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Endoscopic Findings and Associated Factors in Children with Hematemesis

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Abstract

Background

Gastrointestinal bleeding (GIB) and especially upper GIB in children under 18 years, is underestimated compared to the adult population. Although mortality rate in this group of patients is reported to be about 2 percent, the role of early endoscopy in diagnosis and treatment of underlying causes and prevention of recurrence is essential. We aimed to evaluate endoscopic findings in children with hematemesis and assess the relationships between these findings and demographic/clinical variables.

Materials and Methods: In this cross-sectional study, we have studied the medical records of 102 patients from November 2017 to November 2018, under 18 years who referred to Children's Medical Center with hematemesis and had undergone the endoscopic procedure. The demographic information, past medical history, history of using NSAIDs (Non-Steroidal Anti-inflammatory Drugs), accompanying symptoms, laboratory records, and endoscopic findings were investigated.

Results: Participants are mostly between 6-11 years old (52.9%, n=54). The most common accompanying symptom is non-bleeding vomiting (52%, n=51). Patients with a history of using NSAIDs had a significantly higher rate of gastric ulcers (P-value<0.05). Moreover, the patients with a positive history of vomiting had a higher duodenal ulcer rate (P-value<0.05). Hb levels are significantly lower in patients with esophagitis (P-value<0.05). Also, patients with antrum nodularity were significantly older (P-value<0.05).

Conclusion

Prolapse gastropathy and gastric ulcers are the most common finding in endoscopy of children <18 years old with hematemesis. Also, the recent use of NSAIDs is the cause of gastric ulcers, and vomiting is related to duodenal ulcers. It is necessary to control recurrent vomiting and to limit the use of NSAIDs in children to prevent GI bleeding.

Key Words: Gastrointestinal bleeding, pediatrics, NSAIDs, Prolapse gastropathy, Esophagitis.

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1- INTRODUCTION

Upper gastrointestinal (GI) bleeding is a common and costly problem in the healthcare system (1). Despite being a common and preventable issue, the mortality due to upper GI bleeding in children is still high. In children<21 years old, upper GI bleeding of unknown causes make up nearly two percent of deaths in the first week of hospitalization–especially the first three days (2). The most important reasons for poor prognosis include: poor diagnosis of bleeding severity, inadequate knowledge on bleeding control before endoscopy, expertise limit, and poor risk assessment of rebleeding and insufficient education to children's parents (3).

Hematemesis is a sign of upper GI bleeding. It can happen because of esophageal, gastric, or duodenal pathologies. The sensitivity and specificity of hematemesis in the prediction of upper GI bleeding are reported 82.6% and 94%, respectively (4). The reasons for upper GI bleeding in children differ according to age: in newborns these are ingestion of maternal blood, cow milk allergy, and trauma; in infants they include Mallory–Weiss syndrome and esophagitis; in older children, esophagitis, esophageal varices, Mallory–Weiss syndrome, gastric ulcers, and gastritis are common causes (5).

The use of Non-Steroidal Anti-inflammatory Drugs (NSAIDs) is a preventable cause of gastritis (6). Endoscopy was approved in 1970 as a procedure to diagnose and treat upper GI bleeding. It is effective in 85-90% of the patients (3). According to the European Society of Gastrointestinal Endoscopy (ESGE), and the European Society of Pediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) guidelines in 2016, hematemesis is an indication to perform upper GI endoscopy in children (7). Endoscopy is safe, and complications are reported <1% (8). Recent developments have made it easier to detect the causes of bleeding and to limit the chance of rebleeding by an endoscopic intervention (4). In the current study, we aim to review diagnostic endoscopy results in children <18 years old with hematemesis in Children's Medical Center, Tehran, Iran. We aimed to evaluate the endoscopic findings of children that were admitted with hematemesis, to determine the causes of hematemesis, and to assess the relationships between causes and clinical/demographic variables. We hope that our results will help to prevent complications and subsequent deaths in children.

2- MATERIALS AND METHODS

2-1. Study design and population

In a cross-sectional study we assessed all patients from November 2017 to November 2018 with acute hematemesis who referred to Children's Medical Center, Tehran, Iran. The inclusion criteria were age<18 and coffee-ground hematemesis. We excluded patients with recurrent esophageal varices or isolated melena (without hematemesis), coagulopathy, or patients with missing data. Eventually, 102 patients with hematemesis who underwent upper gastrointestinal endoscopy in Children's Medical Center, Tehran, Iran, entered the study.

