# Anesthesia for Endoscopic Retrograde Cholangio-Pancreatography (ERCP) from 1999-2003 in Siriraj Hospital: A retrospective study

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***Background :*** *Endoscopic retrograde cholangio-pancreatography (ERCP) is another treatment option for in hepato-biliary tract abnormalities. The authors studied anesthetic data as a basis for further research.*
***Method :*** *Retrospectively analyzed the patients on whom ERCP had been performed during the period of January, 1999 to November, 2003 in Siriraj Hospital. The patients' characteristics, preanesthetic problems, anesthetic techniques, anesthetic agents, anesthetic time, ERCP procedure and complications were assessed.*
***Results :*** *There were 2,144 patients who received the procedure during study period. The age group of 50-69 years was the highest one (46.9%). Most patients had ASA class II (54.7%). The diagnosis were stone (40.3%), tumor (34.0%), hepato-biliary tract infection (8.1%) and others (17.6%). Hypertension, diabetes mellitus and hematologic diseases were the most common preanesthetic problems. Total intravenous anesthesia (TIVA) was the anesthetic technique mainly employed (96.4%). Anesthetic agents were mainly administered with propofol, midazolam and fentanyl. The mean anesthetic time was 40.0 $\pm$ 18.5 minutes. The indications for ERCP indications for procedures were diagnostic (18.9%), stone removal (37.1%), stent removal and/or insertion (35.3%) and others (8.7%). The most frequent anesthetic complication was hypotension.*
***Conclusion :*** *During anesthetic management for ERCP, special techniques or drugs in anesthesia are not routinely required, however, the anesthetic personnel had to optimize the patient's condition for safety and there should be an awareness of complications.*

***Keywords :*** *Endoscopic retrograde cholangio-pancreatography, Anesthetic management, Anesthetic technique, Complication*

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Despite an increase in the number of patients with hepato-biliary tract diseases, surgical treatment is limited along with risky outcomes such as bleeding, infection or improper postoperative pain control. ERCP is another treatment of choice which has some advantages over surgery [1]. Although both kinds of treatment have been developed to avoid complications, however, the risks from anesthetic management still persist.

Siriraj Hospital has performed ERCP since 1996 and most of them have been performed by endoscopists under anesthesia. The choices and techniques of anesthesia and drug selection vary according to the condition of the patients, familiarity of the anesthesiologists and satisfaction of the endoscopists.

To report and evaluate the choices and techniques of anesthesia, drug usage and complications which occurred during that period of time, a descriptive retrospective study was performed in order to adapt and keep the data for further research in the near future.

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## Material and Method

Data from anesthetic, procedure records and history charts of patients who underwent ERCP in Siriraj Hospital from January 1st, 1999 to November 30th, 2003 were reviewed. The general data included sex, age, ASA physical status, body weight, height

and diagnosis. The anesthetic data encompassed pre-anesthetic problems, premedications, choice of anesthesia, variety of drug usage, monitoring, time agent and complications evolved intraoperatively.

Results were reported as mean ± standard deviation (SD) or percentage (%) where appropriate.

## Results

There were 2,144 ERCP procedures performed during the study period. The majority of the patients were male, mean age was 57.2 ± 15.9 years, and ASA physical status I-II. The patients that were in 50-69 year old group were 46.9% as shown in Table 1.

The diagnoses were biliary tract stone (40.3%), tumor (34.0%), biliary tract infection (8.1%) and others (17.6%), respectively.

There were 830 pre-anesthetic problems in 2,144 procedures. They involved mainly hypertension and diabetes mellitus. Other problems were hematologic disease; anemia, heart disease; coronary artery disease, vulvular heart disease, liver disease; cirrhosis, respiratory disease; chronic obstructive pulmonary disease, asthma, renal disease; chronic reneal failure and others; electrolyte imbalance as shown in Table 2.

Almost all of the procedures were carried out under total intravenous anesthesia technique (96.4%) and general anesthesia with either endotracheal tube insertion or tracheostomy tube (3.6%). The details of sedative agents, inhalation agent, muscle relaxants and narcotics are shown in Table 3.

