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Outcomes of Children After Esophagogastroduodenoscopy for Chronic Abdominal Pain

Kalpesh Thakkar, Leon Chen, Mary E. Tessier, and Mark A. Gilger

Section of Pediatric Gastroenterology, Hepatology and Nutrition, Baylor College of Medicine, Houston, Texas

Abstract

BACKGROUND & AIMS—Chronic abdominal pain is the most common indication for esophagogastroduodenoscopy (EGD) in children. However, little is known about the accuracy of EGD-based diagnosis or the outcomes of the patients who undergo this procedure. We examined the diagnostic yield of EGD and short-term outcomes of children who underwent this procedure for chronic abdominal pain.

METHODS—We conducted a prospective study of 290 children (4–18 years old; mean age, 11.9 ± 3.5 years; 93 girls) who underwent EGD for the primary indication of chronic abdominal pain (216 with at least 1 alarm feature) at a US pediatric gastroenterology referral center. We collected data on demographic features (age, sex), clinical characteristics (alarm features, Rome III criteria), and EGD results for each patient. All subjects with diagnostic lesions were followed for at least 1 year after EGD to determine short-term outcomes.

RESULTS—Overall, EGD provided an accurate diagnosis for 109 children (38%). Diagnoses included esophagitis (21.0%), eosinophilic gastroenteritis (4.1%), eosinophilic esophagitis (3.8%), *Helicobacter pylori* infection (2.0%), celiac disease (0.6%), and Crohn's disease (0.4%). Short-term outcomes were available for 81% of patients with diagnostic findings, and medical therapy was effective in approximately 67% of these children.

CONCLUSIONS—EGD is valuable for the diagnosis of children with abdominal pain, with a 38% diagnostic yield. EGD identified disorders for which medical therapy was effective in 67% of children during the year after diagnosis.

Keywords

Gastrointestinal Endoscopy; Pediatrics; Evaluation; Management

Chronic abdominal pain (CAP) is the most frequent indication for esophagogastroduodenoscopy (EGD) in children.^{1,2} However, EGD is generally not recommended for the evaluation of CAP because consensus recommendations conclude that

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Reprint requests Address requests for reprints to: Kalpesh Thakkar, MD, 6621 Fannin Street, CCC 1010, Houston, Texas 77030. kthakkar@bcm.edu; fax: (832) 825-3633.

Conflicts of interest

The remaining authors disclose no conflicts.

most of these patients have functional disorders.³ In addition, the Rome criteria for childhood functional gastrointestinal disorders do not require a negative EGD for diagnosis of abdominal pain–related functional disorders.⁴

We previously performed a systematic review of the literature to evaluate the yield of EGD in children with abdominal pain by defining the prevalence of endoscopic and histologic findings and clinical outcomes (eg, change in treatment, quality of life, improvement of abdominal pain, cost-effectiveness).⁵ We found that the diagnostic yield of EGD in children with abdominal pain was low (4%) in the existing literature; however, available studies were inadequate because of small sample size, variable findings, and selection bias. We subsequently performed a retrospective study in children who had EGD for the primary indication of abdominal pain and found that EGD was diagnostic in 454 of 1191 procedures (38.1%).² Our finding of significant diagnostic yield was in marked contrast to previous studies; however, our study was limited by its retrospective design.

Therefore, we conducted the current prospective cohort study to examine the diagnostic yield and clinical outcomes of specific diagnoses after EGD with biopsy in children with CAP of unclear etiology.

Methods

Study Design

We conducted a prospective cohort study in children who had EGD for the primary indication of CAP at Texas Children's Hospital in Houston, Texas, from November 1, 2007, to March 1, 2010. Endoscopists at Texas Children's Hospital participate in the Pediatric Endoscopy Database System-Clinical Outcomes Research Initiative and create endoscopy reports by using a computerized report generator shortly after each procedure is completed. Patients were screened before endoscopy to meet inclusion criteria: (1) abdominal pain for 2 or more months without known organic etiology as the primary indication for endoscopy, (2) no previous gastrointestinal endoscopic procedures, and (3) age between 4 and 18 years. We excluded procedures performed in patients with previously established conditions (eg, inflammatory bowel disease [IBD], celiac disease, peptic ulcer). We also excluded patients with significant comorbidities such as a history of organ transplant, psychiatric disorders, and neurodevelopmental disorders (eg, cerebral palsy, Down syndrome). Patients undergoing EGD for the evaluation of elevated tissue transglutaminase were not included. Patients taking corticosteroids or other immunosuppressive medicines were not eligible for the study. Subjects with GERD responding to therapy were included if the primary clinical symptom was abdominal pain. At least 1 biopsy taken from 3 upper gastrointestinal regions (ie, esophagus, stomach, and duodenum) was required in all enrolled patients.

