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Anesthesiologist-managed sedation for endoscopic retrograde cholangiopancreatography: Experience at the University of Hong Kong Shenzhen Hospital

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ABSTRACT

Providing sedation and analgesia to patients undergoing endoscopic retrograde cholangiopancreatography (ERCP) is challenging because of patient position, procedure duration, and depth of sedation required. Conventionally, sedation for ERCP is managed by endoscopists with intravenously administered benzodiazepines and opioids. With increasing complexity of ERCP procedures, there is a trend to involve anesthesiologists to provide sedation and anesthesia. Anesthesiologists are able to provide general anesthesia in failed sedation. Moreover, patients at high risk of aspiration should be identified, and general anesthesia with endotracheal intubation would be a recommended approach in these patients. Anesthesiologists are also experienced in using potent and short-acting intravenous sedation and in management of cardiovascular and respiratory adverse events that arise from sedation. Use of short-acting sedatives would enhance recovery from ERCP. We discuss our experience with sedation for ERCP at the University of Hong Kong Shenzhen Hospital.

1. Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is a diagnostic and therapeutic procedure often performed in endoscopy suites rather than the operating theater and involves the concurrent use of gastroscopy and radiography. ERCP is invasive and can be painful, particularly when bile duct dilation of a stenosis is performed, and additionally the duration of the procedure may be longer than other endoscopic procedures.

Providing sedation and analgesia is particularly challenging as patients are usually required to be in the prone position and any movement, coughing, or gagging during the intervention can impede the progress or even result in complications. While focusing on the procedure, it can be difficult for the operator to simultaneously and safely manage moderate or deep sedation.

2. "Conscious Sedation" for ERCP

Sedation for ERCP is usually achieved with a combination of intravenous benzodiazepines and opioids prescribed by the endoscopist, and it is often termed as “conscious sedation.” Although effective in some patients, the failure rate was as high as 8.5% in 1 retrospective report [1]. This was mostly secondary to inadequate sedation and accounted for more than 60% of the ERCP failures in this review. On the contrary, over-sedation can also result in adverse events and, in 1 study, 33% of the patients undergoing sedation with midazolam required flumazenil [2].

In another retrospective review of patients from 3 academic affiliated community hospitals in Michigan, the complication rate in patients undergoing ERCP under general anesthesia (GA) or sedation was evaluated [3]. In the sedation group, 22 out of 367 patients experienced serious cardiopulmonary adverse events, which included hypoxia, bradycardia, tachycardia, and atrial fibrillation. With GA, no patient suffered from cardiopulmonary complications, whereas 1 out of the 283 experienced prolonged weaning from assisted ventilation. There were also significantly more patients in the sedation group, who experienced procedural complications including post-ERCP pancreatitis, infection, and

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sepsis. As this was a retrospective review, it would be difficult to exclude selection bias for the mode of anesthesia; nevertheless, this report highlights the risks of endoscopist-performed sedation.

The term “conscious sedation” can be misleading and confusing because it is often misinterpreted as a state in which the patient retains only reflex withdrawal to pain [4] and is, in fact, an oxymoron. In 2002, the American Academy of Pediatrics advised to omit the term “conscious sedation.” The American Academy of Pediatrics recommends that it is more appropriate to use the terminology of the American Society of Anesthesiologists (ASA) [5]. Depth of sedation is classified by the ASA as mild, moderate, or deep sedation and GA according to the patient's ability to maintain a patent airway, spontaneous ventilation, and cardiovascular stability. The sedation practitioner should realize that different levels of sedation represent different points on a continuum, and patients may move between these very rapidly; hence, practitioners must be constantly prepared to rescue the patient and deal with possible complications.

In most public hospitals in Hong Kong and in China, sedation is usually performed by the endoscopist, and help from anesthesiologists is only occasionally required for difficult or failed cases. As anesthesiologists are not regularly involved in endoscopic sedation, GA is often offered whenever help is summoned. The reason for GA in these circumstances would include a sicker patient, a previous failed sedation attempt, and an unfamiliar environment and sedation procedure for anesthesiologists.

