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IN THIS ISSUE



- Climate Change Project
- Telemedicine and COVID-19 Pandemic
- Gamete Donation for Artificial Insemination
- Paediatric Gastrointestinal Endoscopy
- Monkeypox Surveillance
- Abdominal Massage in Pregnancy
- Deprescribing Polypharmacy
- Survival in Childhood Cancer
- Secondary Hypothyroidism

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ORIGINAL RESEARCH

Paediatric Gastrointestinal Endoscopy in a Nigerian Tertiary Hospital

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Abstract

Background: Gastrointestinal endoscopy is a very useful tool in the diagnosis and treatment of gastrointestinal disorders. Gastrointestinal endoscopy in paediatric practice is still evolving in Nigeria.

Objective: To determine the common indications for paediatric endoscopy in a Nigerian tertiary hospital.

Method: This was a retrospective study of all gastrointestinal endoscopic procedures performed for children aged 0 - 18 years between January 2021 and March 2022. The hospital records of the children were retrieved, and data were extracted for analysis.

Results: Thirty-seven endoscopic procedures were performed on 32 children with two subjects having repeated procedures while one had both upper and lower gastrointestinal endoscopic studies. The mean age of the children was 11 ± 5.4 years with those aged between 10 and 14 years constituting the majority (40.6%). Most indications were diagnostic and the commonest indication for endoscopy was upper abdominal pain (40.6%) which was followed by upper gastrointestinal bleeding (37.6%). The endoscopic findings were mainly gastritis (56.8%), hiatus hernia (32.4%) and duodenitis (18.9%). The commonest therapeutic indication for gastrointestinal endoscopy was variceal banding.

Conclusion: Paediatric gastrointestinal endoscopy is useful for the diagnosis and treatment of paediatric gastrointestinal disorders. Upper abdominal pain and upper gastrointestinal bleeding are the leading indications for paediatric gastrointestinal endoscopy in Nigeria.

Keywords: Abdominal pain, Children, Diagnostic, Gastritis, Gastrointestinal bleeding, Gastrointestinal endoscopy.

Introduction

Gastrointestinal endoscopy is a veritable tool in the diagnosis and treatment of different gastrointestinal disorders globally. The history of gastrointestinal endoscopy dated back to the 18th century with Philip Bozzini's invention of the Lichteiter which consisted of a series of lenses

illuminated by candlelight. ^[1] Similar instruments were subsequently designed following the same principle until 1868, when Adolf Kussmaul designed the first gastroscope. ^[2] The tortuosity of the gut coupled with poor illumination posed a challenge, which led to the invention of the flexible fiberoptic endoscope by Basil Hirschowitz and Larry Curtiss in the 1950s. ^[3] Paediatric endoscopy became easier in the

1970s with improvement in the instruments, though occasional examinations were performed earlier in children in the 1960s. [1] There has been a gradual improvement in the practice of paediatric endoscopy following availability of more modern scopes, sedation of children, nursing support and improved expertise of physicians. [4]

It is, however, observed that in most hospitals in developing countries, endoscopy in paediatric patients is performed by adult gastroenterologists. Only a few centres have specialized paediatric gastrointestinal endoscopists due to a dearth of paediatric gastroenterologists. [5]

Although pockets of training in paediatric endoscopy take place in selected tertiary health facilities in Nigeria, the first documented report on training of paediatric endoscopists in Nigeria was at a pre-conference workshop organized by the Nigerian Society of Paediatric Gastroenterology, Hepatology and Nutrition (NISPGHAN) in collaboration with the Paediatric Association of Nigeria in 2014, hosted by the University of Calabar Teaching Hospital, Calabar. [6]