Before each procedure, we collected demographic characteristics (eg, age, gender, race) and clinical features (eg, alarm symptoms, Rome III criteria, proton pump inhibitor [PPI] use) in a uniform fashion by using paper data collection forms completed by research staff. The data collection was completed through structured interviews with each family before the EGD in combination with examination of medical records. Each patient was screened for abdominal pain–related Rome III functional disorders including abdominal migraine, irritable bowel

syndrome, functional dyspepsia, and functional abdominal pain syndrome.⁴ Alarm features included dysphagia, weight loss, chronic diarrhea, nocturnal diarrhea, pain awakens child from sleep, persistent vomiting, unexplained fever, growth failure, arthralgia, family history of IBD, family history of celiac disease, history of atopy, perirectal disease, delayed puberty, and gastrointestinal bleeding.⁴ The presence of a clinical diagnosis of gastroesophageal reflux disease (GERD) or obesity before endoscopy was recorded.

Diagnostic Yield of Esophagogastroduodenoscopy

Diagnostic yield (ie, pathologic lesions) was based on gross endoscopic findings in procedure notes or histologic changes in biopsy reports and defined as having potential therapeutic or prognostic value (eg, reflux esophagitis, peptic ulcers, *Helicobacter pylori*).

Procedures without diagnostic yield included those with nonspecific endoscopic findings (eg, erythema, increase or loss of vascularity, pallor) and descriptive histologic changes (eg, reactive changes, edema, mild inflammatory changes).^{6,7}

Review of the final pathology report on biopsies provided the data source for histologic diagnosis. The diagnosis of eosinophilic esophagitis (EoE) was defined by 2 criteria from the 2007 guidelines: (1) histologic evidence of esophagitis with more than 15 eosinophils per high-power field (HPF) with other compatible features (eg, microabscess, degranulation, surface layering, extracellular eosinophil granules) and (2) symptoms related to esophagitis (eg, abdominal pain).⁸ Predetermined cutoffs for eosinophils in the stomach (ie, 10 eosinophils per HPF) and duodenum (ie, 20 eosinophils per HPF) with compatible features defined eosinophilic gastroenteritis.⁹

Diagnostic Outcomes

All patients meeting criteria for diagnostic lesions were followed for up to 1 year after the EGD for the recording of the following short-term outcomes: type of therapy, response to therapy, status of abdominal pain, and loss to follow-up. Improvement of symptoms was defined by decrease in the duration, severity, and frequency of abdominal pain. Subjects who did not follow up in outpatient clinics within 1 year of EGD were contacted by phone and asked to participate in a brief survey to capture the above outcomes of interest.

Statistical Analysis

Descriptive statistics were calculated for demographic features (eg, gender, age) and clinical characteristics (eg, alarm symptoms, underlying diseases). Chi-square tests were used to compare patients with and without diagnostic yield for the distribution of categorical variables describing demographics (gender, race), clinical history (alarm symptoms, underlying diseases), and laboratory tests (anemia, low serum albumin, elevated erythrocyte sedimentation rate, elevated C-reactive protein [CRP]). Subjects were divided into groups on the basis of the type of diagnostic lesion for descriptive analysis of short-term outcomes (eg, type of therapy, response to therapy).

Regression models were used to investigate characteristics associated with diagnostic yield, while controlling for potential confounding variables. On the basis of an expected diagnostic

yield of 38%,² a sample size of 300 procedures was planned to allow for a 95% confidence interval of 5.5%.

Results

During the study period, 2170 diagnostic EGDs were performed, of which 332 (15.3%) were performed for the primary indication of CAP. Forty-two (12.7%) were excluded for being repeat endoscopies in the same patient, having exclusion diagnoses, lack of required biopsies, or for patient age older than 18 years. Thus, a total of 290 EGDs performed in 290 unique patients with a mean age of 11.9 years (standard deviation [SD], 3.5) were included in the analysis. A median of 9 biopsies were taken per endoscopy (mean = 10), with a mode of 6 biopsies. The majority of patients were female (n = 193, 66.1%). Race was described as white in 69.0% (n = 200), Hispanic in 23.9% (n = 70), black in 4.1% (n = 12), and Asian in 2.7% (n = 8). Rome III criteria were met in 272 subjects (93.4%) including 118 (40.4%) with functional dyspepsia, 80 (27.4%) with functional abdominal pain syndrome, 42 (14.5%) with irritable bowel syndrome, and 32 (11.0%) with abdominal migraine.