3. General Anaesthesia for ERCP

With the increasing complexity and the number of therapeutic interventions performed under ERCP, there is a trend to involve anesthesiologists in ERCP procedures. The major advantage of an anesthesia-run sedation service for ERCP is the option to assess patient suitability for sedation and the option to provide GA when appropriate. This may be a safer option and an even easier way to provide stable conditions for complicated ERCP procedures. Patients receiving GA in the prone position may undergo endotracheal intubation at some centers. ERCP is often a relatively long procedure with gastrointestinal air insufflation, so a secure airway may help protect against pulmonary aspiration. A high-risk residual gastric content, defined as a volume >25 mL and pH < 2.5, was present in 12.2% (95% CI: 8.7%-16.7%) of a prospective cohort of 255 fasted patients for endoscopy [6]. Despite the presence of residual gastric content, the risk of aspiration pneumonia remains uncertain and unknown. The incidence of pneumonia after upper gastrointestinal endoscopy was 0.08% in a prospective audit of 14,119 procedures in England [7]. Of the 11 patients, 10 had oropharyngeal local anesthesia and 8 died. The authors suggested that there was a link between the use of local anesthetic sprays and the development of pneumonia after gastroscopy. This report was published in 1994, and sedation was provided by gastroenterologists with intravenous benzodiazepines. From the 2004 report of the National Confidential Enquiry into Patient Outcome and Death on endoscopic procedures “Scoping our practice,” the reported risk of aspiration pneumonia was 1 of 1688 (0.06%) in endoscopic procedures [8]. Although the risk is extremely low, it is potentially avoidable. Even if not all patients warrant endotracheal intubation for ERCP procedures, those with increased risk of pulmonary aspiration should be identified and managed appropriately. The 1 case of pulmonary aspiration from the National Confidential Enquiry into Patient Outcome and Death report was an elderly patient with a history of stroke and swallowing difficulty. Although the authors of the 2004 report suggested that the use of local anesthetic was associated with an increased risk of aspiration pneumonia, it may be more appropriate to state that patients with preexisting swallowing problems or aspiration risk should have their airway protected before upper endoscopy, including ERCP.

Apart from a protected airway, there are other advantages of GA. Patients are almost guaranteed to be motionless. Short-acting opioids such as remifentanil are a good adjuvant to stable anesthesia and obtunding surgical stress. These agents decrease the requirement for propofol or anesthetic agents and would hasten patient recovery from anesthesia. ERCPs are often performed in relatively crowded locations with the patient surrounded by the endoscopic unit, fluoroscopy equipment, as well as an anesthetic machine. It may be difficult for the anesthesiologist to have clear and quick access to the patient's airway and intravenous access site. Easy and immediate airway access in an already intubated patient becomes less crucial as long as appropriate monitoring for GA is used. Anesthesiologists may also be able to monitor the patient in the control room when fluoroscopy is being used to minimize occupational radiation exposure. Anesthetic machines and scavenging equipment would be required for administration of inhalational GA. Although most patients may undergo ERCP with intravenous sedation, GA is necessary in selected patients, and equipment and monitoring should be made available in the endoscopy suite. Although GA is an option in selected patients, most can undergo ERCP with intravenous sedation without endotracheal intubation. When sedation is provided by the endoscopist, it is associated with an increased failure rate and more adverse events.

4. Anaesthesiologists Managed Sedation Service for ERCP

In the University of Hong Kong and Shenzhen Hospital (HKU-SZH), anesthesiologists are responsible for most ERCP sedation. Conventionally in Hong Kong and in China, most sedation in the endoscopy unit is provided by an endoscopist who is also responsible for the procedure. There are no nurse anesthetists. The health service is largely funded by the Hong Kong government, so patients do not have a choice of sedation provider. Commonly used sedatives by endoscopists for ERCP include a combination of intravenous benzodiazepines and opioids, with midazolam and pethidine (meperidine) being the most common regimen, as they are not allowed to use propofol. Involvement of anesthesiologists is usually difficult because of a lack of manpower. As the HKU-SZH is a new hospital which opened in 2013 and is managed by the University of Hong Kong and funded by the Chinese government, we have been able to incorporate this into our anesthesiology service. In China, patients have to either self-fund or fund their medical service with medical insurance. As anesthesiologists are more readily available, endoscopists usually ask them to provide ERCP sedation as long as the patient agrees.

In the HKU-SZH, we have performed 245 ERCPs between May 2014 and November 2015. A total of 206 patients (84.1%) were managed by anesthesiologists and 39 patients were sedated by endoscopists. For the 206 patients who were managed by anesthesiologists, 185 (89.8%) had intravenous sedation without tracheal intubation and 21 (10.2%) patients had GA with intubation

Table 1
Demographic data. Values in mean $\pm$ SD (range) or % (n).

	Intubated ($n = 21$)	Not intubated ($n = 185$)	P value
Age (year)	55.7 $\pm$ 16.0 (27-78)	57.3 $\pm$ 16.1 (11-98)	0.667
Sex, M:F	57.1 = 42.9 (12:9)	57.3 = 42.7 (106:79)	0.989
ASA 1:2:3	66.7 = 9.5 = 23.8 (14:2:5)	75.7 = 19.5 = 4.9 (140:36:9)	0.004*

Abbreviations: F, female; M, male; SD, standard deviation.

* Significantly different if $P < 0.05$.