Pediatric Gastrointestinal Endoscopic Sedation: A 2010 Nationwide Survey in Taiwan

Po-Hon Chen a,b, Tzee-Chung Wu a,b,*, Chih-Yu Chiu a,b

a Children’s Medical Center, Taipei Veterans General Hospital, Taipei, Taiwan
b National Yang Ming University School of Medicine, Taipei, Taiwan

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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 ~ 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. 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, the debate over the most ideal endoscopy sedation practice still persists. Safety remains the primary concern during endoscopy. 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 than 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 year 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
without sedation, only hypoxia (Wilcoxon statistics = 347.00, p = 0.003) was significantly more common in patients receiving EGD under sedation. The survey showed no obvious difference in the frequency of other complications between sedated and non-sedated patients. The need for resuscitation measures, including providing bag-mask ventilation, endotracheal intubation and administration of sedation antidotes were reported in 1.4%, 0.14%, and 0.7% of sedated cases, respectively. The respondents also reported that 2% of endoscopies performed without sedation had to be aborted due to patient intolerance compared with 0% of those performed under sedation.

The respondents were asked to rate their satisfactions of EGD procedures performed with and without sedation using a 10-point visual analog scale (10 = most satisfied). Results showed that respondents’ satisfaction was greater with EGD sedation. The results expressed by median (25th/75th) were seven (5/8) for the nonsedated group and nine (8/9) for the sedated group (p = 0.001). Twenty of the 22 (90.9%) respondents stated they had established standard procedure guidelines regarding endoscopic sedation practices in their suite.

All of the respondents agreed that applying sedation during endoscopy increased the procedure costs and suggested that the government medical insurance should increase the subsidy for such procedures, especially in younger children. In children younger than 2 years old, respondents suggested that the payment for sedation should be an average of 2.92 times more compared to those for adults while in children older than 2 years of age, the payment should be an average of 2.24 times more.

4. Discussion

This survey was intended to clarify and sort out the practice preferences and experiences regarding EGD sedation based on the perspective of each individual endoscopist. The results demonstrate that conscious sedation during pediatric diagnostic EGD is a standard and acceptable practice throughout Taiwan. Although the total number of respondents seems relatively small, a response rate of 68.8% is currently the highest among similar studies worldwide.2,5,6 Those who participated in this survey are all highly experienced colleagues in the field of gastrointestinal endoscopy, and most practiced in academic medical centers (86.4%). Due to limited feasible practice settings for EGDs in Taiwan, it is possible that more than one respondent worked in the same institution and may influence the outcome. Such bias has been lessened by enrolling no more than three survey participants per institution.

When given a choice, 72.7% of the respondents prefer applying sedation during EGD (Table 1). Lightdale et al reported that 98% of pediatric gastrointestinal endoscopy procedures were performed under sedation in the United States.5 Data focusing on the pediatric population in other countries is scant. According to an worldwide internet survey from Beson and colleagues8 in 2008, 53% of EGDs in adults were completed with sedation in Asian countries not including Taiwan. The estimated frequency of sedation during EGD in European countries varies from 1.5% to 95%.7 Countries with higher frequencies include France (95%), Switzerland (77%), and Germany (74%), while Finland (1.5%) and Spain (17%) were countries where sedation practices were less commonly used. Several factors including the development of sedative regimens, the experience and training of endoscopists, the clinical practice setting, the responsible personnel administering sedation, social and cultural backgrounds, and the physicians’ reimbursement for the procedure may contribute to the vast difference in endoscopic sedation practice. For instance, the high percentage of EGD sedation noted in Switzerland may be related to their policy that propofol does not have to be administered by an anesthesiologist.1

Our survey showed that, when EGDs involved children of a younger age (< 12 years of age), conscious sedation and general anesthesia were more commonly applied by respondents compared to those procedures in older children. For children over 12 years of age, 77% of respondents chose only to use local analgesics to assist EGD procedures, whereas only 19% and 4.5% would provide conscious sedation and general anesthesia respectively. The best explanation for this is probably the respondents’ belief that older children can endure more suffering and restrain themselves more during EGD. Although this seems reasonable, one must consider that exposing these children to such pain and anxiety against their own will is, in fact, a kind of child abuse. Doing so may result in undesirable consequences such as post-traumatic stress, psychosomatic illness, sleep disturbance, anger outbursts, academic

Table 2 Respondents’ (N = 18) preferred choice of sedation agent(s).

