

ENDOSCOPY IN PEDIATRICS

E. Pehlivanoğlu, M.D.*

*Assistant Professor, Department of Pediatrics, Faculty of Medicine, Marmara University, Istanbul, Turkey.

INTRODUCTION

The first endoscopic examination was performed by Hippocrates in the 5th century B.C. using a rigid tube. Recently through advances in medical technology, endoscopy has become one of the most widely used diagnostic and therapeutic methods in gastroenterology (1).

Although decades have passed since the application of this technique in adults, only a limited number of pediatric gastroenterology centers have used it. Pediatric endoscopy has revolutionized pediatric gastroenterology in terms of diagnosis and management of many conditions. Through the establishment of pediatric gastroenterology training programs in Europe and the United States, infant or pediatric endoscopists have become more widely available. Currently, it is considered as a subspecialty of pediatrics although most centers only have facilities for rigid rectosigmoidoscopy performed by surgeons. Where available, fiberoptic endoscopy has provided total examination of the colon, stomach, esophagus and proximal small bowel under direct vision by skillful endoscopist.

Endoscopic examinations are performed by rigid instruments (anoscopy and rectosigmoidoscopy) or flexible fiberoptic endoscopes. Fiberoptic technology allows the examination of previously unreachable areas of the gastrointestinal tract.

Preparation for endoscopy increases the success rate of the procedure. The patients should be kept n.p.o for 12 hours prior to endoscopy. Because of the uncooperative nature of pediatric patients, sedation is generally necessary (2). This is accomplished using intravenous medications. In our own practice we have chosen a combination of diazepam (0.1-0.3 mg/kg) and meperidine (1.2 mg/kg), usually supplemented with antihistaminic drugs.

UPPER GASTROINTESTINAL ENDOSCOPY

Examination of the upper gastrointestinal system requires an endoscope appropriate to the caliber of the esophagus of the pediatric patient. This can be achieved by using small diameter infant endoscopes for children less than 5 years and even adult instruments for over 5 years.

Sedation is required prior to the procedure, but generally application of local anesthetics to the oral

pharynx is not used in our practice.

Indications of upper gastrointestinal endoscopy are variable (table I). Although it is not a routine evaluative method of abdominal pain, the specimen taken by endoscopic biopsy may reveal the underlying pathologic condition (3). Since radiologic films are not sensitive enough to determine the nature of many mucosal illnesses in pediatrics, endoscopy is considered one of the diagnostic tools in the investigation of, inflammatory diseases (2). Emergency upper gastrointestinal endoscopy can reveal the source of bleeding in most of the cases, but because of the high mortality and morbidity rate, it should only be performed if it will change the therapeutic approach (3,4,5). The following methods and materials are used for endoscopic therapy of gastrointestinal bleeding: a) topical therapy (tissue adhesives, clotting factors, collagen, ferromagnetic tamponade), b) injection therapy (ethanol and other sclerosants), c) mechanical therapy (ballons, hemoclips, snares, sutures), d) thermal therapy (electrocoagulation, heater probe, laser, cryotherapy) (5).

Newly developed endoscopes have limited the number of contraindications (table II) of upper gastrointestinal endoscopy. Flexibility and caliber of the instruments are appropriate even for small infants. Patients who are at high risk for developing complications, should be observed and monitored during the procedure. Inhibition of respiration, aspiration of secretions or gastric contents, perforation of the esophagus, stomach or duodenum, and traumatic bleeding are rarely seen complications (6,7).

RETROGRADE ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY (ERCP)

This procedure provides visualization of the pancreatic or common bile duct by cannulation of sphincter of Vater and injection of contrast material under fluoroscopy. The indications of ERCP are limited in pediatrics (8). Congenital strictures of the bile duct, Caroli's disease and pancreatic tumors or relapsing pancreatitis are conditions where ERCP may be utilized (9). They are very rare in children, and other non-invasive diagnostic methods are generally preferred.

The complication rate of ERCP is approximately 3 % in most centers (8,10).

