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Upper Gastrointestinal Endoscopy in Infants and Children: A Series of 100 Patients

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Abstract

Upper gastrointestinal endoscopy, one of the most fundamental methods of investigating the gastrointestinal tract, is a well established and indispensable procedures. One hundred patients aged from one month to 13 years, presenting with different symptoms, were evaluated endoscopically using gastro-intestinal fiberoptic endoscopy of the Olympus type either P3 or XP according to the age and size of the child. The indications for upper gastro-intestinal endoscopy in children under-study were obscure hepatomegaly and/or splenomegaly (47%), gastrointestinal bleeding (19%), persistent vomiting (19%), persistent or recurrent abodminal pain (7%), ingestion of a corrosives (3%), sclerotherapy (2%), foreign body (2%), and post operative gastro-intestinal bleeding (1%). The endoscopic findings observed were: no abnormality in 32 patients, esophagitis in 29 patients, gastritis in 23 patients, varices in 22 patients, duodenitis in 8 patients, ulcers in 4 patients, esophageal stricture in 3 patients and foreign body in 2 patients. The presenting symptoms and endoscopic findings differed with age of patients. Upper gastro-intestinal endoscopy seems to be a safe procedure if performed by experienced personnel in appropriate settings and facilities.

Introduction

SINCE the introduction of flexible fiberoptic endoscopy in the early 1980s, esophagogastrodudenoscpy (EGD) has become an established procedure for the evaluation, diagnosis and treatment of gastrointestinal (GIT) diseases in pediatric patients. These procedures have increased dramatically during the past two decades, and the use and importance of GIT endoscopy have continued to increase as instruments specifically designed for children and infants have come into routine use [1,2]. There is little question that endoscopy increases diagnostic yield in comparison to roentgenographic studies of GIT [3]. Many physicians and surgeons interested in the upper GIT have to regard EGD as the primary method of diagnosis when symptoms suggest a pathologic process of esophagus, stomach or duodenum [4].

The aim of this work is to study 100

successive upper GI endoscopy procedures carried out in Cairo University New Children's hospital.

Material and Methods

The study included 100 infants and children who have been referred to the "Endoscopy Unit" of Cairo University New Children's Hospital for upper gastrointestinal endoscopy. They were 65 males and 35 females and their ages ranged from 1 month to 13 years.

All patients were subjected to careful history taking, thorough physical examination as well as review of their enclosed investigations, if any e.g. blood picture, ESR, liver function tests, kidney function, urine analysis, stool analysis and X-ray.

Facilities:

All procedures were performed in the special room designed for endoscopy in Cairo University New Children's Hospital. In addition to the endoscopist, at least one assisting nurse was always attending throughout the whole procedure. Thirty minutes after termination of the procedure patients were transported to a recovery area in the hospital wards and were allowed to sleep under the observation of mothers and a house officer or a nurse.

Instruments:

Examinations were performed, using for young patients the Olympus GIF-P3 (9. Omm in diameter) and the Olympus GIF-XP)7.8 mm in diameter with 2 mm channel). It has a four way tip control and bending ability 210° up, 90° down and 100° right and left.

Premedication:

All infants and children were sedated using chloral hydrate (20 mg/kg, oral, 20-30 minutes before procedure) and/or diazepam 0.2 mg/kg IV.

Precautions:

1- A set of endotracheal tubes of appropriate size, a laryngoscope, a resuscitation tray and a source of oxygen with different oxygen delivery devices were at bedside.

2- In newborns and infants below 3 months a monitor that displays heart rate, respiratory rate and ECG have been installed to allow careful observation of infants throughout the procedure.

3- A functioning I.V. line was ensured before starting.

Results

The results of this work are presented in tables 1 to 5 and in Figs. 1 and 2.

The age of children under study ranged from 1 month to 13 years. Twenty nine % of patients were below 2 years of age, among these 3 were in the neonatal period and 6 between 1 month and 6 months of age. Thirty two percent of patients were >2.6 years and the remaining 39% were above the age of six.

