

# An Experience of Pediatric Upper and Lower Gastrointestinal Endoscopy in a Tertiary Center

Upadhyay S, Sharma A

Department of Pediatrics  
Nepal Medical College Teaching Hospital,  
Jorpati, Kathmandu, Nepal.

## Corresponding Author

Satyam Upadhyay  
Department of Pediatrics  
Nepal Medical College Teaching Hospital,  
Jorpati, Kathmandu, Nepal.  
E-mail: rimalsatyam@gmail.com

## Citation

Upadhyay S, Sharma A. An Experience of Pediatric Upper and Lower Gastrointestinal Endoscopy in a Tertiary Center. *Kathmandu Univ Med J* 2017;58(2):142-5.

## ABSTRACT

### Background

Although upper gastrointestinal endoscopy and colonoscopy is considered to be a gold standard in the diagnosis of many pediatric gastrointestinal disorders, there is limited data about its utility from our country. This important diagnostic tool is underutilized.

### Objective

The objective of this study is to report the common indications, endoscopic findings and complications of pediatric upper gastrointestinal endoscopy and colonoscopy in a tertiary center to increase awareness amongst pediatricians.

### Methods

This descriptive cross-sectional study was conducted in children undergoing upper gastrointestinal endoscopy and colonoscopy for various indications in a tertiary center from November 2014 to October 2016 (24 months).

### Results

We performed 192 endoscopies during this period. Upper gastrointestinal endoscopy 158 and Colonoscopy 34. Mean age of patients was 10.2 years (range 6 months to 16 years) and 140(72.9%) patients were under 10 years of age. Common indications of UGI endoscopy were recurrent abdominal pain (67%), acute abdominal pain (12.6%), recurrent vomiting (8.0%), upper GI bleed (4.4%), failure to thrive (3.1%) and caustic ingestion (2.5%). An abnormality was detected in 128(81%) patients. Antral gastritis (55%) was the most common diagnosis. Thirty two percent of children with RAP had chronic moderate to severe gastritis and were positive for H. pylori in Giemsa stain on histopathological examination. Common indications of colonoscopy were Lower GI bleed, 18(82%) patients had rectal polyp and underwent snare polypectomy. Out of 12 patients who were evaluated for chronic diarrhea, 7(20%) were diagnosed to have cow's milk protein allergy and 5(15%) patients had inflammatory bowel disease. An abnormality was detected in 30(88%) patients. All children received sedation/analgesia and tolerated the procedure well.

### Conclusion

Upper gastrointestinal endoscopy and colonoscopy are safe procedure in children. The awareness about its diagnostic and therapeutic role should be raised amongst pediatricians in developing countries. There is also a need to develop training programs of pediatric gastroenterology and pediatric endoscopic suites in developing countries so that children may benefit from this state of the art diagnostic modality.

## KEY WORDS

*Colonoscopy, pediatric, upper gastrointestinal endoscopy*

## INTRODUCTION

The first internally lit device used to inspect the interior of human body was constructed by Philipp Bozzini of Mainz, Germany in 1806.<sup>1</sup> Modern gastroenterology blossomed with the introduction of flexible gastrointestinal endoscopy by Hirschowitz in the late 1950s. Use of fibreoptic flexible endoscopy in pediatric population started in 1970s.<sup>2-5</sup> After the introduction of fibreoptic endoscopy, pediatric gastroenterology has emerged as one of the most diverse medical-surgical practices in modern medicine.<sup>6</sup> In 1977, Ament and Chiristie declared upper gastrointestinal fiberoptic endoscopy as "one of the major diagnostic advances in pediatric gastroenterology in this decade".<sup>7</sup>

Although upper gastrointestinal endoscopy and colonoscopy is considered to be a gold standard in the diagnosis of many pediatric gastrointestinal disorders, there is limited data about its utility from our country. This important diagnostic tool is underutilized. Lack of awareness about its indication and application, limited pediatric friendly endoscopy suites/endoscopes and lack of adequately trained pediatricians who can safely perform the procedure are the greatest hindrances.<sup>8,9</sup> Pediatric gastroenterology is now an evolving subspecialty in our country. Therefore, we carried out this hospital-based study to report the common indications, endoscopic findings and complications of pediatric upper endoscopy and colonoscopy in a tertiary center to increase awareness amongst pediatricians.

