 to December 2012. These reports were reviewed to identify children with duodenitis. Presence of associated gastritis and esophagitis was noted and compared between children with and without duodenitis. For cases with a diagnosis of duodenitis, all microscopic sections were retrieved and reviewed by two pediatric pathologists (SH,RM) and the diagnosis of duodenitis was confirmed in all.

We reviewed the medical charts of all patients with duodenitis, and collected demographic, clinical and laboratory data. The procedure reports were reviewed to assess the presence of

endoscopic findings such as erythema, edema, erosions, ulcers or any inflammatory changes. Etiology of duodenitis was correlated with the patient's clinical diagnosis. Diagnosis of inflammatory bowel disease (IBD) such as Crohn's disease or ulcerative colitis was based on clinical, radiological, endoscopic and pathological findings (including concurrent or preexisting biopsies of the lower gastrointestinal tract). Diagnosis of celiac disease was based on the presence of typical duodenal pathological features and positive celiac serology. Diagnosis of *Helicobacter pylori* infection was based on positive identification of the bacteria either on routine stains or immunostain of gastric biopsies. We also reviewed charts of children without duodenitis to assess common indications for endoscopy and diagnoses to compare with those in children with duodenitis.

Statistical analysis was performed using Chi-squared test and T test. The Human Investigation Committee of Yale University approved this study.

Results

In our institution, 2772 children had 3064 upper gastrointestinal tract endoscopies performed over a 5-year period. Out of 2772 children, 352 children had duodenitis (12.7%). In comparison, gastritis and esophagitis were seen in 48% and 21% of children, respectively. The annual prevalence of duodenitis had increased from 9% in the first year in 2008 to 14% in the fifth year in 2012.

Clinical features

The mean age of patients with duodenitis was 10.6 years (range 0.5 to 18.8) and 51 % were boys. Out of 352 children, 56% were white, 24% were Hispanic, 15% were African-Americans, and 5% were of other racial origin. The common primary indications of endoscopy in children with duodenitis were abdominal pain (38%) and positive celiac serology (32%) (Table 1). In comparison, primary indications for endoscopy in children without duodenitis were abdominal pain (46%) and nausea/vomiting (14%). There was a significant difference in these primary indications for endoscopy in children with and without duodenitis (Table 1).

In 64 % of children with duodenitis, we were able to attribute a specific etiology or a diagnosis while in 36% of the cases, no obvious etiology could be identified. The most common etiology was celiac disease (32%), followed by Crohn's disease (13%), ulcerative colitis (3%), *Helicobacter pylori* infection (6%) and nonsteroidal anti-inflammatory medications (3%). Duodenitis in 7% of children was associated with features of functional dyspepsia and functional abdominal pain. Interestingly, there was one patient with concomitant ulcerative colitis and celiac disease who has been described before by us as a case report (4). This patient was classified as a celiac disease patient. In comparison, children without duodenitis did not have celiac disease as per diagnostic criteria and had less prevalence of IBD compared with children with duodenitis (10 % vs 16%; $P<0.01$).

Endoscopic /Pathological features

Review of procedure reports of children with duodenitis showed that in 63% of the endoscopies the duodenum appeared macroscopically normal despite presence of duodenitis

on histological examination. In 37% of endoscopies, macroscopic abnormalities such as edema, erythema, erosions, scalloping or ulcers were evident. Three patients (1 %) had duodenal ulcers. Histology showed various changes in duodenal mucosa such as neutrophil infiltrate, cryptitis, villous blunting/atrophy, excess of intraepithelial lymphocyte infiltrate and mixed cell infiltrate in lamina propria. Duodenal granuloma was observed in two patients with Crohn's disease.

Table 1 shows the presence of associated esophagitis and gastritis in children with and without duodenitis. While there was no difference in the prevalence of esophagitis, the prevalence of gastritis was significantly higher in children with duodenitis compared with children without duodenitis (64% vs. 46% respectively, $p < 0.001$).

Given the high prevalence of associated gastritis in children with duodenitis, we subdivided our cohort into 131 children with duodenitis and 221 children with gastroduodenitis. There was no significant difference in clinical symptoms in these two groups of children (Table 2). We also compared children with two common etiologies (celiac disease and IBD) for the presence of duodenitis and gastroduodenitis. Celiac disease presented almost equally as duodenitis and gastroduodenitis (51% vs 49% respectively, $P = NS$). However in children with IBD, gastroduodenitis was significantly more common than isolated duodenitis (87% vs 13%, respectively, $P < 0.001$)

Discussion

We report the prevalence, etiology, clinical, endoscopic, and pathological features of duodenitis in a large cohort of children. Duodenitis has been described as a part of upper gastrointestinal tract lesions in children with IBD (5,6), but there is very limited literature on duodenitis in general unselected group of children. To the best of our knowledge, there are only two small pediatric studies on this topic. In 1987, Oderda et al reviewed 320 endoscopies in children and reported 32 children with endoscopic duodenal abnormalities and 4 children with histological evidence of duodenitis (1%) (3). In another study in 1998, Long et al correlated radiologic findings with endoscopic and pathological findings in 24 children with duodenitis and 51 healthy control subjects (7). In our study, prevalence of duodenitis was 12.7 % in children undergoing endoscopy. This increase in prevalence compared to the previous older study (3) could be due to multiple factors such as routine performance of endoscopies and rising incidence and recognition of celiac disease and IBD.

