

Sedation Guidelines for Gastro Intestinal Endoscopy

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Abstract

Effective sedation is usually a vital precursor to any successful endoscopic procedure. With advanced techniques and medications available today this component of the procedure can be dealt with safely and in an efficient manner.

MJAFI 2009; 65 : 161-165

Key Words : Sedation; Analgesia; Endoscopy

Introduction

The benefits of endoscopy have increased enormously as it has matured from a purely diagnostic tool to become a therapeutic subspecialty, but so too has the potential for causing harm. There has been a considerable progress in the practice of sedation and anaesthesia during endoscopic procedures. However it is emphasized that a high degree of safety has to be ensured in delivery of this by adhering to guidelines and also ensuring that specialist service is provided to patients with particular problems so as to avoid a plausible morbidity and if not a probable mortality.

Although some endoscopic procedures such as routine diagnostic upper gastrointestinal endoscopy can be carried out without sedation, many of the other endoscopic procedures are unpleasant and sedation as an adjunct to good pain relief and sympathetic patient management can improve both patient tolerance and acceptance and increase the technical success of the procedure [1]. The fact that the procedure can be performed without systemic medication increases the pressure to use sedation safely. Endoscopist should recognize that any drug which depresses the central nervous system has the potential to impair respiration, circulation or both and hence requires exercising required caution in practicing sedation.

Discussion

Patients should be assessed for risk prior to endoscopy with a concise medical history and examination for identification of risk factors. The American Society of Anaesthesiologists' classification system is convenient for this purpose. Patients in American Society of Anaesthesia Grades III and above which includes - the elderly and those with severely limiting heart disease,

cerebrovascular disease, significant lung disease, liver failure, acute gastrointestinal bleeding and cardiovascular compromise, severe anaemia, morbid obesity and shock require special attention during endoscopy.

Routine endoscopic procedures diagnostic or therapeutic are usually performed nowadays under optimal sedation and analgesia either by the endoscopist or with help of the anesthesiologist. This is known as "conscious sedation". In this, with the set level of sedation, the patient is able to make a purposeful response to verbal or tactile stimulation and both the ventilatory and cardiovascular function are maintained.

Airway support may be required during deep sedation. 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. The level of sedation should be titrated to achieve a safe, comfortable and technically successful procedure [2].

Sedation/analgesia provides two general types of benefit: (a) sedation/analgesia allows patients to tolerate unpleasant procedures by relieving anxiety, discomfort, or pain and (b) in children and uncooperative adults, sedation- analgesia may expedite the conduct of procedures that are not particularly uncomfortable but that require a stable patient without movement. At times, these sedation practices may result in cardiac or respiratory depression, which must be rapidly recognized and appropriately managed to avoid the risk of hypoxic brain damage, cardiac arrest, or death. Conversely, inadequate sedation- analgesia may result in undue patient discomfort or patient injury because of lack of cooperation or adverse physiologic or psychological response to stress [3].

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The ability to provide sedation and analgesia safely and effectively and to ensure patients clinical stability by appropriate monitoring during gastrointestinal endoscopy should be the prime concern of the treating clinician. At present, the vast majority of patients undergoing gastrointestinal endoscopy in clinical practice receive intravenous medication, usually a combination of a narcotic and benzodiazepine, with a very low reported incidence of sedation-induced complications [4]. Despite an excellent overall safety record, cardiopulmonary complications, likely due in large part to sedative and analgesic medications, are believed to account for 50- 60% of procedure-related morbidity and mortality, respectively [5]. Appropriate training in these skills is thus essential to the provision of patient safety and comfort before, during and after each endoscopic examination.

The following are the various levels of sedation in clinical practice [6] :

1. Minimal sedation (anxiolysis)
Patient responds normally to verbal commands. Cognitive function may be impaired, but ventilatory and cardiovascular functions are unaffected.
2. Moderate sedation or analgesia (conscious sedation)
Patient responds purposefully to verbal commands with or without light tactile stimulation. Spontaneous ventilation is adequate, and cardiovascular function is maintained.
3. Deep sedation or analgesia
Patient is not easily aroused but responds purposefully to painful stimulation. Patient may not be able to maintain a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function usually is maintained.
4. Anesthesia
Consists of general anesthesia and spinal or major regional anesthesia. It does not include local anesthesia. Patients are not arousable, even by painful stimulation. The patient often requires assistance in maintaining a patent airway and positive pressure ventilation. Cardiovascular function may be impaired.

