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Clinical-Endoscopic Finding, Risk Factors and Management of Peptic Ulcer Disease in Children

Çocuklarda Peptik Ülser Hastalığının Klinik-endoskopik Bulguları, Risk Faktörleri ve Yönetimi

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Abstract

Objective: Peptic ulcer disease (PUD) is less common in children than in adults and may present with non-specific symptoms. In this study, we aimed to evaluate the long-term clinical follow-up data from a large cohort of pediatric patients diagnosed with PUD.

Methods: All patients who underwent upper gastrointestinal system (GIS) endoscopy between August 2015 and October 2021 were evaluated; those with PUD were included in the study. Clinical, endoscopic, and histopathologic data were evaluated.

Results: PUD was detected in 107 of 3116 patients (3.43%) who underwent upper GIS endoscopy. Among these patients, 57.9% were male, with a mean age of 12.93±4.40 years. The prevalence of PUD by age group was 8.4% in children under 5 years, 19.6% in those aged 6-11 years, and 72% in adolescents aged 12-18 years. In children older than 5 years, The most common presenting symptom was generalized abdominal pain, followed by epigastric pain; in children younger than 5 years, hematemesis was the most frequent presenting symptom. Ulcers were most commonly located in the duodenal bulb (69.2%). In children under 5 years of age, ulcers were predominantly located in the antrum. *Helicobacter pylori* (*H. pylori*) positivity was found in 63.5% of PUD cases. Non-steroidal anti-inflammatory drug (NSAID) use was observed in 6.5% of the cases as a contributing factor. In 76.5% of *H. pylori*-positive patients, the ulcer was located in the bulb. Two patients required endoscopic hemoclip placement due to ulcer-related bleeding. Endoscopic balloon dilation and surgical intervention were performed in two separate cases of pyloric stenosis secondary to an ulcer. Surgical treatment was also required in one patient due to ulcer-related perforation.

Conclusion: PUD should be considered in patients presenting with generalized abdominal pain, even in the absence of isolated epigastric pain. *H. pylori* infection should be assessed in all PUD cases, and eradication therapy should be an integral part of the treatment for positive cases. Families should be informed in detail about the risks associated with NSAID use, and these medications should be used cautiously.

Keywords: Peptic ulcer disease, gastroduodenoscopy, etiology, management

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Öz

Amaç: Peptik ülser hastalığı (PÜH), çocuklarda yetişkinlere kıyasla daha az yaygındır ve spesifik olmayan semptomlarla ortaya çıkabilir. Bu çalışmada, PÜH tanısı almış geniş bir pediatrik hasta grubunun uzun dönem klinik takip verilerini değerlendirmeyi amaçladık.

Yöntem: Ağustos 2015 ile Ekim 2021 tarihleri arasında üst gastrointestinal sistem (GİS) endoskopisi yapılan tüm hastalar değerlendirildi ve PÜH'lü hastalar çalışmaya dahil edildi. Klinik, endoskopik ve histopatolojik veriler değerlendirildi.

Bulgular: Üst GİS endoskopisi yapılan 3116 hastanın 107'sinde (%3,43) PÜH saptandı. Beş yaş üstü çocuklarda en sık başvuru semptomu yaygın karın ağrısı, bunu epigastrik ağrı takip ederken, 5 yaş altı çocuklarda en sık başvuru şikayeti hematemezdi. Ülser yerleşimi en sık duodenum bulbustaydı (%69,2). PUD olgularının %63,5'inde *Helicobacter pylori* (*H. pylori*) pozitifliği bulundu. Olguların %6,5'inde non-steroid anti-enflamatuvar ilaç (NSAID) kullanımı katkıda bulunan bir faktör olarak gözlendi. *H. pylori* pozitif hastaların %76,5'inde ülser bulbusta yerleşmişti. İki hastada ülser ilişkili kanama nedeniyle endoskopik hemoklip yerleştirilmesi gerekti. Ülsere sekonder pilor stenozu olan iki ayrı olguda endoskopik balon dilatasyonu ve cerrahi girişim uygulandı. Bir hastada ülsere bağlı perforasyon nedeniyle cerrahi tedavi gerekti.

