RESEARCH ARTICLE

Upper Gastrointestinal Bleeding in Children: an 11-Year Retrospective Analysis of Clinico-Endoscopic Profile and Management

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ABSTRACT

Background: Upper gastrointestinal (GI) bleeding is defined as bleeding occurring proximal to the ligament of Treitz and specifies a significant health problem in children.

Aims: The study planned to assess the clinical presentation, underlying causes, and the role of endoscopy in the diagnosis and management of upper GI bleeding in children.

Methods: A retrospective study was implemented from November 2014 to May 2025 at a tertiary referral center in Sulaymaniyah, Iraq. The study included all hospitalized children and adolescents under 18 years of age with upper GI bleeding who underwent esophagogastroduodenoscopy (EGD). Data on demographic characteristics, clinical history, endoscopic findings, and therapeutic interventions were collected from the patients' medical records.

Results: Out of 941 EGDs performed over eleven years, 184 were for GI bleeding. The mean patient age was 5.5 years, with 52.7% of the participants being male. Presentations encompassed hematemesis in 55.4%, melena in 28.9%, both in 15.2%, and isolated hematochezia in 0.5%. The most common endoscopic findings were gastritis (39.1%), reflux esophagitis (11.9%), duodenal ulcers (11.4%), and gastric ulcers (10.8%). No abnormalities were observed in 16.3% of cases. Therapeutic interventions included variceal band ligation (1.6%), endoscopic clipping (0.5%), balloon dilatation for esophageal stricture and pyloric stenosis (each 0.5%), and argon plasma coagulation (APC) for hereditary hemorrhagic telangiectasia (0.5%).

Conclusions: The study spotlights the value of clinico-endoscopic correlation in upper GI bleeding in the pediatric age group and establishes a cornerstone for future prospective studies and follow-up strategies.

Keywords: argon plasma coagulation, endoscopy, variceal band ligation, vascular ectasia.

INTRODUCTION

Depending on the bleeding site, whether it starts proximal or distal to the ligament of Treitz, GI bleeding can be categorized as either upper or lower. Bleeding from sites superior to the ligament of Treitz (positioned at the junction of the duodenum and jejunum) is referred to as upper GI bleeding [1].

Upper GI bleeding in children is not an uncommon condition. It has a global prevalence of nearly 6.4% [2]. Although there are a few hospital-based studies from Baghdad and Erbil on pediatric patients, there are no current epidemiological data that estimate the national incidence or prevalence of upper GI bleeding in Iraqi children.

Many conditions have been reported to cause upper GI bleeding. The incidence of bleeding in these conditions varies by age, from newborns to adolescent patients, but some of the causes were shared between pediatric age groups. Although particular causes, like cow's milk protein allergy and vitamin K deficiency, are confined to specific age groups, occurring only in neonates and infants, other causes, such as gastritis and esophagitis, may be identified in all pediatric age groups [2].

Furthermore, the incidence of upper GI bleeding varies worldwide and in distinct hospital settings. In developed countries (Europe and North America), the majority of upper GI bleeding is nonvariceal in nature and associated mainly with gastritis, esophagitis, and gastric and/or duodenal ulcers [3] . In the last few years, the predominant causes in some Middle Eastern and Far Eastern countries are approaching similarity to those in Western countries [4]. However, variceal bleeding as a cause of upper GI bleeding still prevails in specific regions of the world, especially in South Asia.

Life-threatening hemorrhage arises as a complication of esophageal variceal bleeding, peptic ulceration, and disseminated intravascular coagulation [5]. In cases of brisk bleeding, overt upper GI bleeding may present

with hematochezia (vivid red blood per rectum or maroon-colored stools), but more typically manifests as hematemesis (vomiting bright red blood or material resembling coffee grinds) or melena (black, tarry stools) [6].

Children who experience upper GI bleeding may develop serious and sometimes fatal clinical problems; therefore, it is crucial to accurately assess the patient and provide suitable early care prior to EGD to reduce morbidity and mortality. The purpose of early-stage management is to prevent end-organ injury caused by bleeding, like hypoxia or renal impairment, and to support hemostasis prior to EGD. Resuscitation steps include airway management, fluid infusion, and blood transfusion. Endoscopic evaluation is performed to diagnostically determine and probably manage the origin of bleeding following resuscitation interventions [7].

Computed Tomography Angiography (CTA) scan aids in detecting the site and cause of hemorrhage and is an adjunctive assessment tool to endoscopy, conventional angiography, and nuclear medicine in investigating pediatric patients with GI bleeding, especially in complex or atypical cases [8].