<table>
<thead>
<tr>
<th>Sedation Agent(s)</th>
<th>n, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketamine alone</td>
<td>5 (27.8)</td>
</tr>
<tr>
<td>Midazolam + meperidine</td>
<td>4 (22.4)</td>
</tr>
<tr>
<td>Midazolam alone</td>
<td>3 (16.7)</td>
</tr>
<tr>
<td>Midazolam + ketamine</td>
<td>2 (11.2)</td>
</tr>
<tr>
<td>Midazolam + fentanyl</td>
<td>1 (5.5)</td>
</tr>
<tr>
<td>Midazolam + propofol</td>
<td>1 (5.5)</td>
</tr>
<tr>
<td>Propofol alone</td>
<td>1 (5.5)</td>
</tr>
<tr>
<td>Ketamine + meperidine</td>
<td>1 (5.5)</td>
</tr>
</tbody>
</table>
Pediatric endoscopic sedation in Taiwan

difficulties and decreased tolerance to future procedures. Several attempts to ease the psychological stress and anxiety before and during endoscopic procedures have been studied, including nonpharmacologic maneuvers such as music distraction, preprocedural videotape education, and the presence of a relative throughout the procedure. The current concept is to not only decrease the physical burden but also to look after the emotional stress during different painful procedures.

For patient aged less than 1 year of age, around 33% of respondents still practice endoscopies with only local analgesic agents or none. Recent reviews and studies pointed out that neonates have increased pain sensitivity and experience more pain by the same stimuli compared to older children. Currently, there is no recognized consensus on whether infants should be sedated before EGD. The International Evidence Based-group for Neonatal Pain did, however, suggest premedication with sedative and analgesic drugs to infants before non-emergent tracheal intubation. One should also keep in mind that pediatric patients at a younger age have higher ASA classification and are identified as being at risk for developing complications. Therefore, promoting endoscopic sedation in children should be encouraged under more cautious monitoring and with appropriate sedation regimens.

Most of our respondents use midazolam in combination with other sedatives (61.2%), and only 11.5% include propofol to their regimen. The findings were consistent with the results of the 2008 survey by Benson and colleagues, who reported benzodiazepine (53%) as the most commonly preferred sedative in Asian countries. Recent studies, however, have pointed out an increasing use of propofol for conscious sedation outside of the operation room. Amor-nyotin and colleagues reported that propofol was the drug of choice in Thailand when an anesthesiologist was in charge of administrating sedatives during pediatric EGDs. Koh and others stated that 95% of pediatric patients undergoing EGDs received a propofol-based anesthetic by an anesthesiologist. A nationwide survey on endoscopic sedation in the United States also noted that, although 74.3% of respondents reported using conventional sedation (midazolam + narcotic), 68% of them would consider using propofol if their staff could be properly trained.

The use of propofol compared to general anesthesia was found to result in less total time for anesthesia and recovery with similar safety profiles. Compared with midazolam, sedation with propofol was more efficacious, with a shorter recovery time in cirrhotic outpatients. Given the fact that most hospitals in Taiwan restrict the administration of propofol to anesthesiologists, sedation with propofol by gastroenterologists was uncommon. Recent studies, however, suggested that with proper training and routine monitoring, propofol can be safely and effectively administered under the direction of a gastroenterologist.

The current survey shows that hypoxia was more frequently reported in patients who underwent sedation. The rates of other adverse events are relatively similar between sedated and non-sedated patients. Most of our respondents reported establishment of their own practice guidelines for safety during endoscopic procedures in their practice suite. Unifying such guidelines throughout Taiwan and throughout the world have been difficult due to the changing landscape of endoscopic and sedation practice. Although the American Society of Anesthesiologists (ASA) has already made recommendations on this issue, further discussions and studies should be undertaken to improve and update these guidelines according to each country’s clinical environment.

The results of the current survey show that most pediatric endoscopists are satisfied with their current EGD procedures. Satisfaction ratings are also significantly higher when respondents apply sedation methods. However, the ratings between endoscopists using different sedation agents have not been compared due to the relatively small numbers of respondents. Cohen’s nationwide survey in the United States observed that endoscopist satisfaction with sedation was greater when applying propofol compared to conventional sedation (10 vs. 8, p < 0.0001). Further studies should be done to determine the most suitable combination of regimens for pediatric endoscopic sedation.

This survey has several limitations. First, it is a retrospective survey and subject to recall bias causing difficulty in validating responses. Second, the total number of respondents (22) was still relatively small compared to similar surveys in other countries, although the response rate is the highest reported. Third, this survey was directly restricted to diagnostic EGD, so the results cannot be applied to more time consuming therapeutic endoscopies. This survey is the first to report the contemporary information on pediatric sedation practices in Taiwan and may serve as comparison and reference data for future studies.

Application of sedation during diagnostic endoscopy is generally practiced by pediatric endoscopists in Taiwan with higher frequencies applying to younger children. Most pediatric endoscopists still use conventional sedation agents for EGDs. Sedation during EGD did not have significant influence on complication rates and higher satisfaction ratings were reported when EGDs were performed under sedation. The current trend in pediatric endoscopy worldwide is the increased usage of sedation. Our results imply that pediatric endoscopists in Taiwan are willingly to sedate patients during EGD but still lack a consensus on the most ideal sedation practice. With proper training, sedation with propofol by pediatric gastroenterologists may be encouraged to facilitate endoscopic procedures in pediatric patients.

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References