Sonuç: Yaygın karın ağrısı ile başvuran hastalarda PÜH düşünülmelidir. Tüm PÜH olgularında *H. pylori* enfeksiyonu değerlendirilmelidir. Aileler NSAID kullanımına bağlı riskler konusunda detaylı olarak bilgilendirilmeli ve bu ilaçlar dikkatli kullanılmalıdır.

Anahtar Kelimeler: Peptik ülser hastalığı, gastroduodenoskopi, etiyoloji, tedavi

Introduction

Peptic ulcer disease (PUD) refers to an acid-peptic injury within the gastrointestinal system (GIS). Peptic ulcers are deep mucosal lesions that extend through the muscularis mucosae of the stomach or duodenal wall[1]. Gastritis, duodenitis, and PUD develop as a result of an imbalance between mucosal defense mechanisms and aggressive factors[2]. PUD is classified as either primary or secondary based on etiology[3]. Most primary causes are associated with *Helicobacter pylori* (*H. pylori*) infection[4]. Secondary PUD is commonly caused by stress (such as sepsis, burns, shock, increased intracranial pressure, or postoperative states), medications [including non-steroidal anti-inflammatory drugs (NSAID), corticosteroids, and aspirin], and certain systemic diseases[5,6]. Upper GIS endoscopy plays a crucial role in diagnosing PUD, determining the location of the ulcer and the severity of bleeding, and providing endoscopic treatment when necessary.

Patients typically present with abdominal or epigastric pain, or with hematemesis[7-10]. However, PUD may present with non-specific symptoms in children[11]. Unlike in adult cases, clinical symptoms in pediatric patients may not reliably predict PUD before GIS bleeding occurs[12]. Recognizing the clinical features, etiological factors, and management strategies of PUD in children is crucial for raising awareness and ensuring appropriate care. Therefore, we aimed to evaluate long-term clinical follow-up data from a large cohort of pediatric patients diagnosed with PUD.

Materials and Methods

Children who underwent upper GIS endoscopy in the pediatric gastroenterology clinic between August 2015 and October 2021 and who were diagnosed with PUD were included in the study. Clinical, endoscopic, and histopathological data obtained from medical records and hospital information systems were evaluated. Demographic characteristics, presenting complaints, endoscopic ulcer locations, Forrest classification, histopathological findings, risk factors, *H. pylori* infection status, medical and endoscopic treatments administered, complications related to PUD, and management of recurrent PUD were recorded. Additionally, findings in *H. pylori*-positive and *H. pylori*-negative patients were compared. Anthropometric measurements were classified based on body mass index (BMI) percentiles: underweight (<5th percentile), normal weight (5th-85th percentile), overweight (85th-95th percentile), and obese (>95th percentile). Ethical approval was obtained from University of Health Sciences Türkiye, İzmir Tepecik Education and Research Hospital (approval no: 2022/06-13, date: 15.06.2022). Patient data were reviewed retrospectively, and informed consent was obtained from the patients' families.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as counts (n), percentages (%), mean ± standard deviation, minimum, maximum, and median values. The Pearson chi-square test was used to compare categorical

variables between groups. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 3116 pediatric patients who underwent upper GIS endoscopy were evaluated; PUD was identified in 107 cases (3.43%). Of these patients, 57.9% were male and 42.1% were female. The mean age at diagnosis was 12.93±4.40 years (ranging from 3 months to 17 years). The age distribution showed that 8.4% of cases were aged 0-5 years, 19.6% were aged 6-11 years, and 72% were aged 12-18 years. Regarding BMI percentiles, 26.2% of patients were underweight, 59.8% were of normal weight, 5.6% were overweight, and 8.4% were obese.