Anesthetic agents such as propofol and sedatives such as midazolam, lorazepam and sedative adjuncts such as promethazine, and diphenhydramine are useful in certain patients undergoing endoscopic procedures. Propofol provides faster onset and deeper sedation than standard benzodiazepines and narcotics, as well as faster recovery. For prolonged therapeutic procedures, propofol has been demonstrated to be superior to standard benzodiazepine/narcotic sedation and its use should be considered. Deep

sedation requires more intensive monitoring by trained individuals. The assistance of anesthesiologists should be considered in patients undergoing prolonged therapeutic procedures requiring deep sedation, those with anticipated intolerance of standard sedatives, and those at increased risk for sedation-related complications, such as patients with severe comorbidities or with anatomic variants increasing the risk of airway obstruction [7].

Essential to the guidelines is the method of assessing sedation - The Ramsay Scale (Table 1). The goal of the sedation algorithm is to maintain patients at a Ramsay score of 2-3. Patients will need to be assessed using the Ramsay Scale and have their sedation adjusted accordingly. Achieving the appropriate level of sedation in a patient may be as simple as administering a midazolam bolus and scheduled lorazepam dose, or require the use of multiple agents. The guidelines also use pathways that address pain and delirium, reasons why patients often continue to be agitated and are unresponsive to sedation.

Though GI endoscopy is a safe procedure, significant complications can occur as a result of instrumentation, such as bleeding, perforation, and infection [8]. Cardiopulmonary complications may account for over 50% of all reported complications, with the majority because of aspiration, oversedation, hypoventilation, vasovagal episodes, and airway obstruction [9].

Most complications of endoscopy are cardiopulmonary [10]. Sedation should be kept to a minimum required level for patient comfort and safety, particularly in the elderly. Increasing the level of sedation to allow more forceful passage of the endoscope, particularly in colonoscopy, carries an unnecessary risk of iatrogenic trauma.

Excessive pain during endoscopic procedures often signals poor technique and may mean impending perforation. It should be noted that the combination of benzodiazepines with an opioid increases the risk of cardiopulmonary complications. Opioids should be given first, and then the benzodiazepine dose increased slowly

Table 1
Ramsay Scale : Sedation Score

Score	Patient description
1	Anxious, agitated or restless
2	Cooperative, oriented and tranquil
3	Responds to commands only
4	Asleep, but brisk response to glabellar tap or loud auditory stimuli
5	Asleep, but sluggish response to glabellar tap or loud auditory stimuli
6	No response

according to clinical status. Benzodiazepine antagonists should always be available but these drugs are not to be used simply to obtain greater sedation. Their duration of effect is less than the benzodiazepines and so late "re-sedation" may occur in recovery [9].

A retrospective analysis identified that cardiopulmonary incidents were noted in the immediate post procedure period. Aspiration pneumonia, pulmonary embolism and myocardial infarction were however noted in the later period [11]. Complications ranged from mild transient hypoxemia to severe cardiorespiratory compromise and even death. The risk of cardiovascular complications is related to both the patient's underlying condition and the endoscopic procedure being performed. Patients who are elderly or who have concomitant medical problems, including cardiovascular, pulmonary, renal, hepatic, metabolic and neurologic disorders, and morbid obesity, may be at increased risk from sedation. These patients may require more complex or intensive monitoring during endoscopic procedures. Patients who are already taking sedative or anxiolytic medications, or opiates may also be at a greater risk for oversedation. The risk for emergency or therapeutic procedures, such as control of bleeding, polypectomy, laser treatment, stent placement or Endoscopic Retrograde Cholangio Pancreatography (ERCP) are all associated with higher risk to the patient [10].

Appropriate attention to patient monitoring before, during and after the procedure, will help to minimize complications as well as recognize early signs of distress, so that appropriate resuscitative measures can be instituted.