Before endoscopy, approximately 66.7% of patients (195) were prescribed a PPI trial for at least 1 week, and 20.5% of patients (60) were clinically diagnosed with gastroesophageal reflux. The mean duration of PPI use was 11 weeks, with a median and mode of 4 weeks. Of the 195 patients receiving PPI therapy, 99 (50.5%) reported no response, 82 (42.3%) reported partial response, and 14 (7.2%) reported good response before endoscopy. Among subjects with a clinical diagnosis of GERD (n = 60) receiving PPI therapy, 27 (45.0%) reported no response, 27 (45.0%) reported partial response, and 6 (10.0%) reported good response before endoscopy.

Overall, 216 subjects (74.5%) had at least 1 documented alarm symptom before endoscopy, and 125 had 2 alarm symptoms reported. Nighttime awakening that was due to pain was reported in 140 subjects (33.3%), followed by weight loss in 70 (15.6%), family history of IBD in 38 (8.4%), vomiting in 35 (7.8%), dysphagia in 31 (6.9%), nocturnal diarrhea in 30 (6.7%), gastrointestinal bleed in 26 (5.8%), chronic diarrhea in 26 (5.8%), unexplained fever in 20 (4.4%), arthralgia in 18 (4.0%), growth failure in 11 (2.4%), perirectal disease in 3 (0.7%), and delayed puberty in 1 subject (0.2%). We found that PPI therapy before EGD was not associated with the presence of alarm symptoms ($P = .52$). Subjects reported the abdominal pain occurred for a mean of 58.6 weeks before the endoscopy.

Overall, EGD was diagnostic in 109 (37.6%; 95% confidence interval, 32%–43%) of the 290 procedures including reflux esophagitis (21%, n = 61), EoE (4.5%, n = 13), eosinophilic gastroenteritis (4.1%, n = 12), *H pylori* infections (2.8%, n = 8), celiac disease (0.6%, n = 4), Crohn's disease (0.3%, n = 1), and chemical gastritis (0.3%, n = 1). Endoscopic diagnostic findings included peptic ulcers (0.6%, n = 3), hiatal hernia (0.6%, n = 3), and erosive esophagitis (0.6%, n = 3). Our subject with Crohn's disease had a 1-year history of periumbilical abdominal pain and was found to have elevated CRP and erythrocyte sedimentation rate (ESR).

Determinants of Diagnostic Yield

Procedures with and without diagnostic yield were compared with regard to demographic (eg, age, gender, ethnicity) and clinical features (eg, alarm symptoms, underlying disease, Rome criteria, laboratory tests) (Table 1). Male patients had a significantly higher rate of diagnostic EGDs as compared with female patients (46.4% vs 33.2%, $P = .03$). Black patients had high diagnostic yield (66.7%, $P = .06$) including 4 patients with *H pylori*, 2 with eosinophilic gastroenteritis, 1 with reflux esophagitis, and 1 with a hiatal hernia. Patients with 1 or more alarm symptoms did not have a significantly higher diagnostic yield than those without (38.9% vs 33.8%, $P = .43$). Diagnostic yield in patients without alarm symptoms ($n = 25$) included 16 patients with reflux esophagitis, 4 with eosinophilic gastroenteritis, 2 with EoE, 1 with erosive esophagitis, 1 with celiac disease, and 1 with *H pylori*. No specific single alarm feature was associated with increased diagnostic yield. However, patients with ≥ 2 alarm symptoms ($n = 125$) had a higher diagnostic yield compared with patients with <2 alarm symptoms (45.0% vs 32.1%, $P = .03$). Duration ($P = .3$) or frequency ($P = .9$) of abdominal pain was not associated with diagnostic yield. The number of biopsies taken between diagnostic and nondiagnostic EGDs was not significantly different ($P = .9$). The presence of clinical gastroesophageal reflux or obesity was not associated with a diagnostic EGD. Other Rome III screening clinical features such as pain interfering with normal activities ($P = .33$), pain relieved by defecation ($P = .09$), periodic/paroxysmal episodes of pain ($P = .75$), and intervening periods of usual health ($P = .68$) were not associated with diagnostic findings. Among laboratory tests, elevated CRP, anemia, and elevated ESR were not significantly associated with diagnostic yield.