Note that the number of findings is more than the number of patients as some patients had more than one endoscopic findings.

Table (1): Age Distribution of the 100 Children who Required Upper GI Endoscopy.

Age group	Number = %	Cumulative %
≤ 1M	3	
> 1-3M	3	6
> 3-6M	3	9
> 6M-2Y	20	29
> 2Y-6Y	32	61
> 6Y-13Y	39	100

Table (2): Indications for UGIE in Children Under Study n = 100.

			n = %
1	Obscure hepatomegaly and/or splenomegaly:		47
	HSM	30	
	Splenomegaly without hepatomegaly	9	
	Hepatomegaly without splenomegaly	8	
2	GI bleeding:		19
	Hematemesis	15	
	Melena	4	
3	Persistant vomiting/dysphagia ± abdominal pain		19
4	Persistant or reccurent abdominal pain		7
5	Sclerotherapy		2
6	Foregin body		2
7	Ingestion of corrosives		3
8	Post operative GIT bleeding		1

Table (3): Endoscopic Findings in Children Under Study (Arranged in a Descending Order of Frequency).

	Findings n = 123	
1	No abnormality	32
2	Esophagitis	29
3	Gastritis	23
4	Varices	22
5	Duodenitis	8
6	Ulcers	4
7	Esophageal stricture	3
8	Foreign body	2

Table (4): Causes and/or Associated Findings in Patients with Esophagitis n = 29.

	Associated findings	
1	No abnormality	14
2	Gastro-esophageal reflux	7
3	Hiatus herrnia	5
4	Caustic ingestion	3

Table (5): Age Distribution of Children with Different Edoscopic Indings.

Endoscopic diagnosis	No	Age	
		Range	Mean
Esophagitis	29	1M-12Y	2.7-Ys
Gastritis	23	1M-12Y	5.4Y
Varices	22	8M-13Y	8Ys
Duodenitis	8	3M-13Y	7.1Ys
Ulcer diseases	4	4Y-12Y	9.5Ys
Esoph. stricture	3	12Y-2.2Y	1.8Y
Foriegn body	2	1Y-3Y	2Y

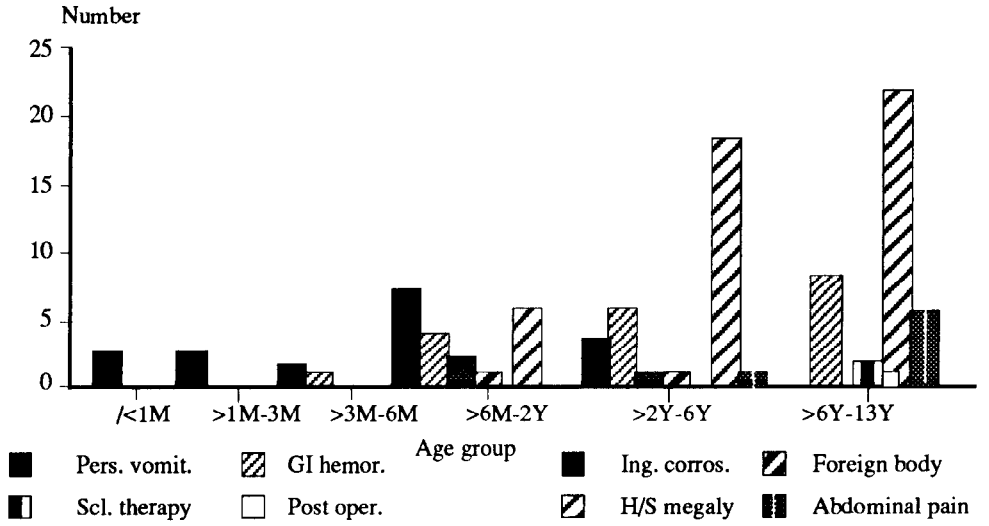

Fig. (1): Indications for UGIE. in 100 children.

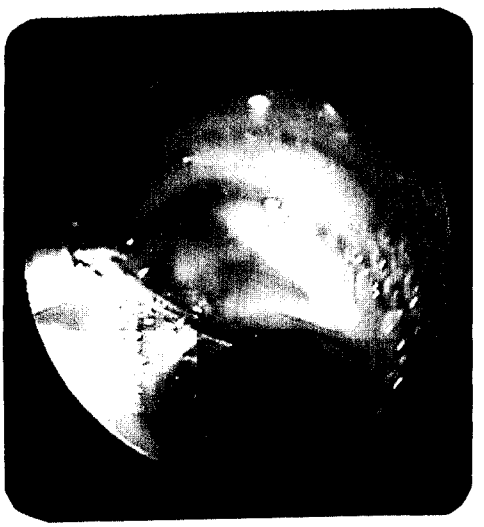

Fig. (2)

Discussion

In this work we review a series of 100 successive upper GI endoscopic examinations.

The three main indications for UGIE were "obscure" hepatomegaly and/or splenomegaly (47%), gastrointestinal bleeding (19%) and persistent vomiting or dysphagia (19%), collectively they constituted 85% of the studied patients (Table 2).

Obscure hepatomegaly and/or splenomegaly:

Hepatomegaly is a sign which is commonly encountered in the practice of pediatrics. Hepatomegaly and/or splenomegaly can be acute or chronic, its etiology is so wide, it can include infections, metabolic diseases, blood disorders, tumors, or other infiltrative disorders [5]. While many patients with HSM can be diagnosed on the basis of careful history taking, careful physical examination as well as selected non-invasive investigations that constitute an initial work-up in the evaluation of this problem (e.g. complete blood picture, urine analysis, stool analysis, liver function tests, infection screens, ESR, hemoglobin electrophoresis, osmotic fragility, abdominal sonography and others), the diagnosis in a good number of patients will remain unrevealed. Furthermore, although the presence

or absence of portal hypertension could help in a way to diagnose the cause of HSM, the classic signs of poral hypertension can be subtle or unclear. For this reason we used the term "Obscure" hepatomegaly and/or splenomegaly to describe our patients. None of them could be confidently diagnosed on the basis of the initial work up. It seems that most pediatricians consider UGIE less invasive, when compared to other investigations such as liver biopsy, splenic aspirate or splenoportography. Out of the 47 children with obscure HSM, UGIE showed gastroeosophageal varies in 12 children (25.5%). An equal number of patients showed gastritis, 7 showed esophagitis (14.9%), 4 showed duodenitis (8.5%) and 22 patients showed no abnormal findings (46.8%).

Gastrointestinal bleeding:

Most gastroenterologists and surgeons agree that endoscopy should be performed in patients with bleeding from the upper gastrointestinal tract. In most cases, endoscopy will provide an accurate diagnosis, will establish the site of bleeding, will indicate how active the bleeding is and may help to predict the chance of rebleeding [1]. In the preendoscopy era the cause of upper GIT hemorrhage was not identified in approximately one third to half of all presenting children [6,7]. Inspite of endoscopy Cox and Ament [8], could not identify the source and cause of upper GIT bleeding in 6 of 13 patients (46%). In the same year Ament and Christie [9] could not identify the source of bleeding in 8 out of 36 children (22.6%). Out of these 8 children, 2 with Mechel's diverticulum were identified at exploratory laparotomy and 2 with epistaxis were identified by nasopharyngeal examination when they rebled.

The cause of upper GIT bleeding varies with age [10]. Esophagitis, gastric and duodenal ulcers and gastric erosions account for the majority of bleeding in infants below 1 year of age. In children aged 1 to 6 years, gastric ulcers and duodenitis or esophagitis are seen. From the age of 7 onwards duodenal ulcers are most common, followed by gastric erosions, varices and esophagitis [11].

In this work we passed across 19 patients with gastrointestinal bleeding, 15 with hematemesis (± melena) and 4 with melena alone (Table 2). On Endoscopic evaluation the cause of bleeding could not be identified in 4 patients (21%), varices were found in 8 patients (42.1%), gastritis in 5 patients (26.3%), duodenitis in 3 (15.8%), esophagitis in 3 (15.8%) and ulcers in 2 (10.5%). Since 5 of the bleeding patients have more than one "ednoscopic lesion", the number of endoscopic diagnosis is more than the number of patients with GIT bleeding.

Children with variceal bleeding have been successfully treated with endoscopic sclerotherapy [12]. In a series of 16 children with bleeding varices, the incidence of re-bleeding and transfusion requirements were significantly reduced during a 3-years follow-up [13]. Endoscopic sclerosis of the esophageal varix can be done in many different ways depending on the preference of the endoscopist regarding the type of sclerosing agent, injection volume, pattern of injections and intravariceal versus paravariceal injections [11]. Complications of endoscopic sclerotherapy include rebleeding, strictures, ulceration, perforation, chest pain and infection [14].

Our series of 100 patients included 2 patients presented for sclerothrapy of their varices. For an intravariceal technique, retractable, inexpensive, sharp, sterilized,

transparent injections were used with 2 ml per site of TES (final concentration 10% Tetradecyl, 33% Ethanol and 0.3 Saline).

Persistent vomiting / dysphagia:

Persistent vomiting may be the presenting symptom of a variety of GIT, metabolic, renal, CNS diseases and others [15]. In most infants less than 6 months of age who are growing normally, no diagnostic study is needed. Endoscopy should eventually be done in the face of persistent vomiting associated with bleeding or weight loss to exclude the variety of mucosal lesions that could be missed with barium studies [11].

In this work persistent vomiting / dysphagia was the indication for UGIE in 19 patients (Table 2). In 3 children (15.8%), no abnormalities could be detected, esophagitis was the commonest endoscopic finding, observed in 13 children (68.4%). The cause-effect relationship between vomiting and esophagitis is difficult to establish, however, most studies point to esophagitis as the commonest finding in children with persistent vomiting / dysphagia.

In 1979, Ament and Christie [9] reported esophagitis in 12 out of 39 patients (30.8%). In the same year Cox and Ament [8] found it in 5 out of 10 children with vomiting (50%), all the 5 children had chalasia of cardia.

Other endoscopic findings in the 19 children with vomiting/dysphagia were gastritis in 3 patients (15.8%), ulcer disease in 2 (10.5%) and esophageal stricture in one patient (5.3%) who gave no history of caustic ingestion.

Abdominal pain:

UGIE should be considered for children with recurrent abdominal pain who have associated symptoms of weight loss, nausea, vomiting or hematemesis, who awaken at night with pain; who have persistence of the same degree of severity or increasing severity of pain. It can be recommended as the initial diagnostic test where experienced pediatric endoscopists are available [11].

In a series of 163 endoscopic procedures Ament and Christie [9] reported chronic abdominal pain as the commonest indication for endoscopy (66 children, 40.5%). A source for pain could be identified in only 21 of 66 patients (31.8%). The commonest identified lesions were duodenal ulcers (8 patients, 28%) gastric ulcers and gastritis (4 patients each, 14%), duodenitis and pancreatic rest (2 patients each, 7%). Abdominal pain was again the commonest indication for endoscopy in the study of Bryne [16] (21 out of 72 procedures, 29.2%).

In this work abdominal pain has been ranked as the 4th most common indication for UGIE (7 children). Among these, 3 children (42.9%) showed no abnormality, 2 showed esophagitis.

Caustic ingestion:

Caustic ingestion was the indication for UGIE in 3 children (Table 2). Endoscopy was performed in the first week after the injury in 1 child, in whom esophagitis was observed. In the remaining 2 patients endoscopy was done 2 and 3 months later. In both patients oesophageal strictures could be seen in addition to esophagitis.

Foreign bodies:

UGIE was performed to remove ingested foreign bodies in 2 patients. The first (3y) accidentally ingested a coin the second (1y), ingested a closed golden pin (Fig. 2). Both F.B. could be seen on plain X-rays and were safely removed under endoscopy.

The indications of UGIE in the different age groups:

Below the age of 6 months persistent vomiting was the main indication (8 out of 9 patients, 88.9%) (Fig. 1).

Accidental ingestion of corrosives or foreign bodies occurred between 1 and 3 years of age. Obscure heptomegaly/ splenomegaly and gastrointestinal bleeding were the major indications in children > 2-6 Ys and > 6-13 Ys. Among children > 2-6 years, HSM and GI hemorrhage were indication for endoscopy in 59.4% and 18.8% of children respectively. In the older age group (> 6-13 years) the corresponding figures were 56.4% and 20.5% respectively.

Another important indication for endoscopy above the age of 6 years was abdominal pain (6 out of 39 children 15.4%) (Fig. 1).

The age distribution of children with different endoscopic findings:

The mean ages of children with esophageal stricture, FB ingestion, esophagitis and gastritis were 1.8 years, 2 years, 2.7 years and 5.4 years respectively. Patients with duodenitis, varices and ulcer disease were older (Mean ages of 7.1 years, 8 years and 9.5 years respectively) (Table 5). Varices could be demonstrated as early as the 8th month of age. All patients below the age of 6 months showed esophagitis, gastritis and/or duodenitis.

Esophagitis has been the commonest endoscopic finding in children under study (Table 3). Among the 29 patients with esophagitis 3 children had a history of caustic ingestion, 5 had hiatus hernia and 7 showed chalasia of cardia with gastroesophageal reflux. In the remaining 14 children no associated findings could be identigied (Table 4).

Impact of endoscopy on diagnosis:

In order to evaluate the overall impact of endoscopic examination on diagnosis and hence on subsequent therapy Knuston [17] in his studies on adults, suggested that, in every patient, endoscopy can accomplish one of five possibilities:

1- Changing the provisional clinical diagnosis,
2- confirming the provisional clinical diagnosis,
3- providing the ultimate means of establishing diagnosis (by being the only effective method or by clarifying questionable X-ray findings),
4- detecting no abnormalities and 5- inadequate or inconclusive examination.

In this work no abnormalities could be seen in 32 patients (Table 3). Examination was interrupted by complications in 3 patients. The exact effect of endoscopy on confirming, changing or establishing the diagnosis could not be assessed since, surprisingly, all patients have been referred with "no" provisional diagnosis. Instead, referring clinicians tended to "Label" the patient with his presenting symptoms or signs e.g. hematemesis for investigations, hepatosplenomgealy for investigations of abdominal pain for investigations. If an accurate correlation between clinical diagnosis, radiographic findings and endoscopic findings is to be established one must first have a provisional clinical diagnosis.

Complications:

Upper gastroinatestinal endoscopy is considered a safe procedure, although reported complications include hypoxemia, apnea, aspiration and choking, cardiac arrhythmias, bacteremia, perforation and bleeding [18].

In one series Ament [19] reported after

2045 pediatric UGIE that transient respiratory arrest from oversedation, bronchospasm related to general anaesthesia and phlebitis were the 3 most common complications. Vagal stimulation or airway compression, resulting in bradycardia or stridor may occur in young infants [10]. These symptoms usually resolve with removal of the endoscope.

In this work bradycardia and transient apnea occurred in 3 children, 2 of them were at the age of 1 month, the 3rd was 4 years old. In all the 3 children heart rate and respiration were restored immediately after withdrawal of the endoscope and with the initiation of oxygen therapy. All the 3 patient were referred back safely to their hospital wards.

The exact incidence of "minor" complications such as phlebitis dental injury, drug reactions and prolonged obtundation has not been reported in children, it has been approximately 1% in adults [20]. We did not receive any reports or complaints of such complications from clinicians who followed the children after completion of the procedure.

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