Chula Med J Vol. 52 No. 1 January-February2008

Prospective of Anesthesia for Gastrointestinal Endoscopy from 2006 - 2007 at Surin Provincial Hospital

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Ungpinitpong W. Prospective of Anesthesia for Gastrointestinal Endoscopy from 2006 - 2007 at Surin Provincial Hospital. Chula Med J 2008 Jan - Feb; 52(1): 41 - 53

Background : *Gastrointestinal endoscopy is a procedure for diagnosis and treatment of GI abnormalities. It is one of the most common interventional medical procedures performed throughout the world. However, a "successful endoscopy" is related to the choices and techniques of anesthesia.*

Objective : *To study anesthetic data such as choices and techniques, drug usage and complications of anesthesia for GI endoscopy from 2006-2007.*

Setting : *Surin Provincial Hospital*

Research design : *A prospective study*

Patients : *The patients undergoing GI endoscopy during the period of October, 2006 to September, 2007 at the Divisions of Medicine and Surgery of Surin Provincial Hospital.*

Method : *We analyzed the patients' characteristics, preanesthetic problems, anesthetic techniques, agents, time, and complications, as well as endoscopic procedures and summarized by using descriptive statistics.*

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Results : *This study reviewed 1,337 cases and 1,410 endoscopic procedures i.e. esophagogastroduodenoscopy (70.78 %), gastroscopy (20.99 %), colonoscopy (5.46 %), sigmoidoscopy (2.70 %), and proctoscopy (0.07 %). The majority of them were in the age group of 51-60 years old (22.84 %) and classified in ASA class II (80.64 %). The diagnoses were gastritis (37.24 %), esophageal varices (18.79 %), peptic ulcer (17.20 %), upper gastrointestinal hemorrhage (6.17 %), dyspepsia (2.70 %), and others. Most common preanesthetic problems were hematologic diseases (18.81 %), alteration of consciousness (13.86 %), hypotension (8.91 %) and cardiovascular diseases (7.92 %). Topical pharyngeal anesthesia (92.52 %) and intravenous sedation (3.78 %) were the main anesthetic techniques. The mainly used anesthetic agents were lidocaine, fentanyl, midazolam and propofol. The anesthetic duration ranged from 5 to 100 minutes (10.62 ± 6.76). The overall complication rate was 12.87 %. Hypotension (4.95 %) was the most frequently found anesthetic complication.*

Conclusion : *Almost all cases of the GI endoscopy can be performed under topical anesthesia. Sedation-related risk factors, the depth of sedation, and the urgency of the endoscopic procedure. All these played important roles in determining whether or not the assistance of an anesthesiologist is needed.*

Keywords : *Gastrointestinal endoscopy, Anesthetic technique, Complication.*

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Received for publication. October 15, 2007.

วิลาวัลย์ อึงพินิจพงศ์. การให้ยาระงับความรู้สึกสำหรับการตรวจและส่องกล้องระบบทางเดินอาหารในโรงพยาบาลสุรินทร์ ตั้งแต่ปี พ.ศ. 2549 – 2550 : การศึกษาแบบไปข้างหน้า. จุฬาลงกรณ์เวชสาร 2551 ม.ค. – ก.พ; 52(1): 41 – 53

บทนำ : *การตรวจและส่องกล้องระบบทางเดินอาหารเป็นหัตถการชนิดหนึ่งสำหรับการตรวจวินิจฉัย และรักษาความผิดปกติของระบบทางเดินอาหารที่นิยมกันอย่างแพร่หลาย ความสำเร็จในการทำหัตถการบางครั้งจำเป็นต้องใช้การให้ยาระงับความรู้สึก*

วัตถุประสงค์ : *เพื่อศึกษาวิธีการให้ยาระงับความรู้สึก ยาที่ใช้ ภาวะแทรกซ้อนต่าง ๆ ที่เกิดขึ้น และเกี่ยวข้องกับการให้ยาระงับความรู้สึกในการตรวจและส่องกล้องระบบทางเดินอาหาร*