The primary multivariable logistic regression model included race, gender, and the presence of at least 2 alarm symptoms as potential predictors of diagnostic yield (Table 2). After adjusting for all other variables, male gender (+82%), ≥ 2 alarm symptoms (+75%), and black race (+250%) remained independently associated with increased diagnostic yield. There were no significant interaction terms for ≥ 2 alarm symptoms, gender, or black race. Abnormal laboratory tests (elevated CRP, anemia, and elevated ESR) were added to the regression model, and none were significantly associated with diagnostic yield.

Reflux Esophagitis Outcomes

Reflux esophagitis was reported in 61 patients (21%), and chart review revealed that 10 (16.7%) were lost to follow-up. Among the 51 patients with records available, 42 patients (84%) received or continued PPI therapy on the basis of the biopsy results, whereas 3 (5%) received H_2 receptor antagonist medications (eg, ranitidine), and 5 (10%) were not treated with anti-reflux medications. Among the 42 patients taking PPI medications after EGD, 26 (62%) reported improvement in abdominal pain while on PPI therapy. Among the 3 patients taking H_2 blockers, 2 (66.7%) reported improvement in abdominal pain with the medication. Therefore, antisecretory agents were effective in approximately 62% of patients (28 of 45) with CAP and histologic reflux esophagitis.

Eosinophilic Esophagitis Outcomes

EoE was reported in 13 patients, and 2 (15.4%) were lost to follow-up. Among the 11 patients with records available, 7 patients received topical corticosteroids (eg, fluticasone),

and 4 patients were placed on PPI therapy. Resolution of abdominal pain was noted in 4 children taking corticosteroids and 3 children taking PPI. Therefore, medical therapy was effective in approximately 64% of patients (7 of 11) with CAP and EoE.

Eosinophilic Gastroenteritis Outcomes

Eosinophilic gastroenteritis was reported in 12 patients. This included 4 with eosinophilic inflammation of the stomach and 8 with primarily duodenal eosinophilia. Overall, 4 of the subjects (33.3%) were lost to follow-up. Among the 8 patients with follow-up data available, 4 were treated with PPI medications, 3 were treated with corticosteroids, and 1 patient was scheduled for a colonoscopy, which revealed IBD. All of the patients receiving PPI therapy (n = 4) reported resolution or improvement of abdominal pain, whereas 2 patients (66.7%) receiving corticosteroids reported improvement. Thus, medical therapy for eosinophilic gastroenteritis was effective in approximately 85.7% of children (6 of 7) with CAP.

Helicobacter pylori Outcomes

H pylori infections were reported in 8 patients on the basis of biopsy findings, and 1 (12.5%) was lost to follow up. Among the 7 patients with records available, 5 received 2 antibiotics plus PPI, and 2 received PPI therapy only. Two of the 5 subjects on triple therapy reported improvement in abdominal pain, and both patients on PPI therapy alone reported a good response to medications. Thus, medical therapy for *H pylori* was effective in approximately 57% of children (4 of 7) with CAP.

Other Diagnostic Outcomes

Other diagnostic lesions based on histopathology included celiac disease (n = 4), Crohn's disease (n = 1), and chemical gastritis (n = 1). Among the 4 patients with celiac disease, 2 experienced improvement of abdominal pain after starting gluten-free diet, 1 patient continued to have abdominal pain after dietary changes, and 1 was lost to follow-up. In 3 patients, tissue transglutaminase antibodies were checked after EGD to help confirm the diagnosis. The patient with Crohn's disease was placed on 6-mercaptopurine and prednisone, and the abdominal pain resolved. Chemical gastritis was noted in a child taking nonsteroidal anti-inflammatory drugs regularly; stopping these medications and initiating PPI therapy resolved this patient's abdominal pain.

Endoscopic diagnostic findings included peptic ulcers (0.6%, n = 3), hiatal hernia (0.6%, n = 3), and erosive esophagitis (0.6%, n = 3). Among the 3 patients with ulcers, one improved with carafate and PPI therapy, another improved on PPI therapy alone, and one patient was lost to follow-up. Among the 3 patients with hiatal hernia, one improved on PPI therapy, one did not improve despite PPI therapy, and one patient was not placed on any specific treatment. Among the 3 patients with erosive esophagitis, 2 were lost to follow-up, and 1 did not respond to PPI therapy and was referred to surgery.