Intravenous vitamin K (infant patients, 1-2 mg/dose; children, 5-10 mg) and intravenous proton pump inhibitors (PPIs) should be initiated in cases of severe upper GI bleeding [9]. Octreotide infusion is beneficial in achieving hemostasis in cases of massive hemorrhage due to esophageal variceal bleeding by causing splanchnic vasoconstriction, thereby reducing portal hypertension [10]. A short-term placement of the Sengstaken-Blakemore tube can be lifesaving if pharmacologic and endoscopic procedures failed to achieve control of esophageal variceal bleeding, this procedure use balloon tamponade to provide a temporary hemostasis by compressing the esophageal varices [11]. However, Personalized treatment is the best approach after confirming the diagnosis and the cause of upper GI bleeding. The therapeutic approach in patients with mucosal bleeding is focused on neutralization and prevention of gastric acid release. High-dose proton pump inhibitors are more effective than H2 receptor blockers for this intended therapeutic effect [12].

The aim of the study is to disclose the clinico-etiological pattern of upper GI bleeding in patients under 18 years old and to validate the significance of EGD in the diagnostic workup and treatment of upper GI tract disorders in this age group.

PATIENTS AND METHODS

The current study (retrospective design) was performed in the endoscopy unit of Dr. Jamal Ahmed Rashid Pediatric Teaching Hospital, a tertiary care facility in Sulaymaniyah City in Iraq. The medical documents of children who required hospital admission for upper GI bleeding from November 2014 to May 2025 were examined. Participants under the age of eighteen who were hospitalized for upper GI bleeding were comprised in the study. All patients were assessed by flexible endoscopy (OLYMPUS EXERA CLV-160 video endoscope), which was performed by an experienced gastroenterologist in the endoscopic care unit, and the findings were recorded. The procedure is done only after proper informed consent from the parents, and the endoscopy is done under general anesthesia after 6 hours of fasting. A datasheet created to fulfill the study's objectives was used to collect data from patient medical documents. Age, gender, the patient's complaints (hematemesis, melena, and hematochezia), the endoscopic findings (normal study, gastritis, gastric ulcer, duodenal ulcer, reflux esophagitis, eosinophilic esophagitis, corrosive esophagitis, esophageal varices, Mallory-Weiss syndrome, traumatic esophageal erosions, gastric antral vascular ectasia (GAVE), telangiectasia, and duodenal vascular ectasia), and endoscopic interventions (band ligation, APC, endoscopic clip, and balloon dilatation of the esophagus and pylorus) are among the information gathered.

The inclusion criteria included all confirmed cases of upper GI bleeding that occurred over the indicated period. Exclusion criteria included cases with incomplete records.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki and its later amendments. Written consents were obtained from all the child's parents. The study was approved by the institutional Arab Board for Health Specializations in Iraq (No. 1581) on July 23, 2025. Also, the study was approved by the Scientific Unit and the Medical Ethics Committee of the College of Medicine-University of Sulaymaniyah during its 14th meeting on July 20, 2025.

Statistical Analyses

SPS program, version 27, and Minitab version 16. The P-value is considered significant if less than 0.05.

RESULTS

Of the 941 children who had EGD throughout the course of 11 years, 184 (19.55%) had upper GI bleeding diagnostic and therapeutic procedures. 184 patients fulfilled the inclusion and exclusion criteria listed above during the period of study. With 97 males (52.7%) and 87 females (47.3%). Upper GI bleeding was slightly more prevalent in males with a male-to-female ratio of 1.11:1. The median age of the patients was 5.5 years (47 days to 17 years), (

Table **1**).

In these patients, hematemesis was the most common presenting symptom (55.4%) with a significant P-value

of 0.001, followed by melena (28.9%), hematemesis and melena (15.2%), and hematochezia (0.5%), (Table 2). Table 3 shows the endoscopic findings of the studied cases. The most frequent underlying etiology of upper GI bleeding was gastritis (39.1%), followed by reflux esophagitis (11.9%), duodenal ulcer (11.4%), and gastric ulcer (10.8%). Due to incomplete documentation and the absence of histological reports, the exact etiology of gastric ulcers could not be determined in all cases. Other confirmed causes included esophageal varices (4.8%), corrosive esophagitis (1.08%), duodenal vascular ectasia (1.08%), traumatic esophageal lesion (1.08%), eosinophilic esophagitis (0.5%), Mallory-Weiss syndrome (0.5%), GAVE (0.5%), and gastric telangiectasia (0.5%). Importantly, these findings are clinically relevant, as they represent distinct etiologies of upper GI bleeding that require specific diagnostic and therapeutic approaches. Therefore, their statistical significance, even with small numbers, highlights their importance within the studied population.