Paediatric endoscopy provides diagnostic and therapeutic benefits in the management of gastrointestinal disorders in children. Endoscopy is superior to other radiographic studies in the diagnosis of peptic ulcers, polyps and mucosal abnormalities while offering opportunity for tissue biopsy and therapeutic procedures such as banding, dilatation and polypectomy. The indications for paediatric endoscopy vary from those seen in adults due to the difference in the epidemiology and pattern of gastrointestinal disorders in children. The indications for upper gastrointestinal (GI) endoscopy may include bleeding (active, persistent, recurrent), upper abdominal pain with significant morbidity (anorexia, anaemia, asthenia), dysphagia,

odynophagia, persistent food refusal, persistent chest pain, iron deficiency anaemia, polypectomy, banding/sclerotherapy, removal of foreign bodies and passage of gastrostomy feeding tube. [4] The indications for lower GI endoscopy include unexplained iron deficiency anaemia, lower GI bleeding (haematochezia), unexplained chronic diarrhoea, radiographic abnormalities (stricture, filling defect) and inflammatory bowel disease (IBD). Therapeutic indications may include polypectomy, dilatation, removal of foreign bodies and reduction of sigmoid volvulus. [4]

A study by Roth *et al.* in Sweden [7] compared the indications and outcomes of gastroscopy between two periods: 2001 - 2004 and 2011 - 2014. A total of 834 gastroscopies were performed; 376 were in 314 patients aged between 0 - 15 years between the 2011 - 2014 period. There was a greater variation in the spectrum of cases seen in the latter period. The procedures grouped under various categories of indications included laparoscopic gastrostomies (40%), gastroenterological investigations (22%), obstruction in the GIT (20%), gastroesophageal reflux disease GERD) (15%), and others 3%. The indications for lower gastrointestinal endoscopy were not evaluated in that study.

A study by Fachler *et al.* [8] conducted in Jerusalem over a period of one year, among 329 children between the ages of 0 - 18 years, reported common indications of both upper and lower GI endoscopy. Upper GI endoscopy accounted for 78%, lower GI endoscopy accounted for 3% while 19% of cases had both upper and lower GI endoscopy. The major indications for gastrointestinal endoscopy were abdominal pain, diarrhoea, failure to thrive, short stature, iron deficiency and weight loss.

There is notably a dearth of studies on paediatric endoscopy in Nigeria. A study by Ray-Offor *et al.* [9] carried out among 20 children aged 15 months

to 18 years between 2012 and 2018, using two private health facilities in Port Harcourt, Nigeria, showed the following indications for upper GI endoscopy: upper abdominal pain (29.4%), gastrointestinal bleeding (29.4%), foreign body ingestion (23.5%), dysphagia (5.9%), vomiting of hair (5.9%), and neurologic impairment (5.9%). Three of the 20 cases required lower GI endoscopy for rectal bleeding. Similarly, Alatise *et al.* [10] in Ile-Ife, Nigeria, reported abdominal pain, haematemesis and dysphagia as the commonest indications for GI endoscopy among 59 children aged 0 - 18 years between January 2007 and December 2014.

The University of Benin Teaching Hospital (UBTH) is the premier tertiary hospital in southern Nigeria and provides specialized medical and surgical services for adults and children. There is a well-established paediatric gastroenterology unit in the Department of Paediatrics. This unit recently added endoscopic studies to the armamentarium of its services. Current documentation of the common indications and findings of paediatric endoscopy in UBTH will add to the body of knowledge in Nigeria. It may also create awareness concerning the procedure, thereby encouraging greater utilization and enhanced expertise of the concerned physicians, especially the paediatric gastroenterologists. This study is aimed at describing the common indications for paediatric endoscopy at UBTH, Nigeria.

Methods

This was a retrospective study covering the period between January 2021 and March 2022. The hospital records of all children aged 0 -18 years who had gastrointestinal endoscopy in the Special Investigating Unit of the University of Benin Teaching Hospital, Benin, were retrieved. The age, sex, type of endoscopy, frequency of procedures, indications and findings of

endoscopic procedures were extracted from the unit register.

Gastrointestinal endoscopies in UBTH started in 2009 and are performed mainly by a team of adult endoscopists, paediatric gastroenterologists and Resident doctors, led by the adult endoscopists, on three days (Mondays, Tuesdays and Wednesdays) of the week. A day (Thursday) was set aside for paediatric cases with the from April 2022, following increased referrals of paediatric cases. Referrals are received from the general outpatient clinic, paediatric outpatient clinic, children emergency ward, surgical outpatient clinic within the hospital, and from clinics and hospitals within Benin and neighbouring States of Delta, Bayelsa and Ondo.