Clinical monitoring observed by the anesthetic personnel consisted of non-invasive blood pressure, pulse oximetry, electrocardiography, fluid intake and output. The anesthetic duration ranged from 5 to 180 minutes. The mean anesthetic time was 40.1 ± 18.5 minutes as shown in Table 4. The ERCP procedures

**Table 1.** Patients' characteristics

| Characteristics | Number | % |
|---|---|---|
| Sex (2,144) | | |
| Male | 1106 | 51.6 |
| Female | 1038 | 48.4 |
| Age (years) (2,096)* | | |
| < 10 | 9 | 0.4 |
| 10-19 | 21 | 1.0 |
| 20-29 | 80 | 3.8 |
| 30-39 | 188 | 9.0 |
| 40-49 | 329 | 15.7 |
| 50-59 | 467 | 22.3 |
| 60-69 | 515 | 24.6 |
| 70-79 | 352 | 16.8 |
| > 79 | 135 | 6.4 |
| Mean age ± SD (yr) | 57.2±15.9 | |
| ASA physical status (2,075)* | | |
| I | 800 | 38.6 |
| II | 1134 | 54.7 |
| III | 127 | 6.1 |
| IV | 14 | 0.6 |

* There were 2,144 cases, but age and ASA physical status were not the same. This study was a retrospective descriptive study. Some data were missing.

**Table 2.** Preanesthetic problems

| Preanesthetic problems | Number | % |
|---|---|---|
| Hypertension | 245 | 29.5 |
| Diabetes mellitus | 181 | 21.8 |
| Hematologic disease | 139 | 16.7 |
| Heart disease | 81 | 9.8 |
| Liver disease | 67 | 8.1 |
| Respiratory disease | 38 | 4.6 |
| Renal disease | 19 | 2.3 |
| Others | 60 | 7.2 |

**Table 3.** Anesthesia related data

| Data | Number | % |
|---|---|---|
| Anesthetic Technique | | |
| Total intravenous anesthesia | 1,733 | 96.4 |
| General anesthesia with endotracheal tube | 61 | 3.4 |
| General anesthesia with tracheostomy tube | 4 | 0.2 |
| Sedative agents | | |
| Propofol | 1,470 | 94.7 |
| Midazolam | 1,333 | 85.9 |
| Thiopental | 81 | 5.2 |
| Ketamine | 21 | 1.4 |
| Droperidol | 11 | 0.7 |
| Inhalation agent | | |
| Isoflurane | 54 | 3.5 |
| Muscle relaxants | | |
| Succinylcholine | 8 | 0.5 |
| Atracurium | 35 | 2.3 |
| Vecuronium | 6 | 0.4 |
| Narcotics | | |
| Fentanyl | 1,147 | 73.9 |
| Pethidine | 322 | 20.8 |
| Alfentanil | 39 | 2.5 |

**Table 4.** Anesthetic time

| Duration of time (min) | Number | % |
|---|---|---|
| < 30 | 341 | 22.5 |
| 30-59 | 920 | 61.0 |
| 60-89 | 208 | 13.8 |
| > 89 | 40 | 2.7 |

were stone removal (37.1%), stent removal and/or insertion (35.3%), diagnosis (18.9%) and others (8.7%)

The most frequent anesthetic complication was hypotension (8.8%) which was promptly corrected by the administration of vasopressor and fluid loading. The authors noticed that it occurred after rapid propofol injection. Other complications were hypertension (0.7%) and arrhythmia (0.4%).

**Discussion**

Endoscopic retrograde cholangio-pancreatography (ERCP) is an effective treatment with fewer complications than surgery especially for biliary tract abnormalities. In Siriraj Hospital (Department of Surgery), the authors have been employing this technique since 1996 which has reduced the number of operations, the risk of prolonged anesthesia, and special anesthetic technique. The present study was time limited so the treatment given in certain cases was not completed and further therapy is expected to continue.

The two basic choices of anesthesia for the procedure, which have advangages and disadvantages, are total intravenous anesthesia and general anesthesia. With the total intravenous anesthesia technique, the authors can reduce anesthetic agents and the patients would gain a rapid recovery, but control of respiration and cardiovascular systems are more difficult. While the general anesthesia technique, the control of respiration and cardiovascular systems are more reliable. In our Institute, the authors normally use total intravenous anesthesia because of the given reasons in conjunction with the preference of anesthesiologists.