There were 7 (3.8%) patients receiving endoscopic hemostatic therapy; the endoscopic treatment of the studied patients was band ligation (1.6%), APC (0.5%), endoscopic clip (0.5%), balloon dilatation of the pylorus (0.5%), and balloon dilatation of the esophagus (0.5%), as shown in Table 4.

Table 1
Age and gender distribution of studied cases with upper GI bleeding.

Gender	Frequency	%	P-value*	Median age (years)
Male	97	52.7	0.461	5.5
Female	87	47.3		5.5
Total	184	100		5.5

*Chi-square/Goodness of fit test

Table 2
Distribution of complaints of studied cases with upper GI bleeding.

Clinical history	N=184	%	P-value*
Hematemesis	102	55.4	<0.001
Melena	53	28.9	0.234
Hematemesis & melena	28	15.2	0.001
Hematochezia	1	0.5	<0.001

*Chi-square/Goodness of fit test

Table 3
Endoscopic findings of studied cases with upper GI bleeding.

Endoscopic finding	N=184	%	P-value*
Gastritis	72	39.1	<0.001
Gastric ulcer	20	10.8	0.053
Duodenal ulcer	21	11.4	0.031
Reflux esophagitis	22	11.9	0.019
Esophageal varices	9	4.8	0.101
Corrosive esophagitis	2	1.08	<0.001
Eosinophilic esophagitis	1	0.5	<0.001
Mallory Weiss	1	0.5	<0.001
Gastric antral vascular ectasia (GAVE)	1	0.5	<0.001
Duodenal vascular ectasia	2	1.08	<0.001
Gastric telangiectasia	1	0.5	<0.001
Traumatic esophageal lesions	2	1.08	<0.001
Negative finding	30	16.3	<0.001

*Chi-square/Goodness of fit test

Table 4
Endoscopic interventions of studied cases.

Endoscopic interventions	N=184	%
Band ligation	3	1.6
Argon plasma coagulation (APC)	1	0.5
Endoscopic clip	1	0.5
Balloon dilatation of the pylorus	1	0.5

Balloon dilatation of the esophagus	1	0.5

DISCUSSION

In this study, EGD played an important role in the clinical diagnosis of upper GI bleeding in children; it not only facilitated accurate localization of the bleeding site but also enabled therapeutic procedures, thereby decreasing the need for surgical interventions. This is consistent with previous literature that regards EGD as a cornerstone for both diagnosis and management of upper GI bleeding in patients aged less than 18 years. In our study, upper GI bleeding was more common in male than in female patients, which is similar to a study conducted by Chalabi DA, who found that males constitute 65.5% of the enrolled participants, indicating a higher observed prevalence in males [13]. In contrast with the study conducted by Galos F et al., where the upper GI bleeding was more common in females, with a gender-based distribution of 42.1% males and 57.9% females [14].