สถานที่ที่ทำการศึกษา : *โรงพยาบาลสุรินทร์*

รูปแบบการวิจัย : *การศึกษาเชิงวิเคราะห์แบบไปข้างหน้า*

ผู้ป่วยที่ได้ทำการศึกษา : *ผู้ป่วยที่ได้รับการตรวจและส่องกล้องระบบทางเดินอาหารตั้งแต่เดือนตุลาคม พ.ศ. 2549 - กันยายน พ.ศ. 2550*

วิธีการศึกษา : *เก็บข้อมูลจากแบบบันทึกข้อมูลหลังให้การระงับความรู้สึกสำหรับการตรวจและส่องกล้องระบบทางเดินอาหาร บันทึกข้อมูลพื้นฐานของผู้ป่วย ปัญหาก่อนการให้ยาระงับความรู้สึก วิธีการให้ยาระงับความรู้สึกยาที่ใช้ ระยะเวลาการให้ยาระงับความรู้สึก ชนิดของหัตถการ และภาวะแทรกซ้อน วิเคราะห์และสรุปผลโดยใช้สถิติเชิงพรรณนา*

ผลการศึกษา : *ผู้ป่วยทั้งหมด 1,337 ราย มาทำหัตถการ 1,410 ครั้ง แยกเป็น esophago -gastroduodenoscopy (70.78 %), gastroscopy (20.99 %), colonoscopy (5.46 %), sigmoido-scopy (2.70 %), และ proctoscopy (0.07 %) ผู้ป่วยส่วนมากมี ASA class II (80.64 %) อายุระหว่าง 51-60 ปี พบมากที่สุด (22.84 %) การวินิจฉัย คือ gastritis (37.24 %), esophageal varices (18.79 %), peptic ulcer (17.20 %), upper gastrointestinal hemorrhage (6.17 %), dyspepsia (2.70 %), และอื่น ๆ ปัญหาก่อนการให้ยาระงับความรู้สึก ได้แก่ โรคเลือด (18.81 %), ผู้ป่วยมีภาวะการรู้สึกตัวเปลี่ยนแปลง (13.86 %), ความดันโลหิตต่ำ (8.91 %) และโรคทางระบบหัวใจและหลอดเลือด (7.92 %) การให้ยา*

ระงับความรู้สึกส่วนใหญ่ใช้วิธี topical pharyngeal anesthesia (92.52 %) และ intravenous sedation (3.78 %) ผู้ป่วยส่วนมากได้รับยา lidocaine, fentanyl, midazolam, และ propofol ระยะเวลาการให้ยาระงับความรู้สึกตั้งแต่ 5-100 นาที (10.62 ± 6.76) ภาวะแทรกซ้อนที่พบบ่อยที่สุด คือ ความดันโลหิตต่ำ

วิจารณ์และสรุป : การตรวจและส่องกล้องระบบทางเดินอาหารสามารถทำได้อย่างมีประสิทธิภาพด้วยการใช้ยาชาเฉพาะที่ การเลือกใช้วิธีการให้ยาระงับความรู้สึกควรคำนึงถึงปัจจัยสำคัญ ได้แก่ ปัจจัยเสี่ยงต่อการให้ยาระดับความลึกของการให้ยา และความรีบด่วนของการทำหัตถการในผู้ป่วยบางราย แต่ผู้ให้การระงับความรู้สึกควรเฝ้าระวังภาวะแทรกซ้อนต่าง ๆ ที่อาจเกิดขึ้น และเตรียมพร้อมที่จะแก้ไขได้อย่างทันท่วงที

คำสำคัญ : การตรวจและส่องกล้องระบบทางเดินอาหาร, วิธีการให้ยาระงับความรู้สึก, ภาวะแทรกซ้อน.