The most common presenting complaints were generalized abdominal pain (44.9%), epigastric pain (29%), melena (15.9%), and hematemesis (15%). In children under 5 years, hematemesis was the most frequent symptom, followed by generalized abdominal pain. For patients older than 5 years, generalized abdominal pain and epigastric pain were the most common presenting complaints (Table 1). The ulcer was most frequently located in the duodenal bulb (69.2%). Among children under 5 years of age, ulcers were most commonly located in the antrum (55.5%), whereas in those over 5 years of age, the bulb was the most common site (73.5%). According to the endoscopic Forrest classification, 1.87% were classified as Forrest 1B (active oozing bleeding), 0.93% as Forrest 2A (visible non-bleeding vessel), 23.4% as Forrest 2B (adherent clot), 26.2% as Forrest 2C (flat pigmented spot), and 47.6% as Forrest 3 (clean base ulcer).Histopathological examination of endoscopic biopsy specimens from patients with PUD detected *H. pylori* in 68 patients (63.5%). When evaluating the distribution of *H. pylori* infection by gender, no significant difference was observed between males and females (p=0.328). The prevalence of *H. pylori*-positive cases was higher in patients older than 12 years (p=0.003; Table 2). Isolated epigastric pain was observed in 35.2% of *H. pylori*-positive cases and 17.9% of *H. pylori*-negative cases (p=0.057). Generalized abdominal pain was reported in 44.1% of *H. pylori*-positive patients and in 46.1% of *H. pylori*-negative patients (p=0.838). Histopathological evaluation of PUD cases revealed antral gastritis in 19 patients (17.8%), pangastritis in 82 patients (76.6%), bulbitis in 41 patients (38.3%), duodenitis in 21 patients (19.6%), and esophagitis in 32 patients (29.9%). The frequency of pangastritis was significantly higher in *H. pylori*-positive patients than in *H. pylori*-negative patients (p=0.02) (Table 3). When the etiological causes of PUD were evaluated, 62 cases (57.9%) were associated with *H. pylori* infection, 27 cases (25.2%) were idiopathic, 10 cases (9.3%) were related to drug use, 3 cases (2.8%) were stress-related, and 5 cases (4.6%) were

Table 1. Clinical presenting findings of peptic ulcer disease cases by age group

Presenting complaints	0-5 years, n (%)	6-11 years, n (%)	12-18 years, n (%)
Hematemesis	5 (55.5)	3 (14.3)	8 (10.4)
Generalized abdominal pain	4 (44.4)	10 (47.6)	34 (70.8)
Epigastric pain	-	3 (14.3)	28 (36.4)
Vomiting	-	4 (19)	13 (16.9)
Melena	2 (22.2)	4 (19)	11 (14.3)
Hematochezia	1 (11.1)	1 (4.76)	-
Weight loss	-	2 (9.5)	5 (6.5)
Anemia	2 (22.2)	2 (9.5)	3 (3.9)
Regurgitation	-	3 (14.3)	10 (13)

Table 2. Distribution of age groups in *Helicobacter pylori*-positive and negative cases

***Helicobacter pylori* infection status**			
	Positive, n (%)	**Negative, n (%)**	**p-value***
Age group			
0-5 years	2 (2.9)	7 (17.9)	
6-11 years	10 (14.7)	11 (28.3)	**0.003**
12-18 years	56 (82.4)	21 (53.8)	

*: Pearson's chi-square test was used

Table 3. Histopathological findings in *Helicobacter pylori*-positive and *Helicobacter pylori*-negative patients

	***Helicobacter pylori* infection status**				**p-value***
	Positive, n (%)		**Negative, n (%)**		
Histopathological finding	Present	Absent	Present	Absent	
Antral gastritis	9 (13.2)	59 (86.8)	5 (12.8)	34 (87.2)	0.951
Pangastritis	59 (86.7)	9 (13.3)	18 (46.1)	21 (53.9)	**0.02**
Duodenitis	9 (13.2)	59 (86.8)	7 (17.9)	32 (82.1)	0.511
Bulbitis	24 (35.2)	44 (64.8)	12 (30.7)	27 (69.3)	0.634
Esophagitis	18 (26.4)	50 (73.6)	9 (23.1)	30 (76.9)	0.697