Hematemesis was the most common presenting complaint, followed by melena, aligns with findings from another study conducted by Shahrebabak MG et al. that reported hematemesis as the most chief complaint in 57.5% of pediatric upper GI bleeding cases [15]. In our study, hematochezia was the least common presentation of upper GI bleeding, in agreement with prior studies conducted by Galos F et al. (3.4 %) [14] and Rafeey M et al. (2.46%) [16] . Upper GI tract bleeding in children may present as hematochezia from rapid transit of blood through the intestinal tract due to acute massive bleeding. In our study gastritis was the most commonly encountered endoscopic finding, in agreement with previous studies, Yu Y et al. reported gastritis in 33.5% of cases [17] , and Elhodhod MA et al. [18], followed by reflux esophagitis, duodenal ulcer, and gastric ulcer, common risk factors reported in the literature for pediatric gastric ulcers include H. pylori infection, NSAIDs, physiological stress, and systemic illness. While esophageal varices constituted a small proportion of the endoscopic findings in our study, this occurred in contrast to another study in Bangladesh, where esophageal varices were the most common endoscopic finding in (65%) of cases [19], due to extrahepatic portal vein obstruction secondary to neonatal sepsis, umbilical vein catheterization, and thrombophilic risk factors. In this study, vascular anomalies like duodenal vascular ectasia, GAVE, and gastric telangiectasia with upper GI bleeding are rare and diverse in their presentation and types [20, 21]. Despite vascular anomalies being a relatively uncommon cause of upper GI bleeding in children, they must be considered in the differential diagnosis, especially in cases of recurrent and persistent bleeding. Normal endoscopic findings were documented in our study which is consistent with other studies, Mazumder MW et al. and Cleveland K et al. reported rates of 23% and 11.4%, respectively [19, 22]; while a normal endoscopy might suggest a non-upper gastrointestinal source of bleeding or stopped bleeding, it is important to consider that the absence of visible lesions did not exclude upper GI bleeding, so other diagnostic tools, like a capsule endoscopy, double-balloon enteroscopy, or CTA, might be needed to search for other possible sources of bleeding. Endoscopy is the most reliable method in identifying and treating the bleeding site, so after stabilization of the patient's general condition, particular attention should be paid to investigating the specific contributing pathology. The most frequent underlying source of severe upper GI bleeding in children is esophageal variceal bleeding. In addition to intravenous octreotide to lower portal pressure and splanchnic blood flow, three patients required band ligation to stop the bleeding. In our study, endoscopic band ligation was found to be a safe and clinically effective treatment for esophageal variceal bleeding, which is consistent with previous studies reported in the literature from Ukraine and Nepal [23, 24], respectively.

In this study, one patient with gastroesophageal reflux disease with Los Angeles Classification of esophagitis LA-B [25] and sliding esophageal hernia had an esophageal stricture that needed balloon dilatation. Balloon dilatation is the first-line treatment of pediatric esophageal strictures with a high success rate and fewer complications, consistent with previous studies from India and Japan [26, 27], respectively. Another case with nodular gastritis due to H. pylori infection and severe inflammatory pyloric stenosis needs endoscopic balloon dilatation of the pylorus in addition to H. pylori eradication and proton pump inhibitors, which is in agreement with findings from a study conducted in Korea [28].

Traditional treatment of gastric outlet obstruction had only included surgery, but the emergence of endoscopic interventions like endoscopic balloon dilatation has decreased the number of patients in need of larger and more invasive operative interventions [29]. Visceral vascular anomalies in children are uncommon and complex lesions that frequently require an individualized, interdisciplinary approach to properly diagnose and treat. APC is safe and effective in treating and preventing bleeding from gastrointestinal angiodysplasia, as demonstrated by the fact that one case in our study with hereditary hemorrhagic telangiectasia required 15 pulses of APC with good control of bleeding, which included multiple telangiectatic lesions in the lower esophagus, pylorus, and first part of the duodenum, which is consistent with findings reported in other studies by Olmos JA et al. and Yeh PJ et al. [30, 31], respectively. Additionally, an endoscopic clip was used to treat one case of duodenal vascular ectasia with significant bleeding due to the underlying congenital absence of the portal vein, an

uncommon anomaly in which the intestinal and splenic venous drainage bypasses the liver and drains into the systemic veins through various venous shunts, causing portal hypertension [32]; in this study, endoscopic clipping achieved prompt hemostasis and was not associated with major complications. These results are consistent with findings from previous pediatric studies reported by Cipolletta L et al. and Di Nardo G et al. [33, 34], respectively; the concordance between our outcomes and previously published studies supports the role of endoscopic clips as a safe and effective endoscopic option for GI vascular lesions.

Study limitations: missing data of some patients leads to important information not being available; therefore, apply techniques like multiple imputation or machine learning to handle missing data.

CONCLUSIONS

EGD offered targeted treatment such as balloon dilatation, endoscopic clipping, APC, and variceal banding, as well as a direct visual examination of the bleeding cause. The most frequent presentation of upper GI bleeding in children in this study was hematemesis, which was followed by melena. The most prevalent underlying cause of upper GI bleeding was gastritis. The low incidence of GI vascular anomalies in children often results in underrecognition, so early identification and timely intervention are essential for preventing significant morbidity.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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Authors' contributions

Author 1: Noor Barraq Albaqqal: Conceptualization, Methodology, Data Acquisition, Data Analysis, Manuscript Preparation.

Author 2: Adnan Mohammed Hasan: Supervision, Definition of Intellectual Content, Literature Search, Statistical Analysis, Manuscript Review.

Both authors approved the final version of the manuscript and agreed to take responsibility for the work.

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