Diagnostic gastrointestinal endoscopy is carried out for a multitude of clinical indications. Esophagogastroduodenoscopy is the most commonly performed endoscopic procedure with an incidence of about 8.6 per thousand population.[1] With the increasing safety of endoscopy, both upper and lower gastrointestinal endoscopy are being advocated as first-line screening choices. Sedation is routinely (always or usually) administered in 44 % of procedures in the Asian zone, 56 % in the European zone, and 72 % in the American zone (Canada and Central and South America). Twice as many physicians always give sedation in the American zone than do those in the two other parts of the world.[2] Selected patients may not require any sedation for certain endoscopic procedures, but it appears to remain an unattractive alternative for most patients.[3]

Surin Provincial Hospital has been performed at gastrointestinal (GI) endoscopy for a long time. Now, we have five general surgeons and one GI endoscopist. Most endoscopic procedures are performed by the GI endoscopist under anesthesia. There is, however, a wide range of practice in the choices and techniques of anesthesia and drug selection varies according to the condition of the patients, familiarity of the anesthesiologist and satisfaction of the endoscopist. So far GI endoscopy is a safe procedure. Significant complications can occur as a result of instrumentation and anesthesia. The aim of this study was to report and evaluate the choices and techniques, drug usage and complications which occurred during that period of time. Furthermore this prospective study was performed in order to review and the data were kept for future researches.

Material and Method

We reviewed a 12-month period (October 2006- September 2007) anesthetic, procedure records and history charts of patients from the database of Surin GI Medical and Surgical Divisions. All of the patients who underwent GI endoscopy were included in this study. The general data included sex, age, ASA physical status, diagnosis and GI endoscopic procedures. The anesthetic data encompassed preanesthetic problems, choice of anesthesia, varieties of drug usage, time spent, monitoring and intraoperative complications.

Results were reported as mean and standard deviation (SD) or percentage (%) when appropriate.

Results

There were 1,337 cases and 1,410 GI endoscopic procedures performed during the study period. The majority of the patients were male with ASA physical status I-II. The mean age was 56.21 ± 14.80 years, range (7-98). About 22.84 % of them were in the age group of 51-60 years old (Table 1).

The diagnoses were gastritis (37.24 %), esophageal varices (18.79 %), peptic ulcer (17.20 %), upper gastrointestinal hemorrhage (6.17 %) and dyspepsia (2.70 %) (Table 2).

Anesthesiologists provided their services in 101 endoscopic procedures (7.16 %). The majority of cases presented with preanesthetic medical problems (83.17 %), as shown in Table 3. They involved mainly hematologic diseases including anemia (18.81 %), alteration of conscious (13.86 %), hypotension (8.91 %) and cardiovascular diseases including ischemic heart diseases and congestive heart failure (7.92 %). Other problems were respiratory diseases,

chronic obstructive pulmonary diseases, asthma, pulmonary TB, hypertension, liver diseases, cirrhosis, DM, renal diseases, chronic renal failure, central nervous system diseases, CVA and others.

Table 4 shows the endoscopic procedures, i.e. esophagogastroduodenoscopy (70.78 %), gastroscopy (20.99 %), colonoscopy (5.46 %), sigmoidoscopy (2.70 %), proctoscopy (0.07 %). Almost all of the procedures were carried out under topical pharyngeal anesthesia (92.52 %). Commonly used anesthetic teachniques included intravenous sedation (3.78 %), general anesthesia with either endotracheal tube insertion (1.70 %) or under mask (0.15 %) and monitored anesthesia care (MAC) (1.85 %) with either endotracheal tube insertion (44 %) or tracheostomy tube (4 %). The details of sedative agents, narcotics, muscle relaxants, inhalation agents and local anesthetic are shown in Table 5.

Clinical monitoring observed by the anesthetic personnel consisted of non-invasive blood pressure, pulse oxymetry, electrocardiography, fluid intake and output. The duration ranged from 5 to 100 minutes. The mean duration was 10.62 ± 6.76 min. Seven patients (0.50 %) were transferred to operating room for emergency exploratory laparomy because of active bleeding. The overall complication rate was 12.87 %. The majority of complications were cardiopulmonary and their nature and was related to sedation and analgesia. Hypotension (4.95 %) which was promptly

Table 1. Patients' characteristics.