*: Pearson's chi-square test was used

due to other causes. Among the 10 patients with drug-related PUD, 7 were linked to NSAID use, 1 to chemotherapy, and 2 to steroid use. Of the three patients with stress-related PUD, two were monitored in the intensive care unit due to respiratory distress, and one was monitored due to gastrointestinal bleeding after septic shock. Other causes included 4 patients who were subsequently diagnosed with Crohn's disease and 1 patient who was diagnosed with alpha-1 antitrypsin deficiency. Among those diagnosed with Crohn's disease, 2 cases tested positive for *H. pylori*, and among NSAID-related PUD cases, 4 also tested positive for *H. pylori*.

In terms of medical treatment, 100 patients (93.5%) received proton pump inhibitors, 8 patients (7.5%) received H2 receptor blockers, 67 patients (62.6%) received sucralfate, and 68 patients (63.5%) received *H. pylori* eradication therapy. Endoscopic intervention was performed in 3 patients (2.8%): 2 patients underwent hemoclip application, and 1 patient underwent endoscopic balloon dilation for pyloric stenosis secondary to an ulcer. According to the endoscopic Forrest classification, one of the patients who underwent hemoclip placement was classified as Forrest 1B, and the other was classified as Forrest 2A. Follow-up endoscopies in these three patients demonstrated mucosal healing. Among all 107 patients with PUD, complications were observed in only 3 cases (2.8%). Specifically, 2 patients developed pyloric stenosis, and 1 patient experienced perforation. Endoscopic balloon dilation was performed in one patient with pyloric stenosis, whereas surgical intervention was required in the other patient with pyloric stenosis and in the patient with perforation.

Discussion

The prevalence of PUD in children is lower than in adults. Studies conducted on pediatric patients in our country have reported a prevalence of PUD ranging from 3.4% to 7.6%[10,13]. Studies from different countries indicate that the prevalence of PUD in children ranges from 2% to 8%[8,14-16]. In our study, PUD was detected in 3.43% of cases. In the study by Chan et al.,[17] the prevalence of PUD was higher among male children. Similarly, in our study, PUD was more frequently observed in male patients (57.9%) than in female patients. In our study, 72% of the patients were in the adolescent age group (12-18 years), while 8.4% were under the age of 5. A study conducted in China reported that *H. pylori*-positive PUD cases were more commonly observed after the age of 12[18]. According to the literature, the rate of *H. pylori* positivity in pediatric PUD cases ranges from 45.8% to 77.8%[19,20]. Consistent with the literature, *H. pylori* was detected in 63.5% of our cases, which supports the strong association between *H. pylori* and PUD. Although *H. pylori* positivity was found to be higher in males than females in our study, the difference was not statistically significant. Similarly, Murray et al.[21] demonstrated no gender difference in *H. pylori* infection. Among Korean adults, obesity has been reported to be associated with PUD[22]. In our study, 5.6% of PUD patients were overweight, 8.4% were obese, and the majority had BMIs within the normal range.

Among our PUD cases, the most common presenting symptom was diffuse abdominal pain, observed in 44.9% of patients. Güven et al.[1] reported that 75% of *H. pylori*-positive PUD cases and 64.5% of *H. pylori*-negative PUD cases presented with diffuse abdominal pain. In our study, diffuse abdominal pain was observed in 44.1% of *H. pylori*-positive cases and 46.1% of *H. pylori*-negative cases. Although epigastric pain at presentation was more frequent among *H. pylori*-positive PUD cases, the difference was not statistically significant. As shown in many studies, neither epigastric pain alone nor diffuse abdominal pain alone is sufficient to predict PUD. In our study, the most common presenting symptom in PUD cases under the age of five was

hematemesis. According to the literature, 33% of PUD cases present with gastrointestinal bleeding, regardless of age[14]. Another study demonstrated that bleeding and perforation were the most prominent presenting symptoms during infancy[8]. Our study suggests that in younger age groups, early symptoms such as abdominal and epigastric pain may go unrecognized or that PUD may not be considered among the primary differential diagnoses.

