

## Sedation Practice Outside the Operating Room for Pediatric Gastrointestinal Endoscopy

Medical records of the 575 children who underwent gastrointestinal endoscopy outside the operating room were investigated retrospectively. The most frequently used combinations were propofol-midazolam-fentanyl in 83.2% of the procedures and propofol-midazolam in 13.8% of the procedures. 24 (3.4%) of 703 procedures had complications due to sedation anesthesia; 11 had hypoxia and 8 had pain in the injection area. Sedation anesthesia practice provided by an anesthesiologist outside the operating room enables gastrointestinal endoscopic procedures to be carried out more safely.

**Keywords:** Anesthesia, Complication, Endoscopy, Sedation.

Gastrointestinal (GI) endoscopic procedures in children may cause anxiety, fear, pain and feelings of severe distress. Anesthesia is used to make the patient more comfortable, to prevent pain, to maintain amnesia and to carry on the procedure in the most appropriate way. Differences regarding general anesthesia or sedation anesthesia may arise due to the preferences of the centers [1]. Complications relevant to the endoscopic procedure in pediatric patients are reported to be between 1.7 and 25.1% [2,3]. In this study, we evaluated sedation practice and complication rates for pediatric GI endoscopic procedures outside the operating room.

Medical records of the patients (June 2006 to July 2011) were examined retrospectively, and age, gender, indications of GI endoscopy procedure, presence of comorbid disorders, the American Society of

Anesthesiology (ASA) score assessments of the patients, drugs used for sedation, anesthesia and procedure related complications were noted [4,5]. In our center, pediatric GI endoscopy procedures are carried out in the hospital's central endoscopy unit by pediatric gastroenterologists. Cases that are planned to receive sedation anesthesia are examined by an anesthesiology specialist a day before the procedure and evaluated in detail and referred to other departments, if necessary [6]. After the procedure, cases who received anesthesia are monitored with oxygen support in the endoscopy room under the supervision of an anesthesiologist until they have Ramsay sedation score (RSS) of 2; they are then taken to another recovery room and kept under the supervision of a nurse until they are ready to be discharged from the hospital [7].

Records from 612 patients were investigated and 575 of them (aged between 1 month and 18 years) who had complete clinical records were included in the study. The procedures assessed ( $n=703$ ) included 519 upper GI endoscopy, 108 lower GI endoscopy, 49 combined lower and upper GI endoscopy, 17 placement/tube replacement of PEG, and 7 rectosigmoidoscopy. One was colonoscopy and double balloon enteroscopy, and two were double balloon enteroscopy alone.

In 582 procedures, propofol was used with midazolam and fentanyl; in 95, propofol was used with midazolam; in 8, propofol was used with fentanyl and ketamine; and in one propofol was used with fentanyl. Complications were observed in 27 procedures (3.8%). Three (0.4%) complications (two bleeding and one perforation) were due to the procedure while the rest 24 (3.4%) were due to anesthesia (hypoxia 11, pain at injection site 8, nausea/vomiting 4, skin rash 1). It was observed that the rate of complications (anesthetic and procedural) increased

**TABLE I** AMERICAN SOCIETY OF ANESTHESIOLOGY CLASSIFICATION AND COMPLICATION RATES IN CHILDREN UNDERGOING GASTROINTESTINAL ENDOSCOPY (N=703)

ASA* score	Number of procedures (%)	Complication rates	
		Procedure No. (%)	Anesthesia No. (%)
ASA I	542 (77.2)	0 (0.0)	15 (2.8)
ASA II	126 (17.9)	1 (0.8)	6 (4.8)
ASA III	32 (4.6)	1 (3.1)	3 (9.4)
ASA IV	3 (0.4)	1 (33.3)	0

No child was in ASA grade V or VI.; \*American Society of Anesthesiology.

significantly with the ASA score ( $P < 0.05$ ). No relationship was detected between age and complication rates. There was no difference in complication rate between the drug combinations. There were no deaths due to anesthesia complications. Two procedures had to be abandoned because of anesthesia-related complications.

