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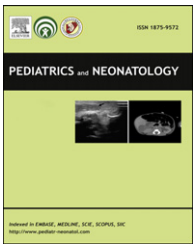

ORIGINAL ARTICLE

Pediatric Gastrointestinal Endoscopic Sedation: A 2010 Nationwide Survey in Taiwan

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Key Words
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Background: There is insufficient data on pediatric endoscopic sedation practices worldwide. This study aimed to assess nationwide data on the current pediatric endoscopic sedation practices in Taiwan.
Methods: Members of the Taiwan Society of Pediatric Gastroenterology Hepatology and Nutrition in 2010 were asked to participate in an 18-item questionnaire survey regarding current sedation practices for diagnostic esophagogastric-duodenoscopy (EGD).
Results: A total of 22 of 32 questionnaires were returned for a response rate of 68.8%. A majority (86.4%) of the respondents practiced in a medical center hospital setting, and 72.7% preferred sedation during EGD. The proportions of respondents applying sedative methods in cases aged < 1, $1 \sim 12$, and > 12 years old were 85.7%, 100%, and 23.7% respectively. Ketamine (27.8%) and midazolam with meperidine (22.2%) were the most commonly applied sedation agents, while the percentage of respondents using regimens that included propofol was 11.2%. Comparing complications between EGD with and without sedation, only hypoxia (Wilcoxon statistics $= 347.00$, $p = 0.003$) was significantly more common in sedated patients. The endoscopists' satisfaction rating was greater among respondents using sedation compared to those without (visual analog scale 9 vs. 7; $p = 0.0001$).
Conclusion: A majority of pediatric EGD in Taiwan was performed under sedation and applied more often to younger children. Endoscopists were more satisfied during EGD when practicing sedation. This survey should help formulate updated practice guidelines and policies regarding endoscopic sedation.
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1. Introduction

Sedation methods during esophagogastric-duodenoscopy (EGD) can help enhance patient tolerance and enable successful completion of the procedure. Several worldwide studies and surveys in the past decade indicated an increasing demand for endoscopic sedation maneuvers.[1,2] Factors that affect the practice of sedation include the development of sedative regimens, the experience and training of endoscopists, the clinical practice setting, and the local social and cultural backgrounds. Although guidelines regarding the sedation of adult and pediatric patients have been previously published,[3,4] the debate over the most ideal endoscopy sedation practice still persists. Safety remains the primary concern during endoscopy.[5] The paucity of information regarding current pediatric endoscopy sedation practices throughout the world causes difficulties in formulating new sedation guidelines specifically designed for pediatric patients. The aim of this study was to characterize the current nationwide status of pediatric sedation practices for diagnostic EGD in Taiwan and report its relevant implications.

2. Methods

An 18-item survey was developed by the authors and modified by senior members of the Taiwan Society of Pediatric Gastroenterology Hepatology and Nutrition (TSPGHAN). The survey addressed the respondent's demographics and sedation practices (three questions), preferred sedation methods (nine questions), complications during EGD (two questions), satisfaction rating (two questions), and their opinion regarding procedure costs (two questions). Members of TSPGHAN with more than 5 years of experience in the field of gastrointestinal endoscopy, pediatric advanced life-support certified, and currently practicing EGD in 2010 were asked to participate in this survey via e-mail and telephone survey. No more than three members who worked in the same practice setting were invited. Responses were subsequently entered into a database (Microsoft Excel; Microsoft Corp., Redmond, WA, USA) and analyzed via SPSS version 19.0 (SPSS Inc., Chicago, IL, USA). Results of categorical data were presented as percentage (%). For comparison between ratings, the Wilcoxon rank sum test was applied.

As for sedation levels, according to the definition published by the American Society of Anesthesiologists, "conscious sedation" refers to a state of depressed consciousness where the patient retains the ability to maintain a patent airway and still respond to verbal commands and tactile stimuli. "General anesthesia" refers to loss of consciousness during which the patient is not arousable, even by painful stimuli. Patients under general anesthesia lose the ability to maintain a patent airway and often require positive-pressure ventilation.

3. Results

Thirty-two TSPGHAN members were qualified for enrollment, and 22 members returned the questionnaire for a response rate of 68.8%. Their demographic data and preference for sedation practice in each category are shown in Table 1. A majority of respondents (86.4%) practiced in medical center settings and most (90.9%) had more than 10 years of experience. They rarely performed more 20 EGDs per month, and 68.2% of them had easy access to an operation room if general anesthesia was needed. The overall percentage of respondents that preferred sedation for EGD procedures was 72.7%. The practice setting, experience, and monthly EGD practice counts of the respondents did not have significant impact on their preference for sedation.

The age of the patient receiving EGDs was a major issue when choosing sedation methods (Figure 1). For patients under 1 years of age, 14.3% of respondents preferred not to apply any sedation or analgesic methods during EGD, 19% preferred only local analgesic agents, 61.9% chose conscious sedation, and 23.8% preferred using general anesthesia. For patients aged between 1 and 12 years of age, the proportions were 0%, 0%, 80.9%, and 19.1%, respectively. For patients older than 12 years of age, the proportions were 0%, 77.3%, 19.2%, and 4.5% respectively. Thus, the respondents had a tendency to apply sedation practices on younger children, whereas they preferred applying only local analgesia for older children.

Respondents were asked to put down their preferred sedative drugs for conscious sedation and to describe the percentage of use for each regimen (Table 2). Single use of ketamine was noted as the drug of choice by 27.8% of respondents, while 22.2% preferred the combination of midazolam with meperidine, 16.7% preferred single use of midazolam, and 11.1% preferred ketamine combined with midazolam. Other regimens included midazolam with fentanyl (5.56%), midazolam with propofol (5.56%), propofol with fentanyl (5.56%), and ketamine with meperidine (5.56%). Overall, 61.2% preferred conventional agents (benzodiazepine) in their regimen, whereas only 11.1% included propofol in their regimen for conscious sedation.

The survey requested respondents to recall the complications and their corresponding prevalence during endoscopies with and without sedation. Hypoxia, tachycardia, bradycardia, laryngospasm, hypertension, and hypotension were the more common adverse events encountered. Comparing the complications between EGD done with and

Table 1 Demographic data of respondents who preferred sedation.

	N	*n*, %
Total respondents	22	16 (72.7)
From medical centers	19	14 (73.7)
Practice y 5∼10	2	2 (100)
Practice y >10	17	12 (70.5)
From local hospitals	3	2 (66.7)
Practice y >10	3	2 (66.7)
Monthly procedures		
> 20	2	2 (100)
10∼20	10	7 (70)
< 10	10	7 (70)

Response rate: 22/32 (68.8%).

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