Overall, medical therapy for diagnostic findings was effective in approximately 67% of children (63 of 88) with CAP with short-term follow-up.

Discussion

Our findings suggest that EGD is valuable for the evaluation of CAP in children with a diagnostic yield of 38%. Reflux esophagitis (21%) is the most common diagnosis, followed by EoE (5%), eosinophilic gastroenteritis (4%), and *H pylori* (2%). These findings are similar to our multicenter retrospective study of 1191 EGDs that showed a 38.1% diagnostic yield including reflux esophagitis (23%), *H pylori* infections (5%), peptic ulcers (3%), EoE (2%), and celiac disease (1%, n = 9).

Our data indicate that esophagitis is the most common abnormal finding (26%) in children with CAP. This was primarily histologic esophagitis consistent with reflux (21%). Several studies in children confirm that abdominal pain is a frequent presenting symptom of GERD.¹⁰ A majority of our patients (68%) attempted a trial of PPI before EGD; however, the presence or response to PPI therapy was not predictive of esophagitis or GERD. Children with reflux esophagitis on PPI therapy before endoscopy were often subjected to an adjustment of dose, duration, or type of PPI on the basis of the histologic findings. Uniform use of PPI therapy before EGD may not be indicated because the use of PPI before endoscopy was not associated with a higher diagnostic yield (Table 1), and the majority of our cohort (79%) did not have reflux esophagitis. Although current expert consensus indicates that histology has limited value in evaluating pediatric GERD, the relationship between reflux esophagitis and clinical outcomes is unknown.¹¹ In addition, a range of gastrointestinal inflammatory conditions (eg, IBD, celiac disease) have demonstrated that microscopic mucosal inflammation may be linked to clinical outcomes despite a lack of association with symptoms. Thirty-two percent of our subjects with reflux esophagitis were not given PPI before endoscopy, likely because of nonspecific symptoms (ie, abdominal pain). In our cohort, antisecretory agents were effective in approximately 64% of children with CAP and histologic reflux esophagitis after 1 year of follow-up. Published data indicate that at least one-third of children with histologic esophagitis experience medical management changes.¹² Thus, reflux esophagitis may be an important finding in children with CAP, because it often leads to a trial of PPI therapy or an adjustment of prior PPI treatment.

EoE was present in about 5% of children with CAP. Although dysphagia is a common complaint in adults with EoE, nonspecific abdominal pain is a common presentation in children.¹³ The histologic criteria for eosinophilic infiltration in our study are supported in the 2007 EoE consensus recommendations.¹⁴ In addition, among our 13 subjects with EoE, 11 received PPI trial before EGD, and none reported good response. Thus, 11 of 13 of our EoE cohort (85%) meet the 2007 guideline criteria. We found that medical therapy (eg, PPI, corticosteroids) improved symptoms in approximately 64% of patients with CAP and EoE. Several reports have shown that significant esophageal eosinophilia may resolve with PPI therapy alone in up to 40% of children.¹⁵ Thus, our 2 subjects not receiving PPI trial may have PPI-responsive esophageal eosinophilia rather than EoE.

On the basis of our criteria of 10 eosinophils per HPF in the stomach or 20 eosinophils per HPF in the duodenum, 4% of enrolled patients had eosinophilic gastroenteritis. Histopathology is required for diagnosis of eosinophilic gastroenteritis; however, the

diagnostic criteria remain unclear.^{16,17} One study found 1.9 ± 1.3 eosinophils per HPF in the gastric antrum and 9.6 ± 5.3 eosinophils per HPF in the duodenum in children without apparent pathology.¹⁸ Abdominal pain has been shown to be the most common presentation for eosinophilic gastroenteritis in children.¹⁹ Evidence in adult patients indicates that duodenal eosinophilia may characterize a subset of patients with dyspepsia.²⁰ In our cohort, medical therapy (eg, PPI, corticosteroids) for eosinophilic gastroenteritis was clinically effective in approximately 86% of children with CAP. Although data on PPI therapy for eosinophilic gastroenteritis are limited, adult studies have shown up to a 95% response rate to corticosteroids in these patients.²¹

The inclusion of patients with and without alarm features allows us to examine the utility of the presence of alarm features. In the current study, we found that alarm symptoms were predictive of diagnostic yield if at least 2 were present. However, no specific alarm symptoms (eg, dysphagia, weight loss, chronic diarrhea, vomiting) were associated with increased diagnostic yield. In addition, among the 74 subjects without alarm symptoms, the diagnostic yield was 34% ($n = 25$), which is still clinically significant. A technical report by the American Academy of Pediatrics and North American Society for Pediatric Gastroenterology, Hepatology and Nutrition suggested that alarm symptoms should be used to screen children for endoscopy.³ However, the sum of our data suggests that although alarm symptoms increase diagnostic yield in CAP, patients without these symptoms may have significant yield (34%) of organic disease from EGD.