Intravenous sedation is being used at increasing rates because it does not need expensive and/or complicated anesthetic tools and can be carried out by fewer staff [6,8]. In our series of patients receiving propofol-based sedation anesthesia, complications were observed in 27 (3.8%) procedures. The rate of complications increased significantly with the ASA score.

In a study conducted in children by Cravero, *et al.* [9], propofol-based sedation was used in 49836 procedures, including 5451 GI endoscopies. Hypoxia (1.5%), changes in heart rate, blood pressure and respiration (0.6%), allergic reaction (0.03%), apnea (0.3%), cardiac arrest (0.004%) airway obstruction (0.9%) and vomiting (0.1%) were reported in their series. Rates of incomplete procedures due to anesthesia complication in children were earlier reported to be between 0.6% and 2.3% [10].

We conclude that propofol-based sedation anesthesia can be safely used for gastrointestinal endoscopic procedures in children.

\*ISHAK A ISIK, #LEYLA IYILIKCI, YESIM OZTURK AND  
#ESMA ADIYAMAN

*Departments of Pediatric Gastroenterology, and  
#Anesthesiology and Reanimation, Dokuz Eylul University  
School of Medicine, Hepatology and Nutrition, İzmir, Turkey.  
\*Yshakisik02@yahoo.com.tr*

#### REFERENCES

1. Redondo-Cerezo E, Sanchez-Robaina A, Martinez Cara JG. Gastroenterologist-guided sedation with propofol for endoscopic ultrasonography in average-risk and high-risk patients: a prospective series. *Eur J Gastroenterol Hepatol.* 2012;24:506-12.
2. Miqdady MI, Hayajneh WA, Abdelhadi R, Giger MA. Ketamin and midazolam sedation for pediatric gastrointestinal endoscopy in the Arab world. *World J Gastroenterol.* 2011;17:3630-5.
3. Martinez JL, Sutters KA, Waite S, Davis J, Medina E, Montano N, *et al.* A comparison of oral diazepam *versus* midazolam, administered with intravenous meperidine, as premedication to sedation for pediatric endoscopy. *J Pediatr Gastroenterol Nutr.* 2002;35:51-8.
4. Bendig DW. Pulse oximetry and upper intestinal endoscopy in infants and children. *J Pediatr Gastroenterol Nutr.* 1991;12:39-43.
5. Cote CJ, Wilson S, Work Group on Sedation, American Academy of Pediatrics, and American Academy of Pediatric Dentistry. Guidelines for monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures: An Update. *Pediatrics.* 2006;118:2587-602.
6. Dumonceau JM, Riphaut A, Aparicio JR, Beilenhoff U, Knappe JT, Ortman M, *et al.* and the NAAP Task Force Members. European Society of Gastrointestinal Endoscopy, European Society of Gastroenterology and Endoscopy Nurses and Associates, and the European Society of Anaesthesiology Guideline: Non-anaesthesiologist Administration of Propofol for GI Endoscopy. *Eur J Anaesthesiol.* 2010;27:1016-30.
7. Cravero JP, Blike GT, Beach M, Gallagher SM, Hertzog JH, Havidich JE, *et al.* Incidence and nature of adverse events during pediatric sedation/anesthesia for procedures outside the operating room: Report from the Pediatric Sedation Research Consortium. *Pediatrics.* 2006;118:1087-96.
8. Julian-Gomez L, Barrio J, Izquierdo R, Gil-Simon P, Cuesta SG, Atienza R, *et al.* A retrospective study of pediatric endoscopy as performed in an adult endoscopy unit. *Rev Esp Enferm Dig.* 2010;102:100-7.
9. Cravero JP, Beach ML, Blike GT, Gallagher SM, Hertzog JH; Pediatric Sedation Research Consortium. The incidence and nature of adverse events during pediatric sedation/anesthesia with propofol for procedures outside the operating room: A report from the pediatric sedation research consortium. *Pediatr Anesthesiol.* 2009;108:795-804.
10. Nguyen VX, Nguyen VT, Nguyen CC. Appropriate use of endoscopy in the diagnosis and treatment of gastrointestinal diseases: up-to-date indications for primary care providers. *Int J Gen Med.* 2010;1:345-57.