In our study, PUD was most frequently detected in the gastric antrum among patients under 5 years of age, whereas in other age groups the duodenal bulb was the most common ulcer location. When all *H. pylori*-positive and *H. pylori*-negative PUD cases were evaluated, the duodenal bulb was the most frequent site of ulceration. Previous studies have also demonstrated that duodenal bulb ulcers are more common in both *H. pylori*-positive and negative *H. pylori*-negative pediatric groups[23]. However, Ecevit et al.[10] reported that antral ulcers were more common in both *H. pylori*-positive and *H. pylori*-negative groups. In our study, independent of *H. pylori* infection, the most frequently observed ulcer type was Forrest type III. It has been reported that approximately 95% of *H. pylori*-positive PUD cases present with pangastritis[10,14]. Similarly, in our study, the frequency of pangastritis was significantly higher in *H. pylori*-positive cases than in *H. pylori*-negative cases.

NSAIDs are the most common cause of drug-related PUD[24]. A pediatric study from Asia reported a prevalence of NSAID-related PUD of 16.5%[15]. Similarly, NSAIDs were the most frequent cause of drug-associated PUD in our study. The literature indicates that numerous chemotherapeutic agents can damage the gastrointestinal mucosa and subsequently lead to PUD[25-27]. In our study, in addition to NSAIDs, we identified steroid use and chemotherapeutic agents as potential etiological factors for PUD. Based on these findings, obtaining a detailed medication history is essential when evaluating the etiology of PUD in pediatric patients.

No endoscopic treatment, including hemoclip application, electrocoagulation, or sclerotherapy, has been proven superior for the management of peptic ulcers[28]. In our study, hemoclips were applied to two patients who were identified endoscopically as having Forrest 1B ulcers and at high risk of bleeding and complications, and balloon dilation was performed in one patient for pyloric stenosis secondary to PUD. All patients infected with *H. pylori* received eradication therapy. Considering that PUD can be a significant cause of morbidity and mortality in the pediatric population, proper management is essential. Pyloric stenosis secondary to ulcers may lead to persistent vomiting, feeding difficulties, and weight loss. Therefore, in cases of prepyloric, antral, or duodenal ulcers at risk for gastric outlet obstruction, clinical follow-up and endoscopic evaluation are important. Peptic ulcer perforation is one of the most serious causes of morbidity and mortality in the pediatric population[29,30]. In our study, one patient required surgical intervention due to perforation secondary to PUD.

Study Limitations

Patients whose full files were accessible were included in the study. Cases excluded from follow-up and whose data were not fully accessible are considered limiting factors. The retrospective nature of the study is the primary limitation. Numerous prospective studies are needed in this area.

Conclusion

PUD should be considered in pediatric patients presenting with diffuse abdominal pain, even in the absence of isolated epigastric pain. The presence of *H. pylori* should be evaluated in patients with PUD, and eradication therapy should be an integral part of treatment. Given the risk of PUD associated with NSAID use in children, these medications should be used cautiously and with appropriate parental counseling. Increasing awareness among healthcare professionals-especially family physicians and pediatricians-is crucial. Recognizing the nonspecific clinical signs of PUD can facilitate early diagnosis, appropriate management, and prevention of potential complications.

Ethics

Ethics Committee Approval: Ethical approval was obtained from University of Health Sciences Türkiye, İzmir Tepecik Education and Research Hospital (approval no: 2022/06-13, date: 15.06.2022).

Informed Consent: Patient data were reviewed retrospectively, and informed consent was obtained from the patients' families.

Footnotes

Authorship Contributions

Surgical and Medical Practises: S.K., B.A., M.B., Y.Ç.A., Concept: Ö.B., B.A., Y.Ç.A., Design: Ö.B., S.K., Y.Ç.A., Data Collection or Processing: Ö.B., S.K., B.A., M.B., Y.Ç.A., Analysis or Interpretation: Ö.B., M.B., Y.Ç.A., Literature Search: Ö.B., Y.Ç.A., Writing: Ö.B., S.K., Y.Ç.A.

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