Although the focus of our study was CAP, many children in our cohort met Rome III criteria for functional disorders including functional dyspepsia, functional abdominal pain syndrome, irritable bowel syndrome, and abdominal migraine. Pediatric Rome III criteria for childhood functional gastrointestinal disorders eliminated the mandatory use of upper endoscopy and recommended a symptom-based approach. However, symptoms do not accurately predict endoscopic findings, and eosinophilic disease requires histopathology for diagnosis.²² The majority of children in our study (93%) met criteria for functional gastrointestinal disorders, and a significant proportion (38%) still had significant histologic findings. Therefore, we conclude the Rome III criteria alone are not sufficient to identify children who require upper endoscopy, and screening for alarm symptoms has limited utility.

Because the current study only examined those children who underwent endoscopy for abdominal pain, there is a possibility of selection bias toward those with more severe abdominal pain or alarm symptoms. Therefore, the study may overestimate the utility of upper endoscopy for CAP. Our study included a somewhat heterogeneous clinical population, and less invasive testing could be considered in selected subjects (eg, *H pylori*). Approximately one-third of our patients did not respond to directed therapy; thus, a control group would be important to establish causality between clinical symptoms, endoscopy findings, and management changes.

In conclusion, our findings suggest that EGD may be valuable for the evaluation of children with abdominal pain, with a diagnostic yield of approximately 38%. Medical therapy for significant histopathologic or endoscopic findings was effective in approximately 67% of

children with CAP with short-term follow-up. These findings require further investigation with controlled studies investigating long-term outcomes in children with CAP who undergo endoscopy.

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Abbreviations used in this paper

CAP	chronic abdominal pain
CRP	C-reactive protein
EGD	esophagogastroduodenoscopy
EoE	eosinophilic esophagitis
ESR	erythrocyte sedimentation rate
GERD	gastroesophageal reflux disease;
HPF	high-power field
IBD	inflammatory bowel disease
PPI	proton pump inhibitor
SD	standard deviation

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Table 1

Comparison of Procedures With and Without Diagnostic Yield in 290 Pediatric Patients Undergoing EGD for CAP Between November 1, 2007, and May 1, 2010

	Diagnostic (%)	Nondiagnostic (%)	<i>P</i> value
Total patients	109 (37.6)	181 (62.4)	
Rome III diagnosis			
Functional abdominal pain syndrome	28 (27.5)	52 (30.6)	.54
Irritable bowel syndrome	15 (14.7)	27 (15.9)	
Abdominal migraine	12 (11.8)	20 (11.8)	
Dyspepsia	47 (46.1)	71 (30.6)	
Gender			
Male	45 (41.3)	52 (28.7)	.03
Female	64 (58.7)	129 (71.3)	
Race			
White	73 (67.0)	127 (70.2)	.17
Black	8 (7.3)	4 (2.2)	
Asian	2 (1.8)	6 (3.3)	
Hispanic	26 (23.9)	44 (24.3)	
Black race			
Present	8 (7.3)	4 (2.2)	.06
Absent	101 (92.7)	177 (97.8)	
Age (y)	11.8 (SD, 3.5)	11.9 (SD, 3.5)	.74
PPI use			
Present	75 (68.8)	120 (66.3)	.66
Absent	34 (31.2)	61 (33.7)	
Any alarm symptom			
Present	84 (77.1)	132 (72.9)	.43
Absent	25 (22.9)	49 (27.1)	
2 Alarm symptoms			
Present	56 (51.3)	69 (38.1)	.03
Absent	53 (50.5)	112 (61.9)	

Table 2

Characteristics Associated With Diagnostic Outcome in Multivariate Analysis Among 290 Pediatric Patients Undergoing EGD for CAP Between November 1, 2007, and May 1, 2010

	Adjusted odds ratio	95% Confidence interval
Alarm 2		
Absent	(Reference)	
Present	1.75	1.07–2.85
Gender		
Female	(Reference)	
Male	1.82	1.05–3.00
Black race		
Absent	(Reference)	
Present	3.50	1.01–12.31