Upper and Lower GI endoscopic procedures are performed in the Special Investigation Unit of the hospital. Referred patients are booked ahead by the nurses in the unit at least a day or three days before the procedure for upper and lower GI endoscopy respectively. This encounter provides an opportunity for the caregivers and older children to be instructed on the preparation and the details of the procedure. Emergency upper GI endoscopy are also performed on the day of referral if enough time has elapsed after the last meal. An overnight fast is usually advised for upper GI endoscopy and a minimum of 4 hours after the last meal if the procedure is to be done as an emergency.

Children requiring lower GI endoscopy are placed on semi-solid diet (Pap without milk) without coloured drinks and vegetables/roughages three days before the procedure. Epsom salt (Magnesium sulphate at 1 - 2 level teaspoons in 240mls of water) is commenced on the evening of the second day of preparation. Same dose of magnesium sulphate is repeated in the morning and evening while castor oil is added at mid-day on the third day of preparation. Liberal intake of water is also

encouraged. Dietary modification and soap and water enema are usually adequate for toddlers. The patients and caregivers present at the endoscopy suite by 7:30am on procedure day.

Most procedures are performed by an endoscopist, an assistant (physician) and a nurse assistant with other trainees in attendance. The endoscopist counsels and reassures the patient on the procedure after which an intravenous assess is secured. The anaesthetic agent utilized for upper GI endoscopy include 1% lignocaine spray which is applied on the oro-pharynx and intravenous midazolam (0.05 - 0.1mg/kg). Intravenous midazolam and pentazocine are administered to the children for lower GI endoscopy. The Olympus video endoscope (EVIS EXERA III CV- 190 Model) is utilized for the procedures. The diameter of the gastroscope is 5.8mm while the colonoscopes have two sizes, 10mm and 12.8mm.

The records of the paediatric patients who had a gastrointestinal endoscopy within the study period were retrieved and entered into an excel spread sheet. Thereafter, the data were analysed using the IBM SPSS (Statistical Package for Social Sciences) version 23 software (IBM Corp, Armonk, NY, USA). Continuous variables were summarized using means and standard deviation while categorical variables were summarized as percentages.

Results

Thirty-seven endoscopic procedures were performed among 32 children within the 15-month duration of the review. One child had both upper and lower GI endoscopic studies while two children had repeated procedures three times each. The mean age of the subjects was 11 ± 5.4 years. The age group with the highest proportion was between 10 and 14 years while

the least age group was 5 - 9 years. Male children constituted 53.1% of the participants.

Upper GI endoscopy constituted the majority (87.5%) of the procedures. Most procedures (87.5%) were diagnostic while 4 (10.8%) were therapeutic. The demographic characteristics and procedure types are as shown in Table I.

Upper abdominal pain was the main reason (40.6%) for requesting for the procedure followed by haematemesis (18.8%). When all the participants with upper and lower gastrointestinal bleeding were combined, it amounted to 46.9% which exceeded the number of participants with abdominal pain. The commonest indication for lower gastrointestinal endoscopy was haematochezia, which constituted 9.4% of the total endoscopic indications. The other reasons for requesting gastrointestinal endoscopy are as shown in Table II.

Most of the findings of the procedure were in the upper GI studies with gastritis constituting a majority (56.8%). Multiple findings were observed in some children. Other findings included hiatus hernia (32.4%), duodenitis (18.9%) and oesophageal varices (10.8%). The four children (2 males and 2 females) with oesophageal varices were aged between 3 and 4 years. Banding of the varices was performed for three of the subjects with two having repeated banding. The details of endoscopic findings are depicted in Table III.

Discussion

Despite the documented benefits of endoscopy, its practice in developing countries, Nigeria inclusive, is relatively inadequate and lacking in many facilities.

Table I: Demographic characteristics of the subjects and types of gastrointestinal endoscopic procedure performed.