RECTOSIGMOIDOSCOPY AND ANASCOPY

Anascopy is a simple procedure which can be easily performed in small infants. It permits evaluation of the anus and anal canal, and still remains superior to flexible endoscopy in the era of flexible fiberoptic endoscopy (1,11). Anal lesions, hemorrhoids, fissures or fistulas can be detected by this examination.

Rectosigmoidoscopy provides more detailed data regarding the diseases of the rectum and sigmoid colon. It is performed with sedation in most pediatric age groups. Cooperative patients in pre-teen or teen age group may tolerate the procedure.

Pediatric rigid proctoscope has been widely used for many years. This permits examination of the first 10-15 cm of the gastrointestinal channel in small children. Recently developed small caliber flexible sigmoidoscopes may be passed up to the 35-75th cm of the colon. Most colonic diseases can be diagnosed by this procedure (table III).

COLONOSCOPY

Endoscopic examination of the entire colon has gained great value in the diagnosis and treatment of several gastrointestinal diseases in pediatric patients (table IV). Experience with this procedure is less than that of upper gastrointestinal endoscopy. It is more complicated and less well tolerated by children and requires sedation and efficient bowel preparation (2,6,12). All of these factors may limit the success of the procedure and in many cases difficulties in advancing the instrument occur in the sigmoid colon and other areas. The maneuvers used to overcome this problem can be performed by a well experienced endoscopist, since the pediatric colonoscope is modified for better torque response. Under ideal circumstances the splenic flexure and cecum can be reached in 75-90 % of cases (8).

The complication rate in colonoscopy is slightly higher than UGI endoscopy especially when it is performed in certain conditions (table V). Perforation is the most important complication with a reported incidence of

0.2 % (8). Excessive bleeding may occur following polypectomy or biopsy in patients with a bleeding tendency. Explosions were reported in the past due to accumulation of gas in the colon but currently it is quite rare (7). Preparation of the colon with laxatives and enemas may easily cause dehydration. This is an avoidable complication by increasing enteral fluid and electrolyte intake.

COMPLICATIONS OF GASTROINTESTINAL ENDOSCOPY

Topical anesthetics are no longer routinely used by most of the pediatric endoscopists because of the fear of anaphylactoid reactions. Antispasmodic and secretory drugs are also not used in children. Diazepam in combination of meperidine may cause phlebitis in 1 to 17 % of patients (7,8). Inhibition of the respiratory center is another risk of sedation. Naloxane should be kept available during sedation to reverse the effect of meperidine.

Aspiration is another complication that may occur during upper GI endoscopy. Hypoxemia, due to both medications and aspiration of gastric contents and secretions may limit the success of the procedure (7).

Transmission of Salmonella, Pseudomonas, Hepatitis B and HIV by contaminated instruments, may cause infections following endoscopy. Transient bacteremia can be seen due to invasive procedures but severe infections and endocarditis are rarely reported (7).

Insufflation of excessive air produces abdominal distention and discomfort. The usage of carbon dioxide is recommended to lessen this problem.

Although many complications of endoscopy exist, both upper and lower gastrointestinal endoscopy have become one of the best diagnostic tool of pediatric gastroenterology. Future technological advances in this area together with improved pediatric endoscopy training programs will permit extension of the indications and uses of therapeutic and diagnostic endoscopy.

Table I. Indications of upper gastrointestinal endoscopy.**A. DIAGNOSTIC**

1. to evaluate dysphagia, abdominal pain
2. diagnosis and follow-up of ulcers
3. to obtain a biopsy
4. to evaluate chest pain, esophageal disease
5. to determine the site of gastrointestinal bleeding
6. evaluation of anatomy of the organ
7. diagnosis of gastric outlet obstruction
8. evaluation of gastric masses or foreign bodies

B. THERAPEUTIC

1. removal of bezoars
2. gastric polypectomy
3. sclerotherapy of gastric and esophageal varices
4. removal of foreign bodies
5. coagulation of bleeding points
6. percutan endoscopic gastrostomy
7. dilatation of esophageal strictures