We collected the data by reviewing the patient's files, endoscopy, and laboratory reports. Two researchers collected the data from the patient's files in GI endoscopy ward. After collection, the data were recorded in papers and after were transmitted to SPSS software version 16.0. Demographic data were age and gender. Basic clinical data included vomiting (before hematemesis), hepatic disorders, drug history (using NSAIDs), first symptoms to endoscopy period, and accompanying symptoms. Accompanying symptoms were non-bleeding vomiting, fever (T>38 ℃), abdominal pain, and melena. The endoscopic findings were

obtained from endoscopic reports (First 48 hours of hematemesis). Laboratory tests included prothrombin time (PT), Partial Thromboplastin Time (PTT), and hemoglobin level (mmHg/dL).

2-2. Ethical considerations

Children's Medical Center's ethical committee approved this study in September 2017 with IRB code: IR.TUMS.CHMC.REC.1397.123. All patient's parents signed the consent forms before data collection. All data remained concealed and was kept anonymous.

2-3. Data Analysis

To demonstrate descriptive statistics, means (±standard deviations) and count (%) in form of tables were used. To assess the relationships between categorical variables, Chi-square test was used. The relationships between continuous and categorical variables were examined with an independent sample t-test. A p-value < 0.05 is considered significant in all tests. To analyze data, we used IBM SPSS 25 and R studio 1.1.463.

3- RESULTS

3-1. Demographic and basic clinical data

Participants are mostly between 6-11 years old (52.9%, n=54). The most common accompanying symptom is non-bleeding vomiting (52%, n=51). **Table.1** describes the demographic and basic clinical data of the patients.

Table-1: Demographic and Basic Clinical Data of the Patients (n=102).

Age (year), Mean	6.5
Age categories, N (%)	
<1	11(10.8)
1-2	7(6.9)
3-5	22(21.6)
6-11	54(52.9)
12-18	8(7.8)
Gender, Number (%)	
Female	54(52.9)
Male	48(47.1)
Accompanying Symptoms, N (%)	
Vomiting	51(52)
Fever	22(21.6)
Abdominal Pain	32(31.4)
Melena	14(13.7)
Hepatic disorders, Number (%)	4(3.92)
Using NSAIDs, Number (%)	27(26.5)
Hb (mmHg), Mean	12.16
Hb≤11, Number (%)	22(21.6)
PT (seconds), Mean ± SD	13.34±1.06
PTT (seconds), Mean ± SD	30.43±2.94

SD=Standard Deviation
Hb=Hemoglobin
PT=Prothrombin Time
PTT= Partial Thromboplastin Time
NSAIDs= Non-Steroidal Anti-Inflammatory Drugs.

3-2. Endoscopic findings

Table.2 demonstrates the relationships between endoscopic findings and demographic/basic clinical variables. The main findings on esophageal endoscopy include hiatal hernia, gastric ulcers and prolapse gastropathy. Four patients (3.92%) with previous hepatic disorders had esophageal varices in their endoscopy. Five patients (4.9%) showed isolated prolapse gastropathy, while only two patients (1.96%) showed hiatal hernia as their only endoscopic finding. Chi-square test showed that patients with a history of using NSAIDs had a significantly higher rate of gastric ulcers (P-value<0.05). Moreover, the patients with a positive history of vomiting (before hematemesis) had a higher duodenal ulcer rate (P-value<0.05). Independent samples t-test showed that Hb levels are significantly lower in patients with esophagitis (mean difference=0.89±0.55 mmHg/dL, P-value<0.05). Also, patients with antrum nodularity were significantly older children (Mean difference= 3.1±1.3 years, P-value<0.05).

Table 2. Relationships Between Endoscopic Findings and Demographic/Basic Clinical Variables. (n=102).

Variables		Demographic/Basic Clinical Variables						
		Independent samples t-test				Chi-square test		
Endoscopic findings	Number (%)	Age	P-value		PTT	Gender	P-value	Vomiting
			Hb	PT			Using NSAIDs	
Prolapse gastropathy	34(33.3)	0.210	0.446	0.517	0.580	0.163	0.363	0.130
Gastric ulcer	34(33.3)	0.113	0.393	0.233	0.277	0.208	*0.001	0.144
Duodenal ulcer	5(4.9)	0.703	0.083	0.184	0.172	0.111	0.092	*0.031
Hiatal hernia	37(36.3)	0.411	0.287	0.354	0.455	0.416	0.612	0.084
Esophagitis	21(20.6)	0.638	* 0.01	0.201	0.167	0.282	0.101	0.283
Varices	5(4.9)	0.838	0.748	0.109	0.263	0.597	0.339	0.481
Antrum nodularity	19(18.6)	* 0.001	0.120	0.360	0.194	0.412	0.274	0.134
Duodenum nodularity	6(5.9)	0.602	0.409	0.391	0.346	0.496	0.231	0.176

*Statistically significant, SD=Standard Deviation, Hb=Hemoglobin, PT=Prothrombin Time, PTT= Partial Thromboplastin Time, NSAIDs= Non-Steroidal Anti-Inflammatory Drugs.