<i>Characteristics</i>	<i>Frequency (%)</i>
Age group (years)	
<5	5 (15.6)
5 - 9	4 (12.5)
10 - 14	13 (40.6)
≥15	10 (31.3)
Gender	
Males	17 (53.1)
Females	15 (46.9)
Type of procedure	
Upper GI endoscopy	28 (87.5)
Lower GI endoscopy	3 (9.4)
Upper/Lower endoscopy	1 (3.1)
Indication for procedure	
Diagnostic	28 (87.5)
Therapeutic	3 (9.4)
Diagnostic/therapeutic	1 (3.1)

Table II: Indications for endoscopy in the subjects

<i>Indications</i>	<i>Frequency (%)</i>
Abdominal pain	13 (40.6)
Hematemesis	6 (18.8)
Hematemesis/melaena	3 (9.4)
Melaena	3 (9.4)
Haematochezia	3 (9.4)
Dysphagia	2 (6.2)
Regurgitation	1 (3.1)
Achalasia	1 (3.1)

Table III: Findings from upper and lower gastrointestinal endoscopy

<i>Endoscopic findings*</i>	<i>Frequency (%)</i>
Gastritis	21 (56.8)
Hiatus hernia	12 (32.4)
Duodenitis	7 (18.9)
Oesophageal Varices	4 (10.8)
Duodenal ulcers	2 (5.4)
Normal	2 (5.4)
Oesophagitis	2 (5.4)
Gastric polyp	1 (2.7)
Colitis	1 (2.7)
Haemorrhoids	1 (2.7)

*Multiple findings were observed for some procedures

This fact is shown in the small number of children benefiting from the procedure as corroborated by the findings in the present study. A total of 37 procedures were performed within 15 months and this comes to an average of two or three procedures per month. This rate is an improvement on previous reports from Nigerian studies such as 20 over a period of six years in Port Harcourt, [8] 65 over a period of eight years in Ile-Ife, [10] and 71 over a period of three years in Lagos. [11] These rates are quite small when compared with findings from studies conducted in more advanced countries. Fachler *et al.* [8] reported 329 procedures in one year in Jerusalem while Altamimi *et al.* [12] reported 778 upper endoscopy procedures in Jordan over a period of six years (2014 - 2020). The lesser number of procedures as seen in the present study and other studies in Nigeria, may be attributed to limited awareness about the availability and affordability of the procedure.

Awareness of the procedure may be influenced by the availability of trained paediatric endoscopists and availability of the appropriate endoscopes in many more facilities. The availability of the required expertise will drive the need for tertiary health institutions to acquire the required equipment and vice versa, thus prompting the floating of the services. Facilities offering such services also face the challenge of providing paediatric scopes. It is expected that as the number of children requiring such procedures increases, the need to acquire the required equipment, including paediatric endoscopes, will automatically increase.

Cost constitutes another limitation to the practice of paediatric endoscopy in Nigeria. The cost of upper GI endoscopy as reported by Ikobah *et al.* [6] ranges from 200 to 250 USD while lower GI endoscopy may cost between 250 and 300 USD. These are far beyond the reach of most Nigerian families. These procedures were mostly

performed in private health facilities but recently, more public facilities have floated such services with costs ranging from 40 to 50 USD and 60 to 70 USD for upper and lower GI endoscopy respectively. Despite this wide difference, the current cost of the procedure in public facilities is still beyond the reach of the average Nigerian family who are often required to make out-of-pocket payment for their health care needs.

Abdominal pain was the leading indication for paediatric gastrointestinal endoscopy in the present study. This is in keeping with reports from previous studies within and outside Nigeria. [8-12] This finding is not strange considering the high prevalence of *Helicobacter pylori* infection in children, especially in developing countries, where overcrowding, low socioeconomic status and poor hygienic conditions are prevalent. [13] *Helicobacter pylori* has been associated with conditions that present with abdominal pain in children such as gastritis and peptic ulcer disease. Other causes of gastritis, reflux oesophagitis and peptic ulcer disease will likewise present with abdominal pain. This finding is in contrast with that of Roth *et al.* [7] in Sweden, where the major (40%) indication for endoscopy was prior to laparoscopic gastrostomy. This is essentially to detect malrotation before the procedure for the placement of a feeding gastrostomy tube for infant and children via laparoscopy. Even though this is a common paediatric surgical procedure in industrialized countries, none of the patients in the present study and other Nigerian studies reported this procedure as an indication for paediatric endoscopy. [9-11] This difference may indicate a low prevalence of feeding problems requiring placement of a gastrostomy tube in Nigeria.