There are no special anesthetic techniques needed for this kind of anesthesia. The indication for providing general anesthesia was mainly related to the underlying diseases, which are frequently treated with complex and painful ERCP procedures, pediatric patients, and refusal of conscious sedation[2-3]. Cardiopulmonary and other diseases that are more frequent in older patients have been regarded as the major risk factors for complications associated with endoscopy or sedation[4-6]. Old age as an important risk factor for endoscopy did not represent as an indication for providing general anesthesia more frequently for ERCP at our institution. However, it depends on the experience of the anesthesiolgists themselves.

More difficult patients were referred for ERCP under general anesthesia. More therapeutic ERCPs were performed in patients who had general anesthesia, and these patients had more interventions in the same time compared to patients with intravenous sedation[2]. In our hospital, the experience of the endoscopists is not taken into account in the indication to perform ERCP under general anesthesia. However, it is tempting to speculate that those patients in particular may benefit from the general anesthesia technique who undergo ERCP with less experienced endoscopists.

There was a tendency toward less frequent ERCP related complications under the improved conditions provided by general anesthesia compared to intravenous sedation, since general anesthesia technique offers less patient movement than the prior technique. However, as the authors evaluate the complications retrospectively from the ERCP protocols, the authors believe that the frequency of ERCP related complications, especially under intravenous sedation, was probably underestimated and this can only be accurately determined in a prospective evaluation. The benefits of the higher efficacy and success rate of ERCP under general anesthesia compared to intravenous sedation have to be weighed up against the limitations of ERCP under general anesthesia. It has been reported that additional time for preparation is required for ERCP under general anesthesia, with induction of anesthesia and intubation of the patient[3]. In addition, 30-40 minutes of surveillance in a postanesthesia care unit have to be added to the additional time required for ERCP under general anesthesia. At our institution, most procedures are performed in the prone position. The present study demonstrates that ERCP can be effectively performed in this position with the patients under intravenous anesthesia. When the supine position is preferred to improve visualization in patients with complex ductal stenoses and strictures, insufficient airway protection may occur during intravenous sedation. General anesthesia is, therefore, often used at our institution to protect the airways during time-consuming ERCP interventions in the supine position.

Sedative agents usually used are either propofol or midazolam because of rapid induction and good recovery. Succinyl choline was the muscle relaxant of choice for intubation and atracurium and vecuronium were the muscle relaxants for maintenance. The inhalation agent was isoflurane. The short acting narcotics such as fentanyl, alfentanil were used more often than the others.

The anesthetic agent propofol is a phenol derivative approved for induction and maintenance of monitored anesthesia and sedation. Propofol may be ideal for sedation during ERCP because of its rapid

onset of sedative action, easy titrability, and a short duration of effect (7 to 8 minutes)[7,8]. In two randomized, controlled trials the sedation efficacy of propofol was higher than that of midazolam during colonoscopy[9], whereas its use during ERCP had not yet been systematically investigated.

Higher costs per procedure have been regarded as a further limitation on providing general anesthesia for ERCP[3] in our developing country. However, the failure rate of ERCP was double when intravenous sedation was used, in comparison with ERCP under general anesthesia. ERCP failure not only causes medical and other serious problems, it can also be assumed that there are additional costs when ERCP fails. This could be related to longer hospitalization periods when the procedure has to be repeated, or when surgical interventions become necessary. Serious cardiac or respiratory complications associated with intravenous sedation occur in up to 5.4 cases per 1,000 gastrointestinal endoscopies[10]. Aspiration of gastric contents represents the most frequent serious complication of general anesthesia, occurring in about 0.3 per 1,000 general anesthesias in elective procedures, and it carries a low risk for subsequent serious morbidity[11]. In the present study, no serious complications related to intravenous sedation or general anesthesia were observed.