Characteristics		Number (%)
Sex :	Male	859 (60.92)
	Female	551 (39.08)
Age (yrs) :	< 10	1 (0.07)
	10-20	13 (0.92)
	21-30	56 (3.97)
	31-40	141 (10.00)
	41-50	317 (22.48)
	51-60	322 (22.84)
	61-70	300 (21.28)
	71-80	210 (14.89)
	81-90	43 (3.05)
	> 90	7 (0.50)
	Mean ± SD	56.21 ± 14.80
ASA physical status :		
	I	241 (17.09)
	II	1,137 (80.64)
	III	30 (2.13)
	IV	2 (0.14)

corrected by the administration of vasopressor and fluid loading was the most frequent anesthetic complication. Other complications were hypertension (2.97 %), anemia (1.98 %) and tachycardia (0.99 %). One patient had cardiac arrest before starting the procedure (0.99 %) and one patient died within 48 hours (0.99 %) after the procedure. No significant complications occurred as a result of instrumentation.

Table 2. Diagnoses

	Number (%)
Gastritis	537 (37.24)
Esophageal varice	271 (18.79)
Peptic ulcer	248 (17.20)
Upper gastrointestinal hemorrhage	89 (6.17)
Check up	50 (3.47)
Dyspepsia	39 (2.70)
Gastric erosion	31 (2.15)
CA stomach	19 (1.32)
Lower gastrointestinal hemorrhage	18 (1.25)
CA colon	15 (1.04)
Internal hemorrhoid	12 (0.83)
CA esophagus	11 (0.76)
CA rectum	11 (0.76)
Polyps	10 (0.69)
Gastric outlet obstruction	9 (0.62)
Mallory Weiss Tear	7 (0.49)
Diverticulum	5 (0.35)
Chronic diarrhea	5 (0.35)
Bowel habbit change	5 (0.35)
Corrosive esophagitis	4 (0.28)
Abdominal pain	4 (0.28)
Chronic constipation	4 (0.28)
FB in gastrointestinal tract	4 (0.28)
Esophageal stricture	1 (0.07)
Others	33 (2.29)

Table 3. Pre-anesthetic problems.

	Number (%)
Hematologic disease	19 (18.81)
Alteration of conscious	14 (13.86)
Hypotension	9 (8.91)
Cardiovascular disease	8 (7.92)
Liver disease	8 (7.92)
Respiratory disease	7 (6.93)
Hypertension	6 (5.94)
Diabetes mellitus	3 (2.97)
Post cardiac arrest	3 (2.97)
Renal disease	3 (2.97)
CNS disease	1 (0.99)
Others	3 (2.97)

Table 4. Procedures

Procedures	Number (%)	Total (%)
Esophagogastroduodenoscopy (EGD)	243 (17.23)	998 (70.78)
EGD with biopsy	531 (37.66)	
EGD with adrenaline injection	22 (1.56)	
EGD with EVL	202 (14.33)	
Gastroscopy (GTS)	223 (15.82)	296 (20.99)
GTS with biopsy	9 (0.64)	
GTS with adrenaline injection	5 (0.35)	
GTS with EVL	59 (4.18)	
Colonoscopy	61 (4.33)	77 (5.46)
Colonoscopy with biopsy	16 (1.13)	
Sigmoidoscopy	24 (1.70)	38 (2.70)
Sigmoidoscopy with biopsy	14 (0.99)	
Proctoscopy with biopsy	1 (0.07)	1 (0.07)
CLO Test :		608 (43.12)
Positive	200 (32.89)	
Negative	408 (67.11)	

Table 5. Anesthesia related data.

Data		Number (%)
Anesthetic teachnique :		
Topical pharyngeal anesthesia		1,250 (92.52)
Intravenous sedation		51 (3.78)
General anesthesia with endotracheal tube		23 (1.70)
General anesthesia with mask		2 (0.15)
Monitored anesthesia care (MAC)		25 (1.85)
	MAC with endotracheal tube	11 (44.00)
	MAC with tracheostomy tube	1 (4.00)
Sedative agents :	Midazolam	36 (47.37)
	Thiopental	22 (28.95)
	Propofol	12 (15.79)
	Diazepam	3 (3.95)
	Ketamine	3 (3.95)
Narcotics :	Fentanyl	37 (48.68)
	Morphine	7 (9.21)
	Pethidine	7 (9.21)
Muscle relaxants :	Succinylcholine	24 (96.00)
	Atracurium	4 (16.00)
	Rocuronium	1 (4.00)
Inhalation agents :	Sevoflurane	12 (48.00)
Local anesthetics :	Lidocaine spray	1,250 (100.00)
Procedures use anesthesiology support :		
	EGD	44 (43.56)
	Colonoscopy	57 (56.44)

Discussion

Gastrointestinal (GI) endoscopy is one of the most common interventional medical procedures performed worldwide. It is an essential medical technique used to examine and detect GI abnormalities. Providing adequate sedation and analgesia is an integral part of the practice of GI endoscopy.