Table II. Contraindications of upper GI endoscopy**A. ABSOLUTE**

1. Dispnoea, cyonosis
2. coma
3. seizures
4. acute perforation
5. shock
6. atlantoaxial subluxation

B. RELATIVE

1. Coagulopathy
 - a. PTT 20 sec over control
 - b. bleeding time greater than 10 min.
 - c. thrombocytopenia
 - d. PT 3 sec over control
2. Upper esophageal stricture
3. Myocardial ischemia
4. Congestive hearth failure

Table III. Indications of rectosigmoidoscopy

- a. chronic diarrhea
- b. rectal bleeding
- c. pus and mucus containing stool
- d. examination of polyps or masses
- e. assessment of rectal anomalies
- f. inflammatory bowel disease

Table IV. Indications of colonoscopy

1. Occult lower GI bleeding
2. Gross lower GI bleeding in the stabilized patient
3. Pre or post-operative evaluation of colonic masses
4. To determine the extent of inflammatory bowel disease
5. Screening for colonic cancer in ulcerative colitis
6. Polypectomy and follow-up of polypectomy
7. Coagulation of bleeding lesions
8. Reduction of volvulus or intussusception
9. Chronic diarrhea
10. Foreign-body extraction

Table V. Contraindications of colonoscopy**A. ABSOLUTE**

1. Perforation
2. Peritonitis
3. Acute diverticulitis
4. Toxic colitis
5. Gross bleeding
6. Severe ischemic bowel disease
7. Acute radiation colitis

B. RELATIVE

1. Poor patient cooperation
2. Poor bowel preparation
3. Recent surgery or history of multiple pelvic operations
4. Large hernia

REFERENCES

1. Rogers BHG. Endoscopy in Diseases of the Large Bowel and Anal Canal. In: Kirsner JB, Shorter RG, eds. *Diseases of the Colon, Rectum, and Anal Canal*. Baltimore: Williams & Wilkins, 1988: 225-59.
2. Ament ME, Christie DL. Upper gastrointestinal fiberoptic endoscopy in pediatric patients. *Gastroenterology*. 1977; 72:1244-1248.
3. Sartor RB. Emergency Upper Gastrointestinal Endoscopy In: Drossman DA, ed. *Manual of Gastroenterologic Procedures*. New York: Raven Press, 1985: 99-103.
4. Fleischer D. Therapy for gastrointestinal bleeding. In: Waye JD, Geenen JE, Fleischer D, Venu RP, eds. *Techniques in Therapeutic Endoscopy*. Philadelphia: W.B. Saunders Co, 1987; 1.3-1.21.
5. Fleischer D. Endoscopic therapy of upper gastrointestinal bleeding in humans. *Gastroenterology* 1986; 90:595-608.
6. Ament ME. Prospective study of risks of complication in 6424 procedures in pediatric gastroenterology. *Pediatr Res*. 1981; 15:524.
7. Schrock TR. *Complications of Gastrointestinal Disease*. Philadelphia: W.B. Saunders Co, 1989: 216-20.
8. Silverman A, Roy CC. *Procedures*. In: *Pediatric clinical gastroenterology*. St. Luis: C.V. Mosby Co, 1983: 906-927.
9. Bilbao MK, Dotter CT, Lee TG, Katon RM. Complications of endoscopic retrograde cholangiopancreatography (ERCP). *Gastroenterology* 1976; 70: 314-20.
10. Vanderhof JA, Ament ME. Proctosigmoidoscopy and rectal biopsy in infants and children. *J Pediatr*. 1976; 89: 911-15.
11. Gleason WA, Tedesco FJ, Keating JP, Goldstein PD. Fiberoptic gastrointestinal endoscopy in infants and children *J Pediatr*, 1974; 85: 810-13.
12. Blustein PK, Gaskin K, Filler R, Ho C, Connon J. Endoscopic Retrograde Cholangiopancreatography in Pancreatitis in Children and Adolescents. *Pediatrics* 1981; 68:387-94.