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Anesthesia in Endoscopic Procedures

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Abstract: ***During the last decade there has been an increase of gastrointestinal endoscopic procedures. Endoscopy (gastroscopy, colonoscopy, ERCP and related techniques) means the procedure where a flexible tube with a camera pass into the stomach and first part of the small bowel during gastroscopy and the large bowel during colonoscopy. The equip of anesthesiologists may be asked to provide anesthesia for procedure that require sedation, monitor anesthesia care (MAC) or general anesthesia. MAC is a type of anesthesia service during which a patient is typically still aware, but very relaxed. During endoscopy the patients are in a minimal, moderate or deep "procedural sedation" which allows the specialist to perform the procedure and aims patient's safety and comfort. The common medicines used for sedation are benzodiazepines as midazolam which act on the brain and SNQ and opioids as fentanyl which decrease the patient´s perception of pain, dexmetedetomidine , low dose ketamine or propofol. Propofol is ideally suited for endoscopy sedation because it is a short acting anesthetic induction drug but always is required greater level of monitoring.***

Keywords: endoscopy sedation, midazolam, propofol, fentanyl, monitoring

1. Introduction

As in all medial areas even in gastrointestinal endoscopy [gastroscopy, colonoscopy, endoscopic retrograde cholangiopancreatography (a technique that combines the use of endoscopy and fluoroscopy) and the techniques relating to them] have become normal procedures during the recent years. Gastrointestinal endoscopy once the biggest diagnostic procedure has evolved in therapeutic procedures, which are often performed on the same time. These procedures prevent the need for open surgery. Effective safety and sedation have become a major factor in the development of the therapeutic endoscopy. [1-3] Not all the patients require sedation during the endoscopy procedures, some of them agree to perform endoscopy procedures without sedation, a part of them light sedation and only a small part with anesthesia depending on the type and duration of the procedures, and the health situation of the patients.

Usually the patient has 3 dilemmas before the procedure;
1) Result of the examination (may I have cancer?),
2) Complications of the procedure
3) The most important question: How much I will feel the procedure? Will I have pain?

With modern sedation and careful monitoring, the majority of the patients are comfort during the procedures. Monitor anesthesia care (MAC) is a type of anesthesia service that continually monitor and supports patient vital functions, diagnoses and treats clinical problem that occur during endoscopic procedures, used sedatives, anxiolytic or analgesic if needed and converts to general anaesthesia if required. [3] MAC is known as a safe conscious sedation that minimize discomfort of patients through effective pain control and release satisfaction to the patient. [4]As we know MAC provides less physiologic disturbance, realized to insured titrated spontaneous breathing and airway reflexes through rapid recovery. The main priority is to avoid the central respiratory depression together with airway obstruction[5-10].

Before endoscopy

On the endoscopy day, before the procedure it would be better that the patient to be monitored by an anesthetist or a nurse trained for sedation, and monitor the conscience level, cardiopulmonary condition and the appropriate level of sedation. Before the procedure the anesthetist receives the medical history or preoperative evaluation, is informed for the cardio-vascular diseases, the respiratory situation including the respiratory condition, kidney and hepatic diseases and all hemorrhagic episodes. An important point is the rehydration of the patient through the intravenous line. [13] The anaesthesiologist shall be informed for all the used medicines and for the allergy agents of the patient. During this period the patient has the right to make any question regarding the sedation or the type of sedation that shall be applied. An intravenous cannula is placed on the forearm to provide the venous way for sedation or the monitor anaesthesia care.

During endoscopy

When the patient is at the examination cabinet, he is monitored. The monitoring helps to visualize the current situation of the patient and increases the patient's safety.

Also the patient is connected with the oxygen system to create and increase the oxygen reserves during breathing, a procedure that is currently standard for any endoscopy examination. The oxygen continues during the examination. When the patient is awake it may be aspirated into the mouth or throat if there are unnecessary secretions.

The monitoring of the patient is performed by the pulse oximetry that is the main monitoring during the last 15 (fifteen) years. It measures the different absorption of the red light and the infrared ones from hemoglobin oxygenation and de oxygenation. Cardio frequency and oxygen saturation are measured during examination. Any healthy patient shall have an oxygen saturation over 96% with room air. If the saturation fails the anesthetist shall take the measures to correct the situation and prevent an emergency.

Measuring the pressure and EKG monitoring is used for the patients with cardiac problems or geriatric patients. Intra operative monitoring should be effective, applicable, noninvasive and economic to prevention of respiratory depression.

Sedations and the anesthetic agents used in endoscopy.
In an ideal situation the patient shall be easily seduced, to have no pains, be cooperative, not to remember the procedure, and not to be anxious or afraid. It used intravenous drug alone or as supplemental of each other.