Monitoring

A thorough pre-procedural anesthetic evaluation is mandatory for all patients undergoing endoscopic procedures, in order to evaluate and assess the risks involved and plan accordingly for a safer procedure. Patients undergoing endoscopic procedures with moderate or deep sedation must have continuous monitoring before, during, and after the administration of sedatives. Monitoring detects early signs of patient distress, such as changes in pulse, blood pressure, ventilatory status, cardiac electrical activity, clinical, and neurologic status before clinically significant compromise occurs. Standard monitoring of sedated patients undergoing GI endoscopic procedures includes recording the heart rate, blood pressure, respiratory rate, and oxygen saturation. Although electronic monitoring equipment often facilitates assessment of patient status, it does not replace a well-trained and vigilant assistant. A pulse oximeter measures oxygen saturation and enhances the assessment of respiratory status in patients

under sedation and analgesia. Supplemental oxygen administration has been shown to reduce the magnitude of oxygen desaturation when given during endoscopic procedures [12].

Continuous electrocardiogram (ECG) monitoring is warranted in high-risk patients. Patients who may benefit from ECG monitoring include those who have a history of significant cardiac or pulmonary disease, elderly patients, and those in whom prolonged procedures are anticipated. End tidal CO₂ monitoring is useful in cases which take time for the procedure, especially so if associated with a compromised cardio respiratory status. Though capnography is superior to pulse oxymetry it is not established whether it is associated with improved outcome in these procedures [13]. The role and value of Bispectral Index (BIS) monitoring as a standard monitoring device for these patients as a routine is yet to be evaluated [14].

Recovery

Recovery room observation and monitoring for any adverse effects from either the procedure per se or the sedation itself is to be done without fail so as to avoid any possible mishap. The length of the follow-up observation is dependent on the perceived risk to the patient. Patients may be discharged from the endoscopy unit or post procedure recovery area once vital signs are stable and the patient has reached an appropriate level of consciousness. Despite the appearance of appropriate recovery, it is well recognized that patients may have a prolonged period of amnesia and/or impaired judgment and reflexes after intravenous medications administered to induce sedation. Patients should be advised before the administration of sedatives that a prolonged period of impaired cognition may occur. They should be instructed to make plans not to drive, operate heavy or potentially harmful machinery, or make legally binding decisions. When sedatives are administered, a competent companion for discharge must accompany patients from the recovery area. Written instructions upon discharge are necessary as the amnestic period following sedation is variable. Day cases should be accompanied home by a responsible adult who should then stay with them for at least 12 hours if they live alone. Clear written instructions should be given to this person as to what to do and whom to contact in the event of problems arising.

Post procedure instruction on the signs and symptoms of potential adverse outcomes and complications is also advisable. Patients should be given written instructions on steps to follow in the event of a complication, including a phone number where 24-hour-a day help is available in the event of an emergency. Elective use of naloxone

or flumazenil may be considered to reduce the recovery room time after endoscopy. The routine use of these has been shown to be associated with quicker awakening and reversal of amnesia, without an increased risk of re-sedation compared with placebo [15].

Administration of antagonists after endoscopic procedures will not obviate the need for appropriate post procedure observation and safe discharge planning. More data are needed before this becomes a recommended routine practice for outpatient endoscopy [15].

The American Society of Anesthesiologists (ASA) Taskforce states that airway management may be difficult in the following situations: (a) patients with previous problems with anesthesia or sedation; (b) patients with a history of stridor, snoring, or sleep apnea; (c) patients with dysmorphic facial features, such as Pierre-Robin syndrome or trisomy-21; (d) patients with oral abnormalities, such as a small opening (<3 cm in an adult), edentulous, protruding incisors, loose or capped teeth, high, arched palate, macroglossia, tonsillar hypertrophy or a nonvisible uvula; (e) patients with neck abnormalities, such as obesity involving the neck and facial structures, short neck, limited neck extension, decreased hyoid-mental distance (<3 cm in an adult), neck mass, cervical spine disease or trauma, tracheal deviation, or advanced rheumatoid arthritis; and (f) patients with jaw abnormalities such as micrognathia, retrognathia, trismus, or significant malocclusion. The ASA Taskforce guidelines recommend that the presence of one or more of sedation-related risk factor, coupled with the potential for deep sedation will increase the likelihood of adverse, sedation-related events. In this situation, if the practitioner is not trained in the rescue of patients from general anesthesia, then an anesthesiologist should be consulted. The broad guidelines for seeking the assistance of the anaesthesiologist during these procedures are given (Table 2). The routine assistance of an anesthesiologist for average-risk patients undergoing standard upper and lower endoscopic procedures is not warranted and is cost-prohibitive.