**Conclusion**

Endoscopic retrograde cholangio-pancreatography (ERCP) is a procedure for diagnosis and treatment of hepato-biliary tract abnormalities. But this procedure still needs not only endoscopists but also anesthetic personnel to observe and take care. Clinical signs should be carefully observed although the occurences of complications have no statistical significance with the anesthetic technique. In conclusion, there was no need for special techniques or drugs in anesthesia but anesthetic personnel had to optimize the patients' condition for the safety and there should be an awareness of complications eventhough there were not associated with anesthetic techniques.

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## *การให้ยาระงับความรู้สึกสำหรับการตรวจและรักษาความผิดปกติของระบบทางเดินน้ำดีและตับอ่อนด้วยการใช้กล้องส่องในโรงพยาบาลศิริราช ตั้งแต่ปี พ.ศ.2542-2546: การศึกษาแบบย้อนหลัง*

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***บทนำ*** *: การตรวจและรักษาความผิดปกติของระบบทางเดินน้ำดีและตับอ่อนด้วยการใช้กล้องส่องเป็นการรักษาวิธีหนึ่งสำหรับแก้ไขความผิดปกติของระบบทางเดินน้ำดีและตับอ่อน การศึกษานี้เป็นการรวบรวมข้อมูลเกี่ยวกับการให้ยาระงับความรู้สึก*

***วัตถุประสงค์*** *: เพื่อการศึกษาการให้ยาระงับความรู้สึก, ยาที่ใช้และภาวะแทรกซ้อนต่าง ๆ ที่เกิดขึ้น และเกี่ยวข้องกับการให้ยาระงับความรู้สึก*

***วิธีการศึกษา*** *: ศึกษาผู้ป่วยที่มารับการให้ยาระงับความรู้สึกการตรวจและรักษาความผิดปกติของระบบทางเดินน้ำดีและตับอ่อนด้วยการใช้กล้องส่องในโรงพยาบาลศิริราชตั้งแต่ปี พ.ศ.2542-2546 รวบรวมข้อมูลทั่วไปของผู้ป่วย, ปัญหาก่อนการให้ยาระงับความรู้สึก, วิธีการให้ยาระงับความรู้สึก, ยาที่ใช้, ระยะเวลาการให้ยาระงับความรู้สึก, ชนิดของหัตถการและภาวะแทรกซ้อนต่าง ๆ ที่เกิดขึ้น*

***ผลการศึกษา*** *: ผู้ป่วยทั้งหมด 2,144 ราย มีอายุระหว่าง 50-69 ปี พบมากที่สุด (46.9%) ส่วนมากจะมี ASA class II (54.7%) การวินิจฉัยคือ นิ่ว (40.3%), เนื้องอก (34.0 %), การติดเชื้อของระบบทางเดินน้ำดี (8.1%) และอื่น ๆ (17.6%) พบว่าความดันเลือดสูง, เบาหวานและโรคเลือดเป็นปัญหาก่อนการให้ยาระงับความรู้สึกมากที่สุด ได้รับการให้ยาระงับความรู้สึกด้วยวิธี Total intravenous anesthesia (TIVA) มากที่สุด (96.4%) ผู้ป่วยส่วนมากได้ยา propofol, midazolam และ fentanyl ระยะเวลาการให้ยาระงับความรู้สึกเฉลี่ย 40.0±18.5 วินาที ชนิดของหัตถการคือวินิจฉัย (18.9%), เอานิ่วออก (37.1%), การใส่และ/หรือการถอดท่อระบาย (35.3%) และอื่น ๆ (8.7%) ภาวะแทรกซ้อนที่เกิดขึ้นบ่อยที่สุดคือความดันเลือดต่ำ*

***สรุป****: การให้ยาระงับความรู้สึกในผู้ป่วยที่มารับการตรวจและรักษาความผิดปกติของระบบทางเดินน้ำดีและตับอ่อนด้วยการใช้กล้องส่องไม่จำเป็นต้องใช้ยาหรือเทคนิคพิเศษอื่น แต่ผู้ให้ยาสลบต้องสามารถควบคุมผู้ป่วยให้อยู่ในภาวะที่ผู้ทำหัตถการสามารถทำได้ด้วยความสะดวก และควรระมัดระวังภาวะแทรกซ้อนต่าง ๆ ที่อาจเกิดขึ้น*