## METHODS

We conducted a descriptive cross-sectional study in the Department of Pediatrics at Nepal Medical College and Teaching Hospital (NMCTH) which is a referral hospital and patients arrive to this hospital from various parts of the country. It has endoscopy suite equipped with child friendly pediatric Karl Storz video gastroduodenoscope (outer diameter 5.9 mm) and colonoscope (outer diameter 11.2 mm). We performed upper gastrointestinal (UGI) endoscopy and colonoscopy for various indications. The study covered the period from November 2014 to October 2016 and included patients who were between 6 month and 18 years old at the time they underwent upper gastrointestinal endoscopy. Endoscopies were performed for diagnostic and therapeutic purposes by a Pediatric Gastroenterologist. In accordance with the institutional protocol, endoscopic procedures on patients were performed under sedation (Midazolam 0.1-0.2 mg/kg and Ketamine 1-1.5 mg/kg) administered by a pediatrician/anesthesiologists. Sedation was given through a reliable venous access with monitoring of vital signs and oxygen saturation. The dosage was titrated in accordance to the Endoscopist comfort level and cooperation of the patient for the procedure. The medication employed was chosen by the specialist in charge of sedation according to individual

patient characteristics and procedure site specifications. Endoscopy findings were recorded, biopsies taken for histopathological examination and serological tests (tissue transglutaminase antibody) were sent wherever necessary. These procedures were performed on both an out patient and an inpatient basis. At least two nurses trained in endoscopy assisted in all procedures. Procedures were performed only after patients' parents or legal guardians had signed informed consent forms. Researcher himself collected the data through structured questionnaire. Data obtained from the patient population were then analyzed and studied using SPSS (Version 16) statistical program. The ethical review committee of NMCTH approved the research.

## RESULTS

We performed 192 endoscopies during this study period. One hundred and fifty eight patients underwent upper gastrointestinal endoscopy and 34 underwent Sigmoidoscopy/colonoscopy. Mean age of patients was 10.2 years (range 6 months to 18 years) and 140 (72.9%) patients were under 10 years of age and majority of them were females 109 (56.8%).

Table 1a and 1b outlines the various indications of UGI endoscopy and colonoscopy respectively. The most common indication for upper GI endoscopy were recurrent abdominal pain (67%) followed by acute abdominal pain (12.6%), recurrent vomiting (8.0%), upper GI bleed (4.4%), failure to thrive (3.1%) and caustic ingestion (2.5%). Two cases of refractory Iron deficiency anemia requiring blood transfusion were referred to our center and a case of hypoproteinemia also underwent this procedure to rule out protein losing enteropathy. The most common indications of colonoscopy were lower GI bleed (65%) and chronic diarrhea (35%).

**Table 1a. Indications for UGI endoscopy in children**

Indication	Number	%
Recurrent abdominal pain	106	67
Acute abdominal pain	20	12.6
Recurrent vomiting	13	8
UGI bleed	7	4.4
Failure to thrive	5	3.1
Caustic ingestion	4	2.5
Refractory iron deficiency anemia	2	1.2
Chronic diarrhea/hypoproteinemia	1	0.6
Total	158	100

**Table 1b. Indications for colonoscopy**

Indication	Number	%
Lower GI bleed	22	65
Chronic diarrhoea	12	35
Total	34	100

Table 2a and 2b outlines the endoscopic findings in upper GI endoscopy and colonoscopy respectively. An abnormality was detected in 128 (81%) patients. Gastritis was the most common diagnosis in 72 (45.5%) patients. Thirty two percent of children with RAP had chronic moderate to severe gastritis and were positive for H. pylori in Giemsa stain on histopathological examination. This was followed by duodenitis (9.5%) and esophagitis (7.6%). Hiatus hernia (3.8%) was seen in patients evaluated for recurrent vomiting. Varying grades of esophageal varices (3.8%) were noted in children who were referred to our center for upper GI bleed. All of them were diagnosed to have extrahepatic portal vein obstruction based on clinical, laboratory, ultrasonographic and endoscopic findings. Endoscopic variceal band ligation was applied in all of these patients. Three of them underwent Lienorenal shunt surgeries. Giardia lamblia was noted in all duodenal biopsy in patients who had duodenal nodularity and in three patients who had duodenitis. Duodenal biopsy was also sent in patients with failure to thrive and refractory iron deficiency anemia. Five patients were diagnosed to have celiac disease based on serology (anti tissue transglutaminase) and duodenal biopsy. One of the patients who was evaluated for failure to thrive was found to have two adult ascaris lumbricoides in the body of stomach.