4- DISCUSSION

In the retrospective study, we assessed 102 patients <18 years old with a chief complaint of hematemesis in Children's Medical Center, Tehran, Iran, from November 2017 to November 2018. We collected data on primary endoscopic evaluation, demographic (age and gender), and basic clinical data (accompanying symptoms, hepatic disorders, history of using NSAIDs), and laboratory data (Hb, PT, and PTT). We found that using NSAIDs leads to a higher rate of gastric ulcers. Furthermore, patients with a history of vomiting had a higher duodenal ulcer. Lower hemoglobin levels correlated with a higher rate of esophagitis. We also found that older patients have a higher rate of antrum nodularity. Similar to previous studies with different sample sizes, the main findings on the endoscopy of patients with upper gastrointestinal bleeding were esophagitis and gastric complications (9-11). Rafeey et al. in 2013 and Jafari et al. in 2018 in similar studies mentioned esophagitis and prolapse gastropathy as the

leading causes of upper GI bleeding in children, respectively (12, 13). Dehghani et al. in 2009 in a study on 118 patients with upper GI bleeding reported gastric erosions as the most prevalent finding (28%) in endoscopy (14). In our study, compared with Rafeey et al., prolapse gastropathy (33.3%) followed by esophagitis (20.6%) were top two findings on endoscopy–except for hiatal hernia. We found that only two patients (1.96%) had isolated hiatal hernia. Thus, a high prevalence of hiatal hernia seems like an incidental finding in endoscopy and plays a minor role in hematemesis. Moreover, 30% of the patients had isolated prolapse gastropathy that confirms the importance of this type of gastropathy in upper GI bleeding. A study in Turkey on 941 patients with hematemesis compared to 54 patients with vomiting and recurrent retching showed a higher rate of prolapse gastropathy in the latter (in contrast with 0.6% in the first group). They concluded that another reason might have caused the hematemesis in the first group (15).

Through different variables, using NSAIDs (26.5%) was observed in a noticeable proportion of the participants. Previous studies showed a lower–but considerable– rate of using NSAIDs. A study on eight children's centers in Italy showed that the most prevalent gastrointestinal manifestation following NSAIDs is hematemesis (33%); and 62% of children with upper GI bleeding with a history of using NSAIDs had gastric mucosal impairment in endoscopy (16). High rates of using NSAIDs could result from inclusion of patients with a chief complaint of hematemesis (rather than all types of GI bleeding). Moreover, the high prevalence of gastric ulcers could result from using NSAIDs because we found a statistically significant relationship between them. We found that mean Hb levels in patients with hematemesis are 12.3, and 22% of them had Hb<11. History of hematemesis in children could justify the lack of a significant decrease in mean Hb levels. But, because of differences in the normal range of Hb in different age groups, our study failed to assess the rate of Hb decrease. However, patients with critically low Hb levels need special care because chronic or life-threatening conditions cause lower Hb levels. Other studies confirm this by showing blood transfusion and a decrease in Hb levels as predicting factors for medical intervention in children with GI bleeding (17). Also, the only significant variable that showed the clinical importance of GI bleeding is Hb level (18). Our study also shows that patients with esophagitis have lower Hb levels; this was not mentioned in previous literature. Our study has some limitations. First, poorly documented archives that limited our data collection. Second, because of differences in normal Hb levels according to age in children, our results cannot be generalized to all children<18. However, this study has some strengths. First, we only included the patients with a chief complaint of hematemesis rather than including all GI bleeding types. Second, we considered laboratory variables alongside primary endoscopic findings. We conclude that prolapse gastropathy and gastric ulcers are the most common cause of hematemesis in children <18 years old. Also, the recent use of NSAIDs is the cause of gastric ulcers. Due to the high prevalence of prolapse gastropathy, it is necessary to control recurrent vomiting in children to prevent GI bleeding. We suggest designing guidelines for decreasing the use of NSAIDs in children and educating parents to limit NSAIDs' self-prescription to avoid consequences such as GI bleeding, especially hematemesis.

5- CONCLUSION

The results showed that distraction technique had a good effect on the intensity of pain in children. Given the

need for pain control and its effects on the course of treatment, further studies are needed to be done.

6- CONFLICT OF INTEREST: None.

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