The role of sedation during GI endoscopy is a topic of continuing debate.[4] Abraham et al.[5] showed that the use of routine parenteral sedation is not required to ensure a successful endoscopy in all adult ambulatory patients. Improved patient tolerance and satisfaction afforded by parenteral sedation must be weighed against the risk of adverse cardiopulmonary events and the unit cost. However, most endoscopic procedures are performed with the patient under moderate sedation and analgesia, which is also known as "conscious sedation". At this level of sedation, the patient is able to make a purposeful

response to verbal or tactile stimulation, and both ventilatory and cardiovascular function are maintained. This is usually accomplished by the use of a narcotic and/or a benzodiazepine. The most commonly used benzodiazepines are midazolam and diazepam. They can induce relaxation and cooperation and often provide an amnestic response. In addition to the desired effects, symptoms of overdosage can occur include respiratory depression, hypotension, coma, stupor, confusion, and apnea. Midazolam causes paradoxical reactions, including hyperactive or aggressive behavior have been reported.[6] However, most endoscopists favor midazolam for its fast onset of action, short duration of action, and high amnestic properties. Similar to our results, midazolam is used in the majority of endoscopic procedures but not diazepam, because Diazepam has a longer half-life, a greater chance of phlebitis, and it has less amnestic capabilities. Opiates, such as meperidine or fentanyl administered intravenously, provide both analgesia and sedation. Meperidine should be used cautiously in patients with significant renal impairment as accumulation of metabolites may lead to seizures.[6] Fentanyl has a rapid onset of action and reduced incidence of nausea compared with meperidine but in high doses it may cause chest wall rigidity and difficulty with respiration.[6] Our review shown that fentanyl is the most commonly used opioid agents. Combinations of benzodiazepine and opioid agents may increase the risk of oxygen desaturation and cardiorespiratory complications. One study found no difference in pain experienced during colonoscopy in patients receiving midazolam, meperidine, or both.[7] Another reports suggested that the addition of meperidine to midazolam was favored by endoscopists compared with midazolam alone for upper endoscopy, but added no benefit from the patient's viewpoint.[8] Specific antagonists of opiates (naloxone) and benzodiazepines (flumazenil) are available and should be present in every endoscopy unit to treat over-sedated patients. At present, the commonly used sedative drug is propofol. The use of propofol for endoscopy is still an ongoing topic of discussion.

By comparison, patient responsiveness during "deep sedation" involves purposeful responses to painful stimuli. Airway support may be required. General anesthesia with either endotracheal tube insertion or under mask is frequently used, especially for longer procedures. The ASGE has recently published guidelines on the use of deep sedation and general anesthesia during endoscopic procedures.[9] At the level of general anesthesia, the patient is unarousable, even to painful stimuli. Airway support is frequently required and cardiovascular function may be impaired. The endoscopist must decide the level of sedation that will be required before the procedure. The endoscopy team must be able to recognize the various levels of sedation and analgesia and rescue a patient who exhibits loss of responsiveness, airway protection, spontaneous respiration, or cardiovascular function.

Up to 50 % of morbidity and mortality during endoscopic procedures,[4] as well as equipment and labor costs, are related to sedation.[10] In a prospective survey of 14,149 upper endoscopies, the rate of immediate cardiopulmonary incidents was 2 per 1000 cases and a mortality rate of 0.05 %.[11] A retrospective review of 21,011 procedures found the rate of cardiovascular complications was 5.4 per 1000

procedures.[12] Here, complications ranged from mild transient hypoxemia to severe cardiorespiratory compromise and death. With our results, most common complications in endoscopic procedures still remain with mortality rate of 0.99 % higher than other reviews. The risk of cardiovascular complications is related to both the patient's underlying condition and the endoscopic procedure performed. Patients who are elderly or those who have concomitant medical problems, including cardiovascular, pulmonary, renal, hepatic, metabolic and neurologic disorders, and morbid obesity, may be at increased risk from sedation.[6] These patients may require more complex or intensive monitoring during the endoscopic procedure. The risk for emergency or therapeutic procedures, such as control of bleeding, polypectomy, laser treatment, stent placement or ERCP are all associated with higher risk to the patient.[13] All endoscopists believe that monitoring the patient during endoscopy is necessary; however, only two-thirds of them use a pulse oximeter and approximately 10 % of them routinely monitor the patients with continuous electrocardiograms and continuous blood pressure measurement. Consistent with our findings, 7.16 % of endoscopic procedures were routinely monitored by the anesthetist.

Anesthesiologists provide this service in 18-24 % of all gastroscopic examinations performed in Europe and Asia. The vast majority of upper intestinal endoscopic procedures are performed without supplemental oxygen.[2] Most physicians administer the topical anesthetics themselves. Pharyngeal anesthesia is often used to suppress the gag reflex during the procedures that involves the upper GI tract. Most commonly used topical anesthetics is lidocaine which is administered by aerosol spray. There are numerous case reports on the occurrence of methemoglobinemia after administration of topical anesthetics.[6] Routine use of topical anesthesia for upper endoscopy should be re-evaluated. It probably provides little benefit for most patients receiving the doses of intravenous sedation typically used in the United States. It may be acceptable to use topical anesthesia in some patients, such as those who are younger than 40 years old, those undergoing the procedure for the first time, patients who are anxious, particularly if light or no sedation is administered.[14]

However, patient and endoscopists acceptance of unsedated endoscopy varies widely, and investigators have reported difficulty in recruiting patients to trials of un-sedated endoscopy.[15] Some previous studies have shown that 10-20 % of patients cross over from un-sedated to receiving sedation during the procedure. In Abraham et al.[16] study of sedated endoscopy, 76 % of procedures were successful, 79 % were satisfied with their level of comfort, and willingness to repeat was 81 %. They concluded that the use of sedation was the major determinant of successful endoscopy but more costly and contributed to an increased recovery room time. In common with other clinicians, Chutkan et al.[17] believed that the sedation requires specific training and expertise and should be strictly introduced only under optimal conditions. In Thailand, anesthesia for gastrointestinal endoscopy can be discussed in a similar study, Amornyotin et al.[18] demonstrated that anesthetic techniques, agents and complications were similar when compared to our study; however, 39.50 % of endoscopic procedures used intravenous sedation. A less likely alternative explanation

is associated with complicated procedures and diseases. The differences in diagnosis of GI abnormalities between different provinces have been attributed to cultural differences. Over the years, the patients have also changed. We are increasingly seeing patients on extreme health status; on the one hand, they could be perfectly healthy individuals who undertook a screening procedure and, on the other, they could have a multitude of co-morbid problems who are undergoing endoscopy for serious, potentially life-threatening disorders, such as active bleeding and complex biliary problems. Therefore, every endoscopist should be prepared for emergency surgery. Our study has 0.50 % of endoscopic procedures which were transferred to exploratory laparotomy. Nevertheless, this study clearly suggests that cardiovascular complications may be significantly more frequent in patients who undergo GI endoscopy in the hospital. At the Surin Provincial Hospital, there were two serious complications (0.14 %) that occurred during this study. Both of them were related to the patients' underlying conditions.

A limitation of this study is, however, its dependence on self-reported data. There is no way of knowing whether the data could have the conclusion of this report, i.e. selection biases and incomplete follow-up data. Studies that rely on voluntary reporting typically underestimate actual complication rates.[19]

Conclusion

Sedation is not required to perform a technically adequate endoscopy, but it remains an efficacious strategy by increasing the rate of successful endoscopies, patient satisfaction, comfort, and willingness to repeat. There was no need for special techniques or drugs in anesthesia. Appropriate attention to patient monitoring will help minimize complications as well as recognize early signs of distress, so that appropriate resuscitative measures can be instituted.

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