**Table 2a. Upper GI endoscopy findings/diagnosis**

UGI endoscopic findings/diagnosis	Number	%
Gastritis( antral/fundal)	72	45.5
Normal	30	19
Duodenitis	15	9.5
Esophagitis	12	7.6
Hiatus hernia	11	7
Esophageal varices	6	3.8
Scalloping/bald duodenal folds	5	3.1
Duodenal nodularity	3	1.9
Prepyloric ulcer	3	1.9
Worm(Ascaris lumbricoides)	1	0.6
Total	158	100

**Table 2b. Colonoscopy findings/diagnosis**

Colonoscopic findings/diagnosis	Number	%
Rectal/sigmoid polyp	18	53
Sigmoiditis (bowel wall edema, erythema)	7	20.5
Colitis(bowel wall edema, erythema,ulcers)	5	14.7
Normal	4	11.7
Total	34	100

Common indications of colonoscopy were lower GI bleed and chronic diarrhea. Out of 22 patients who underwent colonoscopy for lower GI bleed, 18 (82%) patients had rectal polyp and underwent snare polypectomy, seven were diagnosed to have cow's milk protein allergy and five

had inflammatory bowel disease. Based on histopathology, three patients were diagnosed to have Crohn's disease and two of them had Ulcerative Colitis. An abnormality was detected in 30(88%) patients. All children received sedation/analgesia. Transient laryngospasm, transient apnea and respiratory depression are well known adverse effect of ketamine sedation. Transient laryngospasm and transient apnea occurred in one patient each; both were quickly identified and were without sequelae. Respiratory depression was not noted in any children. There were 3 children with emesis and two with mild agitation during recovery. Overall, ketamine appears to be safe, effective and well-tolerated agent in diagnostic and therapeutic upper GI and colonoscopic procedures.

## DISCUSSION

A major breakthrough in the diagnosis of esophago-gastro-duodenal lesions in children was evident in the early part of 1970s by the introduction of Esophagogastroduodenoscopy (EGD). Since then its use has escalated in the western world but still its availability is limited in developing countries. Now Upper GI endoscopy and colonoscopy are considered to be a gold standard in the diagnosis of many pediatric gastrointestinal disorders.<sup>10</sup> With the advancement of pediatric gastroenterology, disorders that require endoscopy for diagnosis have shown a rising incidence of diagnosis.<sup>11</sup> However, this important diagnostic tool is not being utilized in developing countries. Diagnostic upper GI endoscopy has recently been introduced in our country.<sup>12</sup> To the best of our knowledge, NMCTH is one of the first teaching institution in the country to offer a facility of dedicated both diagnostic and therapeutic UGI and colonoscopic procedures.

Abdominal pain is a common gastrointestinal symptom in children.<sup>6</sup> The most common referrals at our center for UGI endoscopy was recurrent abdominal pain (67%). This was comparable to the study done by Joshi et al. and Memon et al. where they had 88% and 51.6% respectively.<sup>13,14</sup> Abnormality was detected in 128 (81%) patients who were evaluated for recurrent abdominal pain where as majority (80%) patients with recurrent abdominal pain had negative UGI endoscopic findings in a study done by Thapa et al.<sup>12</sup> 32% of children with RAP had chronic moderate to severe gastritis and were positive for H. pylori in Giemsa stain on histopathological examination. The higher incidence of abnormal finding in our study is probably because routine biopsy was performed in all cases.

Other indications for patients undergoing endoscopy were acute abdominal pain (12.6%), recurrent vomiting (8.0%), upper GI bleed (4.4%), failure to thrive (3.1%) and caustic ingestion (2.5%). Varying grades of esophageal varices 6(3.8%) children were noted in children who were referred to our center for upper GI bleed. All of them were diagnosed to have extrahepatic portal vein obstruction based on clinical, laboratory, ultrasonographic and

endoscopic findings. Endoscopic variceal band ligation was applied in all of these patients. Three of them underwent lienorenal shunt surgeries in addition to band ligation as they developed hypersplenism in the subsequent visits.