Table 2

Guideline for anesthesiology assistance during gastrointestinal endoscopy

Anesthesiologist assistance may be considered in the following situations:

1. Prolonged or therapeutic endoscopic procedure requiring deep sedation
2. Anticipated intolerance to standard sedatives
3. Increased risk for complication because of severe co morbidity (ASA class III or greater)
4. Increased risk for airway obstruction because of anatomic variant

Recommendations

(Adapted from the American Society for Gastrointestinal Endoscopy)

1. Safety and monitoring should be part of a quality assurance programme for endoscopy units.
2. Resuscitation equipment and sedation reversing/ antagonist drugs must be available in the endoscopy room and recovery area.
3. Drugs and equipment necessary for the maintenance of airway, breathing and circulation should be present in the endoscopy room and recovery area and be checked regularly.
4. A qualified nurse trained in endoscopic techniques and resuscitatory techniques should monitor the patient's condition during procedures.
5. Staff of all grades and description should be familiar with resuscitation methods and undergo periodic re-training.
6. Prior to endoscopy, risk factors should be identified in both out-patients and in-patients.
7. Endoscopy is sometimes an emergency procedure, so high-risk patients should be resuscitated as much as possible before attempting the procedure.
8.
 - a) Dosage of benzodiazepines and opiates should be kept to a minimum to achieve sedation and should be within the manufacturers guidelines.
 - b) Opioids should, whenever possible, be given before benzodiazepines and their effect observed before proceeding.
 - c) Most endoscopic practices recommend that 5 mg of midazolam should usually be the maximum dose given and that elderly patients are given 1-2 mg initially with a sensible pause to observe effect. All sedated patients must have a flexible (not "butterfly") intravenous cannula in situ throughout the procedure and recovery period.
9. Oxygen should be given to all sedated patients and selected unsedated patients throughout the procedure and recovery period.
10. The endoscopist is responsible for the health and safety of the patient throughout the procedure and is not just a technician.
11. Pulse oximetry monitoring should be used in all sedated patients and ECG and blood pressure monitoring should be readily available for high risk patients.
12. Clinical monitoring must be continued into the recovery area.

13. Records of management outcome and adverse events should be taken as part of the patient plan and kept and used for audit of departmental practice.

Summary

Sedation in endoscopy is of prime importance for a smooth and successful completion of the procedure. This ensures not only the successful outcome of the procedure involved but also aids in safety of it. A focused history and physical examination of the patient is mandatory prior to sedation. Routine monitoring of vital parameters including ECG in selected cases may be helpful. The use of EtCO₂ in prolonged cases for measurement of carbon dioxide retention is of great benefit in reducing associated morbidity. The use of safe drugs like Propofol, Benzodiazepines and Fentanyl has been found to be preferred and assist in satisfactory outcome. It is mandatory that specific antidotes to these be available in the endoscopy unit to treat over sedated patients [15]. Dexmedetomidine offers beneficial pharmacological properties, providing dose-dependent sedation, analgesia, sympatholysis and anxiolysis without relevant respiratory depression. The side-effects are predictable from the pharmacological profile of α -2-adrenoceptor agonists. In particular, the unique sedative properties of dexmedetomidine resulted in several interesting applications in anaesthesia practice, promising benefits in the perioperative use of this compound. However, dexmedetomidine was approved for sedation in the Intensive care unit in the USA in 1999 and administration in anaesthesia practice remains an 'off-label' use. Further studies are needed to establish the role of dexmedetomidine in the perioperative period [16].

It is emphasized that when a patient undergoes procedure, no matter how minor it is, the anesthetics involved must not be taken lightly. There is minor procedure, but there is no such thing as a "minor anesthetic", as when we give potent anesthetics which can cause patient to slip into general anaesthesia or that may lead to cardio respiratory depression, that is not minor no matter how we look at it and is something very serious [17].

Conflicts of Interest

None identified

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