The characteristics of an ideal medicine for endoscopy include:

- Anxiolytic (reduces the anxiety)
- Amnestic (reduces the memory of the procedure)
- Analgesic (relieves pain)
- Quick action display
- Sedative expected effects depending on the dosage
- Patient safety in high dosages
- Painless in application and do not give irritation in the vein
- Immediate awakening without side effects

Any anesthetic agent does not have these characteristics. For endoscopy procedures today are used these groups of medicines in intermittent bolus, variable rate infusion, target controlled infusion and patient controlled sedation.

Benzodiazepines
These medicines cause sedation but have no effect on the pain. Original benzodiazepines used in endoscopy is diazepam, but because that diazepam plasma half life is assessed to be between 24 and 57 hours even the separating metabolites have sedative effect. This explains the difficult elimination and its elimination lasts until the next day and as consequence this is not used on daily procedures.

Another new sedation agent that currently is massively used is Midazolam. This benzodiazepines with a short effect is used for the amnestic effect during examination and the half life plasma of midazolam is about one tenth of diazepam and the separating metabolites live a little without sedation effects. The dosage varies from 1-10mg.

Midazolam has side effects which are very serious. Breathing is very important. Other side effects are nose swelling, redness, dizziness, anxiety, irritation, dream with open eyes and convulsive movements. [1,2,3,8,9,11,12]

Midazolam is not used for patients with myasthenia grave, with glaucoma and patients allergic to it.

During pregnancy does not cause malformations to the fetus but it is advised to be avoided during the first 3 months.

Midazolam is eliminated with lactation and shall be avoided at the mothers who breastfeed their child.

Dexmedetomidine
It today the gold choice, because is a central alpha-2 adrenergic receptor agonist, provides adequate sedation and analgesia with minimal respiratory depression. It acts primarily on the sleep pathway and does not inhibit the activity of the orexinergic neurons, which is the basis of its arousable sedation. [5,6,7,10,11] Moreover it has sympatholytic action which not only decreases the stress response to surgery but also the surges in heart rate and blood pressure. It ensured modest sedation, rapid offset, profound postoperative analgesia , profound anti-ischemic properties and it is reversible very fast with dose 0.2-1mcg/kg/hr IV.

Opioid
Is used as an analgesic. Opioids with short fentanyl or non fentanyl effect are often used in combination with midazolam. The fentanyl effects lasts 30 minutes. The most important side effect is the depression of breathing. The normal dosage for adults is 1-1.5 ug/kg with smallest usage dosages at geriatric and patients with renal and hepatic insufficiency[3,5, 6,9,11]. During pregnancy it does not create malformations to the fetus but it is advised to be avoided during the first 3 months of pregnancy. Fentanyl is not eliminated with lactation but shall be avoided at the mothers who breastfeed their child.

Ketamina
Low-dose ketamine provides weak sedation but suficcience analgesia. It has a good effect on hemodynamic stability. Emergence delirium is yet a problem. Using low doses ketamine causes a higher incidence of PONV and prolonged it effect with higher dosage. Combining midazolam or propofol with ketamine reduces PONV, but increases the respiratory adverse events. One study identified adverse events in 17% of pediatric patients receiving procedural sedation. Fortunately, most of the adverse events are self-limiting or easily controlled, indicating reasonable level of safety.[12]

Propofol
Propofol is an induction medicine in anesthesia with short acting. Because of the quick action and the quick awakening period it is ideal for the endoscopy procedures. Propofol amplifies the sedative effects of the other analgesic and hypnotic agents. Its dose is 6-9 mg/kg/hr ,depended according to their condition of the patient. Propofol causes pain in 30% of the patients in the injection area, but it passes within one minute. Propfol is not used during pregnancy[2,3,11,12,13]. Propofol shall be avoided at mothers who breastfeed the child.

Awakening from sedation
Normally the sedation is gradual and entertaining. Their antidotes are used only in emergency situations. Flumazenil is used as a benzodiazepines antidote and acts within the second. Naloxone is an opioid antidote[3,11,12,13].

2. Summary

Sedation during **MAC** may be considered safe because less drugs are typically administered due to its cost-effectiveness and rapid recovery. However, the application of sedatives and analgesics should be titrated carefully after monitoring the patient's level of consciousness and hemodynamic value to avoid central respiratory depression and airway obstruction, since the airway of the patient is not secured during **MAC**. It should be chosen as a proper anesthetic alternative after patient co-morbidities and preferences in all

the type of endoscopic procedures. The choice of sedative and analgesic is based on the required depth of sedation and analgesia of each procedure. The presence of a sufficiently experienced anesthesiologist, as well as oxygen supply, monitoring devices and emergency equipment, are required during MAC both in and outside the operating room. Future research comparing different sedation techniques, particularly in pediatric and geriatric population may reveal our answer.

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