International Journal of Public Health Science (IJPHS)
Vol. 13, No. 4, December 2024, pp. 1803~1808
ISSN: 2252-8806, DOI: 10.11591/ijphs.v13i4.24340

Indications and findings of upper gut endoscopy in pediatric patients

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Article Info

Article history:

Received Dec 12, 2023
Revised Feb 2, 2024
Accepted Apr 24, 2024

Keywords:

Children
Endoscopy
Gastritis
Pediatric
Recurrent abdominal pain
Upper GI complaints

ABSTRACT

Children undergoing more gastrointestinal endoscopies without the necessary indications risk serious adverse effects. Therefore, upper GI (UGI) endoscopy examination requires selective indications to minimize the risk of unnecessary use of UGI endoscopy. This study aimed to analyze the indications for endoscopy based on the main UGI complaints in pediatric patients at Dr. Saiful Anwar General Hospital Malang. A retrospective analysis of the first diagnostic endoscopy in children was conducted between July 2022 to July 2023 at Dr. Saiful Anwar General Hospital Malang. Among 60 patients were included with an age of 0-15 years old; 51.7% were boys and 48.3% were girls. The results showed recurrent abdominal pain (RAP) as the primary cause of UGI endoscopic indications (38.3%), followed by blood vomiting (33.3%), acute abdominal pain (21.6%), and prolonged vomiting (6.66%). In conclusion, recurrent abdominal pain in children is the most typical reason for upper gastrointestinal endoscopy, and persistent gastritis is the most typical underlying condition.

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1. INTRODUCTION

Functional gastrointestinal disorders (FGID) are widespread issues among children and are characterized by chronic GI symptoms (eg, abdominal pain, dysphagia, dyspepsia, diarrhea, constipation, and bloating) without overt pathology on conventional tests [1], [2]. The frequency of FGID is 21.8% for people aged 4 to 18 and 22.2% for children under the age of 4. Functional constipation and vomiting were most prevalent in children 13 to 48 months of age, while functional dyspepsia and constipation were most prevalent in children over four years [3]. Gastrointestinal endoscopy as a diagnostic and therapeutic in the pediatric population has been widely carried out at Dr. Saiful Anwar Hospital. It is crucial to perform an endoscopic examination as a preliminary screening for dyspepsia complaints in children, as indicated clearly. Making sure that children who satisfy specific requirements like symptom intensity, duration, or nonresponse to conventional treatments are the only ones who undergo screening endoscopy can be ensured by establishing precise criteria. However pediatric endoscopy associated with adverse events including bleeding, perforation, infection, and cardiac compromise. The total rate of complications during pediatric endoscopy, according to data published by the pediatric clinical outcomes research initiative (PEDS-CORI), is 2.3%. This rate includes a specific risk of hypoxia (1.5%) and bleeding (0.3%) [4]. Therefore, upper GI endoscopy examination requires selective indications to minimize the risk of unnecessary use of UGI endoscopy.

There aren't many studies that address whether pediatric patients should receive UGI endoscopy in the guidelines or medical literature worldwide. Due to its increased ease of use, clinicians are more likely to recommend UGI endoscopy for children exhibiting vague symptoms, which has resulted in an overabundance of these procedures. This makes it challenging to perform an appropriateness assessment based on high-quality evidence, which is why it violates a fundamental evaluation principle. A multidisciplinary expert panel system called the RAND/university of California at Los Angeles (UCLA) method and modified Delphi process had been in use for a while to evaluate the suitability of procedures in a variety of medical and surgical situations, where there is some uncertainty about the most effective therapeutic and diagnostic approach to use and little published evidence supporting it [5]–[7]. However, it has already been used on adult patients undergoing UGI endoscopy.

The aim of this study is to evaluate the indications and outcomes of endoscopy for children based on upper GI problems at Dr. Saiful Anwar General Hospital between July 2022 to July 2023. Additionally, it can reveal the anatomical and physiological roots of pediatric GI disorders. The general public, in particular the patient's parents, also learns about the early signs of pediatric GI disease that can be detected during endoscopy. Thus, it is important to know the indications for upper GI endoscopy based on UGI symptoms in pediatric patients, therefore diagnosis and treatment are on target.

2. METHOD

This descriptive study was conducted from July 2022 to July 2023 at the Endoscopy Unit of Dr. Saiful Anwar General Hospital, East Java, Indonesia. A total of sixty children had UGI endoscopies performed from July 2022 to July 2023. The subjects were all pediatric patients younger than 15 years with UGI symptoms who underwent endoscopy and were recorded in the medical records at Dr. Saiful Anwar Malang. Patients who fulfilled the criteria and were eligible for the study were offered and informed about it. The endoscopic room manager accompanied the researcher to discuss the intended course of the investigation. The patient was asked to sign an informed consent form after deciding to proceed. Descriptive statistics were used to sort the data after it was manually collected. The ethical approval (No.E.5.a/239/KEPKUMM/VIII/2023) was obtained from the Ethics Committee of Medical Faculty of University of Muhammadiyah Malang, East Java, Indonesia. Every individual involved in this study provided their oral informed permission.

3. RESULTS AND DISCUSSION

The samples were drawn from the patients in the pediatric polyclinic at Dr. Saiful Anwar General Hospital Malang. Of the 60 patients, 31 (51.7%) were boys and 29 (48.3%) were girls. The largest age group was 11-15 years 26 (51.6%) Table 1. However, similar studies have found that girls are more likely than boys to experience FGID and that their symptoms are more severe [8]. This is because constipation, bloating, and diarrhea frequently affect girls due to concomitant anxiety or sadness. Additionally, stomach emptying and sluggish colonic transit are common in girls. Additional study indicates that endoscopic evidence of peptic illness is most prevalent in youngsters of the feminine gender. Children typically have abdominal discomfort that lasts a long time, is severe, interferes with daily activities, and is accompanied by nausea and vomiting. Children typically experience abdominal discomfort at the bottom or in the mesogastrium, whereas adolescents experience pain more accurately in the epigastrium [9].

Table 2 presents recurrent abdominal pain (RAP) as the primary cause of UGI endoscopic indications (38.3%), the most common symptom of upper GI as the main complaint of children with a diagnosis of chronic gastritis at the pediatric polyclinic at Dr. Saiful Anwar General Hospital Malang. This is consistent with the study by Adeniyi *et al.* [10], which found that RAP is a frequent cause of referral and a justification for upper GI endoscopy to facilitate a precise diagnosis of the etiology.

Table 1. Characteristics of patients (n=60)

Characteristic	n	%
Age (year)		
0-5	15	25
6-10	19	31.7
11-15	26	43.3
Gender		
Boys	31	51.7
Girls	29	48.3

Table 2. Upper GI endoscopy indication

Indication	n	%
Persistent vomiting	4	6.66
Recurrent abdominal pain	23	38.3
Blood vomiting (hematemesis)	20	33.3
Acute abdominal pain	13	21.6

RAP has been modified with the establishment of Rome I to III criteria (currently known as Rome IV), which identify gut-brain interaction disorders (DGBIs) and was released by The Rome Foundation in 2016 [11]. The Rome IV defines RAP as abdominal discomfort lasting more than two months with at least one episode of pain every week that is severe enough to prevent the children from engaging in typical activities [12]–[14]. Organic causes of RAP can be found, nonetheless, as a result of the development of new technology from diagnostic GI endoscopy.

According to Table 3, UGI endoscopic findings showed that as many as 75% of patients with complaints of persistent vomiting had gastroesophageal reflux and only 25% were found to be anatomically normal. Whereas patients with persistent vomiting did not have a hiatal hernia (0%). Pediatric patients with RAP experienced the most chronic gastritis (30.4%) followed by erosive gastritis (21.7%) and duodenitis (21.7%). In addition, the lowest number of RAP with esophagitis (4.3%), gastric ulcer (4.3%), and normal endoscopic findings without anatomic abnormalities (4.3%). The most common cause of vomiting blood (haematemesis) is esophageal varices (40%), followed by erosive gastritis (25%) and gastric ulcer (20%). Furthermore, the most common pediatric patients with acute abdominal pain experienced acute gastritis (76.9%), while the rest had normal gastrointestinal anatomy (23%).

Table 3. Upper gastrointestinal endoscopy findings based on indications

Endoscopy results		n	%
Persistent vomiting (n=4)	Gastroesophageal reflux	3	75
	Hiatal hernia	0	0
	Normal	1	25
Recurrent abdominal pain (n=23)	Esophagitis	1	4.3
	Hyperemic gastritis	3	13
	Gastric ulcer	1	4.3
	Duodenitis	5	21.7
	Erosive gastritis	5	21.7
	Chronic gastritis	7	30.4
	Normal	1	4.3
Blood vomiting (Haematemesis) (n=20)	Esophagitis	0	0
	Erosive gastritis	5	25
	Varices esophageal	8	40
	Duodenum tumor	0	0
	Duodenum ulcer	1	5
	Gastric ulcer	4	20
	Portal hypertension	2	10
	Acute abdominal pain (n=13)		
	Acute gastritis	10	76.9
	Acute duodenitis	0	0
	Normal	3	23

In the current study, the respondents who were ready to undergo endoscopy were aged 0-15 years. Among the most frequent complaints before undergoing an endoscopy is experiencing RAP. This could be related to the *H. pylori* infection, which frequently affects children. The antrum and body of the stomach are heavily colonized with *H. pylori*, causing severe mucosal inflammation [15]. Children who had symptoms of recurrent abdominal pain and were diagnosed with gastritis went through an endoscopic procedure [10]. Endoscopy frequently links duodenal eosinophilia to dyspepsia in children. Functional dyspepsia (FD) has been associated with increased duodenal eosinophilia worldwide [16]–[20]. It has been hypothesized that in people who have a genetic predisposition to innate immune activation, an allergen including wheat protein or infection may cause antigen presentation, epithelial barrier disruption, and an innate immune type 2 helper T-cell response, in which excessive eosinophils may degranulate to cause inflammation and neuronal sensitivity [12], [21]–[23]. This might lead to cytokine release and circulating homing T-cells to result in altered gastroduodenal function, which could account for why symptoms are tied to meals [12], [21], [24]. A similar pathophysiology mediated by cytokines has been proposed for gastroesophageal reflux disease (GERD) [25], [26]. In those with functional dyspepsia and post-prandial distress syndrome at baseline, duodenal eosinophilia is linked to an elevated risk of GERD at 10-year follow-up. The connection between

functional dyspepsia and GERD may be explained by duodenal eosinophilia, suggesting that some subgroups of both disorders may belong to the same disease spectrum [27].

The most frequent cause of abdominal pain is stress, which also plays a significant role in the pathophysiological alterations that might occur in the digestive system [28]. The study's findings revealed that the requirement for an endoscopy is indicated when a child's dyspeptic symptoms interfere with everyday activities, the patient is older than 10 years old, the duration is longer than six months, and the symptoms are getting worse [29]. Whereas for assessment, an endoscopy should take alarm symptoms like significant vomiting, chronic diarrhea, GI blood loss, ongoing abdominal pain in the upper or right lower quadrants, and a family history of inflammatory bowel disease toward assessment [30]. Participants with the most features identified by endoscopy were boys between the ages of 11 and 15. In contrast, another study found that the highest prevalence of clinical indications and endoscopic information related to peptic disease was in girls [9]. Even the pattern of abdominal pain in young children is severe, lasts a long time, and interferes with regular activities while also causing nausea and vomiting. Children's abdominal pain typically occurs at the bottom or in the mesogastrium, whereas adolescents' abdominal pain is more likely to occur in the epigastrium.

While endoscopy of the upper gastrointestinal tract is frequently beneficial in children as well as adults, there is little direct information regarding how endoscopy affects the prognosis of pediatric dyspepsia patients [31]. There is only one retrospective study that examines the appropriateness of UGI endoscopy in pediatric patients. It reviewed 293 endoscopies done on 251 patients for a variety of indications (such as dysphagia, recurrent abdominal pain, vomiting, bleeding, diarrhea, and failure to thrive). It also evaluated the effect of the procedure on the patient's treatment according to the guidelines provided by the Groupe Francophone d'Hepatologie, Gastroenterologie et Nutrition Pediatriques [32]. The current study's results highlight the necessity for endoscopists to possess recommendations for the appropriateness of upper gastrointestinal endoscopy in pediatric patients to prevent overuse of the operation and the consequent unwarranted exposure of patients to its possible side effects.

According to our research, certain children with dyspeptic symptoms may benefit from UGI endoscopy, but not all of them. However, there are patient and procedure aspects that need to be understood as they raise the possibility of adverse events (AEs) occurring during or after the surgery. Endoscopic AEs can be roughly classified as bleeding, perforation, infection, and sedation-related physiological abnormalities. Avoiding excessive use of UGI endoscopy is advised: When used on pediatric patients, the procedure is simple to perform but still requires special attention; it should only be used on the patients who have the highest chance of benefiting from it. Additionally, endoscopists may need to assess the applicability of our study results to concentrate their efforts on individuals most likely to benefit, so preventing both the under- and overuse of upper endoscopy as well as the unnecessary exposure of patients to non-negligible endoscopic side effects. The use of upper endoscopy in pediatrics will likely be significantly impacted by future advancements in sedation and anesthesia.

This research has the constraint of being restricted to a single hospital, necessitating the consideration of contextual considerations when extrapolating findings to other conditions. Nevertheless, the East Java region is depicted because Dr. Saiful Anwar General Hospital Malang is a type A reference that receives patients from many areas. Suggestions for additional study are to be conducted at multiple centers around Indonesia.

4. CONCLUSION

In conclusion, upper GI endoscopy is crucial in determining the origin of RAP in children, especially when alarming signs are present. As a result of the procedure's success as a diagnostic tool, kids of all ages are now subjected to the procedure for evaluation. When paired with histopathologic analysis, endoscopy allows for direct visualization of the GI tract, precise diagnosis, and the possibility of therapeutic measures. In order to properly carry out this investigation and determine a diagnosis, careful clinical evaluation, an adequate history, and a physical examination are necessary. Endoscopy is not a required test for the diagnosis of functional dyspepsia and must also be based on Rome criteria concerning to alarm symptoms.

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