The most common indication for colonoscopy was lower GI bleed. Rectal bleeding is an alarming symptom and requires additional investigation. Out of 22 patients who underwent colonoscopy for lower GI bleed, 18(82%) had colorectal polyps. Polyps are the most common causes of colorectal bleeding in children.<sup>15,16</sup> Polyps occur in as many as 1% of children and 90% of these are juvenile polyps.<sup>15</sup> The intermittent indolent rectal bleeding is the main symptom of colonic polyps. Juvenile polyps are generally thought to be hamartomatous lesion with little malignant potential. They have been reported to be solitary and rectosigmoid in location in 80-90% of cases.<sup>17,18</sup> All children with colorectal polyps underwent snare polypectomy. Out of ten infants who were evaluated for chronic diarrhea seven were diagnosed to have cow's milk protein allergy based on clinical symptoms and rectal biopsy (> 6 eosinophils/HPF). Colonoscopy revealed typically focal mucosal erythema and aphthous ulcerations. Similarly, five

children who underwent colonoscopy for chronic diarrhea had inflammatory bowel disease. Based on clinical findings, serology, endoscopic findings and microscopy three children were diagnosed to have Crohn's disease and two had ulcerative colitis.

## CONCLUSION

Upper and lower GI endoscopy are safe procedure in children. The awareness about its diagnostic and therapeutic role should be raised amongst pediatricians in developing countries. There is also a need to develop training programs of pediatric gastroenterology and pediatric endoscopic suites in developing countries so that children may benefit from this state of the art diagnostic modality.

## ACKNOWLEDGEMENTS

We would like to acknowledge our sincere thanks to the department of pediatrics, department of anesthesiology, endoscopy unit and all the well wishers for continuous support.

## REFERENCES

1. Sircus W. Milestones in the evolution of endoscopy: a short history. *J Royal Col Physician Edinburgh*. 2002;33:124-34
2. Freeman NV. Clinical evaluation of the fiberoptic bronchoscope (Olympus BF5B) for pediatric endoscopy. *J Pediatric Surg*. 1973, 8:213-20.
3. Ament ME, Christie DL. Upper gastrointestinal Fiber optic endoscopy in pediatric patients. *Gastroenterol*. 1977;72:1244-6.
4. Pepp JP. Endoscopic experience in 100 consecutive cases with the Olympus GIG endoscope. *Am J Gastroenterol*. 1973;60:466.
5. Cremer M, Peters JP, Emonts P, Rodesch P, Cadranet S. Fiberoendoscopy of the Gastrointestinal tract in children: experience with newly designed fiberscopes. *Endoscopy*. 1974;6:186-9.
6. Mark A. Gilger. Gastroenterologic endoscopy in children: past, present and future. *Current Opinion Pediatr*. 2001;13:429-434
7. Ament ME, Christie DL. Upper gastrointestinal fiberoptic endoscopy in pediatric patients. *Gastroenterol*. 1977;72:1244-6.
8. Khan MR, Ahmed S, Ali SR, Maheshwari PK, Jamal MS. Spectrum of upper GI endoscopy in pediatric population at a tertiary care centre in Pakistan. *Open J Pediatr*. 2014;2014.
9. Mandeville KL, Krabshuis J, Ladep NG, Mulder CJ, Quigley EM, Khan SA. Gastroenterology in developing countries: issues and advances. *World J of Gastroenterol*. 2009;15(23):2839.
10. Gleason WA, Tedesco FJ, Keating JP, Goldstein PD. Fiberoptic gastrointestinal endoscopy in infants and children. *J Pediatr*. 1974;85(6):810-3.
11. Murray JA, Van DC, Plevak MF. 3rd Trends in the identification and clinical features of celiac disease in a North American community, 1950-2001. *Clin Gastroenterol Hepatol*. 2003;1(1):19-27.
12. Thapa SB, Sharma AK. Findings of Pediatric Upper Gastrointestinal Endoscopy at a Tertiary Care Centre. *J Nepal Pediatr Soc*. 2015; 35:123-8.
13. Joshi MR, Sharma SK, Baral MR. Upper GI endoscopy in children- in an adult suite. *Kathmandu Univ Med J*. 2005;3(2):111-4.
14. Memon IA, Lal M, Tariq S, Chand S. Upper Gastrointestinal Endoscopic Experience in Children. *Medical Channel* 2011;17(4):30-33.
15. Gelb AM, Minkowitz S, Tresser M. Rectal and colonic polyps occurring in young people. *NY State J Med*. 1962;62:513-8.
16. We JH, Park HS, Park JH. The role of colonoscopy in children with hematochezia. *Korean J Pediatr Gastroenterol Nutr*. 2011;14:155-60.
17. Jalihal A, Misra SP, Arvind AS, Kamath PS. Colonoscopic polypectomy in children. *J Pediatr Surg*. 1992;27:1220-2.
18. Poddar U, Thapa BR, Vaiphei K, Singh K. Colonic polyps: experience of 236 Indian children. *Am J Gastroenterol*. 1998;93:619-22.