Ranking close to abdominal pain among the common indications is upper GI bleeding which, usually manifests as haematemesis or passage of

melaena stools. This is comparable with the findings of Adeniyi *et al.* [11], Alatise *et al.* [10], Ray-Offor *et al.* [9] and Norsa *et al.* [14] in Lagos, Ile-Ife, Port-Harcourt, all in Nigeria, and France respectively. The main causes of upper GI bleeding among infants and young children known in the literature include peptic ulcers and stress erosions while duodenal ulcers, oesophagitis and oesophageal varices are commoner among older children. [15] These are similar to the findings in the present study.

Upper GI endoscopic procedures were more frequently performed than lower GI endoscopy in this study; this is comparable with most other studies. [7-12] This may be attributed to rarity of conditions in children such as colorectal cancer, polyps, inflammatory bowel disease and rectal bleeding which are common in the adult population. The commonest indication for upper GI endoscopy was abdominal pain followed by haematemesis which is not different from the overall commonest indication for gastrointestinal endoscopy. The commonest indication for lower GI endoscopy (colonoscopy) was haematochezia which is like the findings of Alatise *et al.* [10] in Ile-Ife, Nigeria and Altamimi *et al.* in Jordan. [16] Haematochezia was second to abdominal pain as an indication for paediatric colonoscopy in a study conducted by Chen *et al.* [17] in China. When the indications for the study as reported by Chen *et al.* were separated into age group cohorts, haematochezia was the commonest indication in the 0-6 years age group.

In consonance with the findings of Alatise *et al.* [10] in Ile-Ife and Adeniyi *et al.* [11] in Lagos, both in Nigeria, gastritis was also the commonest endoscopic finding in the present study. *Helicobacter pylori* has been reported as a common cause of gastritis in children. About two-thirds (66.7%) of children with gastritis had a positive result for *Helicobacter pylori* in Lagos, [11] while 87.7% and 84.9% of *Helicobacter pylori*-positive Lebanese children had chronic and active

gastritis respectively. [18] The proportion of *Helicobacter pylori* positivity in the children with gastritis in the present study was not determined. Hiatus hernia was the second commonest finding in this study, comparable with that of Adeniyi *et al.* in Lagos. Hiatus hernia commonly presents with symptoms such as regurgitation of feeds, heartburn, chest or abdominal pain, dysphagia, haematemesis and melaena stools, most of which constituted the main indications for endoscopy as recorded in this study.

Oesophageal varices were found in four children, three of which had banding. This constituted 75% of the therapeutic indications for endoscopy in the present study. The other therapeutic indication was polypectomy, comparable with the study of Alatise *et al.* [10] where banding of oesophageal varices and polypectomy ranked commonest as the therapeutic endoscopic procedures. It, however, contrasted with the observation of Isa *et al.* [19] in Bahrain where oesophageal stricture dilatation was the main indication for therapeutic endoscopy. This difference may be attributed to the varying paediatric gastrointestinal disorders commonly observed in different countries. Oesophageal stricture was not reported in the present study and other Nigerian studies. [9-11] The proportion of therapeutic indications (12.5%) in this study was nonetheless comparable with that of Isa *et al.*

Normal endoscopic findings were only reported in two children which is much lower than findings in some previous studies. [11,19,20] The cause of this finding is not obvious but may be attributed to the pattern of referrals for the procedure which may infer strict consideration of a justifiable indication before referrals are made, taking into consideration, cost and anticipated benefit.

Limitation of the study

The interpretation and application of the results from this study should be guided by the inherent

limitation of retrospective studies with regard to missing data. The study has, however, revealed valuable information on the common indications for paediatric endoscopy in a Nigerian facility and a prospective multi-centre study is recommended.

Conclusion

Paediatric gastrointestinal endoscopy is a useful tool for the diagnosis and treatment of paediatric gastrointestinal disorders. Abdominal pain and gastrointestinal bleeding remain the commonest indications for paediatric gastrointestinal endoscopy. The therapeutic uses are also fewer than diagnostic uses.

Authors' Contributions: All the authors conceived and designed the study; AAO did literature review while AAO and E-OR did data collection. All the authors analysed and interpreted the data while AAO drafted the manuscript. All the authors revised the draft manuscript for sound intellectual contents and approved the final version of the manuscript.

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