In our study, children with duodenitis were more likely to have positive celiac serology as indication for endoscopy and less likely to have abdominal pain, nausea, and vomiting compared with children without duodenitis. We could identify a specific diagnosis related to duodenitis in 64% of children. As expected, celiac disease and Crohn's disease were the leading causes in our patients. A large number of children (36%) had nonspecific duodenitis. This finding is similar to high percentage of nonspecific duodenitis (60%) that is reported in adults (8). Our study shows that children with duodenitis are more likely to have gastritis (64%) than esophagitis (22%). The cause of this association may be due to underlying causes of duodenitis such as celiac disease, IBD, *H. pylori* and NSAID ingestion which are

more likely to cause gastritis than esophagitis. We also observed that children with IBD are more likely to have gastroduodenitis than children with celiac disease.

Previous studies have showed a poor concordance between endoscopic findings and histological diagnosis of duodenitis in children. Long et al reported 54% sensitivity of predicting histological duodenitis with endoscopic examination of the duodenum in 24 children (7). Our data shows an even lower sensitivity of 37%, highlighting the need for obtaining routine duodenal biopsies from normal appearing duodenal mucosa. We observed a spectrum of histological features such as inflammatory infiltrate, granulomas, architecture changes involving villi and crypts in our patients.

Duodenitis as a part of upper gastrointestinal involvement has been reported in 31 % to 33 % of children with Crohn's disease and 3% to 23 % in children with ulcerative colitis (5,6). In a recently published study, our group looked at our pathology database over 7 years and identified 421 children with duodenitis in our institution (9). We compared histopathological features of 50 children with duodenitis and IBD with those of 168 children with nonspecific duodenitis and celiac disease. We observed a significant overlap in duodenal histological features due to different etiology, but a higher frequency of cryptitis in children with IBD (9).

Major limitation of this study is its retrospective nature. While diagnosis of duodenitis was confirmed in all, diagnosis of gastritis and esophagitis was based on pathology reports. However, to the best of our knowledge, this is the first study describing prevalence, etiology and clinical features in a large group of unselected children with duodenitis. We also report an interesting association of gastritis with duodenitis in children and a poor correlation of endoscopic appearance with histology for duodenitis.

Acknowledgments

Support: Arik Alper supported by NIH NIDDK T32 DK 007017, Training Program in Investigative Gastroenterology

References

1. Pashankar DS, Bishop WP, Mitros FA. Chemical gastropathy: A distinct histopathologic entity in children. *J Pediatr Gastroenterol Nutr.* 2002; 35:653–7. [PubMed: 12454581]
2. Papadopoulou A, Koletzko S, Heuschkel R, et al. Management guidelines of eosinophilic esophagitis in childhood. *J Pediatr Gastroenterol Nutr.* 2014; 58:107–18. [PubMed: 24378521]
3. Oderda G, Forni M, Farina L, et al. Duodenitis in children: clinical, endoscopic and pathological aspects. *Gastrointest Endosc.* 1987; 33:366–9. [PubMed: 3678763]
4. Cheng SX, Raizner A, Phatak UP, et al. Celiac disease in a child with ulcerative colitis: a possible genetic association. *J Clin Gastroenterol.* 2013; 47:127–9. [PubMed: 23314669]
5. Tobin JM, Sinha B, Ramani P, et al. Upper gastrointestinal mucosal disease in Pediatric Crohn disease and ulcerative colitis: A blinded study. *J Pediatr Gastroenterol Nutr.* 2001; 32:443–8. [PubMed: 11396811]
6. Hummel TZ, ten Kate FJW, Reitsma JB, et al. Additional value of upper GI tract endoscopy in the diagnostic assessment of childhood IBD. *J Pediatr Gastroenterol Nutr.* 2012; 54:753–7. [PubMed: 22584746]
7. Long FR, Kramer SS, Markowitz RI, et al. Duodenitis in children: correlation of radiologic findings with endoscopic and pathologic findings. *Radiology.* 1998; 206:103–8. [PubMed: 9423658]

8. Terada T. Pathologic observations of the duodenum in 615 consecutive duodenal specimens: I. benign lesions. *Int J Clin Exp Pathol.* 2012; 5:46–51. [PubMed: 22295146]
9. Hardee S, Alper A, Pashankar DS, et al. Histopathology of duodenal mucosal lesions in pediatric patients with inflammatory bowel disease: Statistical analysis to identify distinctive features. *Pediatr Dev Pathol.* 2014; 17:450–4. [PubMed: 25207874]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

What is known/What is New**What is known**

- There is a limited literature on duodenitis in children.
- Previous studies reporting duodenitis in children have small sample size.
- Duodenitis occurs in children with celiac disease and inflammatory bowel disease.

What is New

- Prevalence of duodenitis in children undergoing endoscopy is 12.7%.
- There is a poor correlation of endoscopic appearance with histology in children with duodenitis
- Gastritis is a frequent occurrence in children with duodenitis.

Table 1
Endoscopy indications and associated gastrointestinal pathology in children with and without duodenitis

	Children With duodenitis (n=352)	Children Without duodenitis (n= 2420)	P value
Endoscopy Indications			
Abdominal Pain	38%	46%	0.005
Positive celiac serology	32%	2%	<0.001
Diarrhea	9%	7%	0.15
Failure to thrive	5%	4%	0.46
Nausea/vomiting	5%	14%	<0.001
Associated Pathology			
Esophagitis	22%	21%	0.45
Gastritis	64%	46%	<0.001
Etiology			
Celiac disease	32%	0%	<0.001
IBD	16%	10%	<0.01

Table 2
Common presenting symptoms in children having duodenitis with and without gastritis

	Children having duodenitis without gastritis (n=131)	Children having duodenitis with gastritis (n= 221)	P value
Mean age (yr)	10.2 ± 5	10.8 ± 4.7	0.24
Abdominal Pain	70%	63 %	0.29
Vomiting	26%	23 %	0.59
Nausea	22%	15 %	0.16
Failure to thrive	10%	9 %	0.84

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript