

# Indications and yield of upper gastrointestinal endoscopy in children

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## ABSTRACT

**Objective:** Knowledge of the pattern of gastrointestinal tract (GIT) disorders detected by endoscopy is important for clinicians. The objective of this paper is to report on the indications and yield of endoscopy.

**Methods:** Retrospective analysis of data of all patients below 18 years of age who underwent upper GIT endoscopy from 1414 H (1993 G) through to 1424 H (2002 G) over a 10-year period at King Khaled University Hospital, Riyadh, Kingdom of Saudi Arabia.

**Results:** One thousand and fifteen upper GIT endoscopies were performed, of which 851 diagnostic procedures were performed on 851 children. The majority (96%) were Saudi nationals, the age range was between 4 days and 18-years, and the male to female ratio was 0.7: 1. The 2 most common indications were

duodenal biopsy (29%) and abdominal pain (24%). The best diagnostic yield was in children presenting with ingestion of caustic substances, followed by hematemesis, and vomiting in 86%, 75% and 67%. The overall yield, however, was 43%. Finally, the most common diagnoses were gastritis and esophagitis occurring in 32% and 30% of the children. Age related variations are reported.

**Conclusion:** The increasing practice of endoscopy in children resulted in the development of new indications such as endoscopic small bowel biopsy. The differences in indications and yield of endoscopy with age reflecting the varying pattern of diseases.

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Upper gastrointestinal (GIT) endoscopy is now a recognized major diagnostic tool in children.<sup>1-3</sup> The increasing practice of this procedure in children led to development of guidelines for training and practice.<sup>4,5</sup> In the Kingdom of Saudi Arabia (KSA), pediatric endoscopy is performed in most tertiary care centers for both diagnostic and therapeutic indications. Previous reports on the experience with this procedure despite being few or quite old, demonstrate its usefulness in the investigation of children presenting with various GIT complaints.<sup>6-8</sup>

In this paper, we present an update on the role of endoscopy in the investigation of pediatric upper GIT disorders. The objective of this report is to

describe the current indications and yield of endoscopy in children presenting with common GIT symptoms.

**Methods.** This a retrospective analysis of all upper gastrointestinal (UGI) endoscopies performed on all patients 0-18-years of age at King Khalid University Hospital (KKUH) over a period of 10-years. Data retrieved from the records included age, gender, nationality, indication for endoscopy, and endoscopic diagnosis. Simple descriptive statistics were performed to define the indications and yield of endoscopy in patients presenting with various

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GIT symptoms. Data were analyzed for 2 age groups; Children from 0-12-years in order to compare with studies reporting up to this period, and those from 13-18-years to compare with data reported from other parts of the world who consider this age group as pediatric patients. The data were then combined for all age groups from 0-18-years to have an overall idea on the pattern of UGI disorders in our setting.

**Results.** Between the years 1414 through to 1424 H (1993 through to 2003 G), 1015 UGI endoscopies were performed on children in the Endoscopy Unit, KKUH, Riyadh, KSA. Records of 70 patients were either missing or incomplete, and 94 were either repeat or therapeutic procedures. This excludes 164, leaving 851 diagnostic procedures performed on 851 patients who will be the subjects of this analysis. The majority of the children 816 (96%) were Saudi nationals and most of the remaining children (86%) were from other Arab countries. The age range was from 4 days to 18-years and the male to female ratio was 0.7: 1. **Table 1** shows that duodenal biopsy was the most frequent indication 181/396 (46%) in the younger age group (0-12-years), followed by vomiting and abdominal pain in 13% and 10% of the children. By contrast, in older children (13-18- years), abdominal pain was the most frequent indication (35%), followed by abdominal pain associated with vomiting and duodenal biopsy in 22% and 14% of the patients. However, the most frequent indications for all age groups were duodenal biopsy followed by abdominal pain and vomiting with abdominal pain in 29%, 24%, and 14% of the children. The yield of endoscopy is shown in **Table 2**, indicating that the best yield of endoscopy was in children with ingestion of caustic substances (83%), followed by hematemesis and dysphagia in 75% and 68% of the patients. However, in the younger age group, the best diagnostic yield was in children with hematemesis (90%); whereas in older children, the best yield was in patients presenting with vomiting (70%), followed by hematemesis and dysphagia in 66% and 54% of the patients respectively. The overall yield of endoscopy is 364/851 (43%); however, when cases of duodenal biopsy are excluded from analysis the diagnostic yield of endoscopy increases to 53%. The pattern of endoscopic diagnoses (**Table 3**), indicates that in the younger age group, esophagitis was the most frequent diagnosis (53%), whereas gastritis was the most common diagnosis (42%) in older children (13-18-years). The overall pattern, however, was dominated by gastritis, esophagitis and gastroduodenitis diagnosed in 32%, 30%, and 22% of the children. Peptic ulcer disease was diagnosed in only 7% of the patients.

**Table 1 -** Indications for endoscopy in children 0-18-years.

Indications	0-12-years n (%)	13-18-years n (%)	0-18-years n (%)
Vomiting	50 (13)	20 (4)	70 (8)
Abdominal pain	42 (10)	161 (35)	203 (24)
Vomiting and pain	20 (5)	98 (22)	118 (14)
Hematemesis	22 (6)	38 (9)	60 (7)
Dysphagia	17 (4)	24 (5)	41 (5)
Ingestion	12 (3)	0 (0)	12 (1)
GERD*	33 (8)	0 (0)	33 (4)
Duodenal biopsy	181 (46)	63 (14)	244 (29)
Others**	19 (5)	51 (11)	70 (8)
<b>Total</b>	<b>396 (100)</b>	<b>455 (100)</b>	<b>851 (100)</b>

\* Atypical presentations of gastroesophageal reflux disease  
 \*\* Include heartburn, dyspepsia, severe anemia and refractory rickets

**Table 2 -** The yield of endoscopy in children 0-18-years.

Indications	0-12-years Abnormal/ Total (%)	13-18-years Abnormal/ Total (%)	0-18-years Abnormal/ Total (%)
Vomiting	33/50 (66)	14/20 (70)	47/70 (67)
Abdominal pain	16/42 (38)	68/16 (42)	84/203 (41)
Vomiting and pain	9/20 (45)	52/98 (53)	61/118 (52)
Hematemesis	20/22 (90)	25/38 (66)	45/60 (75)
Dysphagia	15/17 (88)	13/24 (54)	28/41 (68)
Ingestion	10/12 (83)	0 (0)	10/12 (83)
GERD*	21/33 (64)	0 (0)	21/33 (64)
Duodenal biopsy	19/181 (7)	15/63 (24)	34/244 (14)
Others**	9/19 (47)	25/51 (49)	34/70 (49)
<b>Total</b>	<b>152/396 (38)</b>	<b>212/455 (47)</b>	<b>364/851 (43)</b>

\* Atypical presentations of gastroesophageal reflux disease  
 \*\* Include heartburn, dyspepsia, severe anemia and refractory rickets

**Table 3 -** Endoscopic diagnosis in 851 children 0-18-years.

Indications	0-12-years n (%)	13-18-years n (%)	0-18-years n (%)
Abnormal procedures	152 (38)	212 (47)	364 (43)
Esophagitis	80 (53)	30 (14)	110 (30)
Gastritis	28 (18)	88 (42)	116 (32)
Gastroduodenitis	26 (16)	53 (25)	79 (22)
Peptic ulcer disease	4 (3)	20 (9)	24 (7)
Others*	14 (9)	21 (10)	35 (9)
Normal procedures	244	243	487
<b>Total procedures</b>	<b>396</b>	<b>455</b>	<b>851 (100)</b>

\* Include esophageal varices, esophageal webs, achalasia, Mallory-Weiss tears trichobezoars, telangiectasia, leiomyoma and bleeding papillary site

**Discussion.** The data presented in this paper represent the largest number of children reported so far from a single institution in KSA. These represent our experience in KKHU over a 10-year period in the investigation of children up to 18-years of age. The children are referred for endoscopy after evaluation by consultant pediatricians, internists or gastroenterologists. Therefore, due the selection bias, these data do not represent incidence or prevalence. However, such data describe the current indications and yield of endoscopy as well as the prevalent pattern of conditions expected to be found on endoscopic examination. Compared to previous reports, this study indicates increasing use of endoscopic duodenal biopsy which, in our practice, has replaced other methods of obtaining small bowel material. The finding that duodenal biopsy was the leading indication for endoscopy in our children (29%), contrasts with the findings in previous studies one from the same institution in 1989,<sup>6</sup> and the other from Dammam in 1996<sup>7</sup> in which this indication represented 1.3% and 7.8% of the patients. Furthermore, there was an age-related difference in the indication for endoscopy. That duodenal biopsy was more common indication in young children (46%) versus only 14% in older children reflects the different pattern of GIT disorders in these age groups. Similarly, while abdominal pain represented the most frequent indication in adolescents (35%), it accounted for only 10% of the indications in younger children. The overall yield of endoscopy of 53% in this study is similar to previous reports from KSA.<sup>6,8</sup> The highest yield of endoscopy in children with ingestion (83%) reflects our practice that we endoscope only cases with history of strong alkali or acid ingestion and very rarely other household products. Abdominal pain, despite being the most frequent indication (24%) (after duodenal biopsy) and despite the highly selective nature of this study, endoscopy had the lowest yield (41%) in this condition. However, the yield was better (52%), when abdominal pain was associated with vomiting. This pattern of common indication and low yield of endoscopy in patients with abdominal pain is similar to the finding of others,<sup>6,9</sup> suggesting the need for further selection of these patients for endoscopy. There are age related differences in the yield of endoscopy which again reflect the different pattern of certain conditions according to age. For example, atypical presentation of gastroesophageal reflux diseases as well as accidental ingestions and their complications (esophagitis) were more common in younger children than in adolescents. The pattern of UGI conditions diagnosed by endoscopy reveals

several important points. First, Except for patients with peptic ulcer disease, the predominance of female patients (ratio 0.7:1) is also similar to previous reports from KSA. The explanation of this finding is unclear. Second, the age related differences indicate that esophagitis was a far more common diagnosis in young children (53%), than in adolescents (14%). By contrast, gastritis was a more common diagnosis in adolescents (42%), than in young children (18%). However, the 3 leading diagnoses in all age groups (esophagitis, gastritis, and duodenitis) are similar to previous reports. Third, peptic ulcer disease was an uncommon condition in this group of children, a finding which is similar to reports from different parts of the world.<sup>2,6,7,8,10</sup>

In conclusion, this study indicates that endoscopy is now becoming a more common indication for small bowel biopsy, demonstrates age related differences in the indications, yield, and pattern of UGI disorders, and the need for further screening of patients with abdominal pain before endoscopy.

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