SECOND EDITION

INTRODUCTION TO FLEXIBLE BRONCHOSCOPY

Moderate Sedation Synopsis

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THE BRONCHOSCOPY EDUCATION PROJECT SERIES

MODERATE SEDATION SYNOPSIS

A Learning guide

The purpose of this synopsis is to provide learners with principles pertaining to the use of moderate sedation during flexible bronchoscopy. While many institutions have regulations and protocols, others are without a formal progam of instruction in these area.

Inappropriate use of medications severely affects patient safety. Many bronchoscopy-related complications are caused by sedation errors , including respiratory failure and even death. In addition to using the Moderate Sedation checklist (available in the Checklists Module on www.Bronchoscopy.org) the information in this synopsis should be mastered by all those using sedating agents in their practice.

We recommend at least ONE formal session during which an interactive, didactic lecture on Moderate Sedation be provided after learners review the content of this synopsis and other reading material. The checklist can be reviewed during separate sessions and during the course of day-to-day procedural training.

MODERATE SEDATION

SYNOPSIS

The purpose of this synopsis is to provide the reader with a brief overview of moderate sedation as it might apply to flexible bronchoscopy. It is assumed that institutions and practitioners have different biases and regulations. Herein a short summary is provided so that beginner bronchoscopists might acquire at least some of the elements necessary for a safe procedure. Readers are encouraged to follow guidelines and protocols established in their own institutions.

Definitions

- Moderate sedation may be produced by the use of intravenous, oral, transmucosal or intramuscular narcotics, sedatives or anxiolytic medications
- Moderate sedation is a medically controlled state of depressed consciousness that allows protective reflexes to be maintained, while retaining the patient's ability to maintain a patent airway independently and continuously. This implies that the patient is mildly drowsy but arouses to voice easily. This is to be distinguished from
- Deep sedation, where the patient is arousable only by vigorous stimulation and may lose the ability to maintain airway patency and protection.

ASA Classification

- ASA 1: normal and healthy patient
- ASA 2: Mild controlled systemic disease and no functional limitation
- ASA 3: Moderate to severe systemic disease that limits activity.
- ASA 4: severe systemic disease that is a constant threat to life or is functionally incapacitating.
- ASA 5: Moribund and not expected to survive without surgery

Equipment

- Informed consent for sedation should be obtained in addition to consent for the procedure.
- Oximetry
- Ability to monitor the patient for vital signs, airway patency, degree of wakefulness.
- Electrocardiogram
- Intravenous access
- Rescue equipment for any patient moving into deep sedation, including crash cart and defibrillator
- Appropriate size endotracheal tubes and ability to ventilate patient (including self-inflating Ambu-bag and mask system) should be available.
- Reversal agents for narcotics and benzodiazepines
- Charting should include baseline ventilatory, hemodynamic, neurologic status, time of administration of medication, dose administered, type of medication used, physical examination, informed consent, allergies, nothing to eat 8 hours prior to the procedure (except for clear liquids and medications, up to four hours prior to procedure).
- Ability to monitor patient status at least every 15 minutes during the procedure and for a minimum of thirty (30) minutes after the procedure and/or until patient returns to baseline status, including pulse oximetry equal or greater than 92% on room air, or assured with supplemental oxygen if patient on oxygen.

- Following administration of reversal agents such as naloxone, patient should not be discharged for a minimum of one (1) hour, and flumazenil two (2) hours.

Potential contrandications

- Uncooperative patients
- Mentally ill patients
- Severe cardiac, pulmonary, hepatic, renal or central nervous disease
- Pregnancy
- Morbid obesity
- Alcohol or drug abuse
- History of sleep apnea

High risk patients

- Previous problems with anesthesia or sedation
- Previous surgery or radiation or injury to neck or face
- Stridor, snoring, or sleep apnea
- Dysmorphic facial features
- Advanced rheumatoid arthritis
- Significant obesity, protruding teeth
- Small mouth opening (<3cm in adults), macroglossia, non-visible uvula, tonsillar hypertrophy, short neck, limited neck extension, decreased hyoid-mental distance (<3cm in adult).

Response to complications

- Ability to rotate patient onto lateral decubitus position in case of vomiting.
- Ability to insert a nasal trumpet
- Ability to perform chin lift/neck extension in case of obstructed airway
- Oral suction should always be available
- Ability to establish a safe and patent airway, and provide hemodynamic and circulatory support in case of compromise.

Specific medications

- *Midazolam* (Versed) is currently the most widely used agent for moderate sedation and anxiolysis. It is a water-soluble benzodiazepine with rapid onset of action. It is four times more potent on a mg per mg basis than

    - When administered intravenously, sedation and anxiolysis usually occurs within 2 minutes. Complete recovery of motor performance and consciousness occurs within one hour in most individuals.
    - Combining Midazolam and opioides increases the incidence of apnea. Large doses can produce prolonged drowsiness and cardio-respiratory arrest. Central nervous system dysfunction, including confusion and seizures can be seen in patients with brain metastases and paraneoplastic syndromes.
    - Ventilation is depressed by 0.15 mg/kg, especially in patients with COPD. The peak effect of respiratory depression occurs at three minutes following injection and remains for approximately 15 minutes. It can be most pronounced in geriatric and COPD patients.
- *Fentanyl* is a synthetic opiate analog that is structurally different from morphine or meperidine. It is 100 times more potent than morphine. The usual adult dose is 50-100 micrograms. Given intravenously, its onset of action and maximum respiratory

depression effect occurs about 5-10 minutes after administration, and lasts 30-60 minutes.

- O Given intramuscularly, the onset of action is within 7-15 minutes with duration of action lasting up to two hours.
- O Fentanyl should never be used in patients receiving MAO inhibitors because of increased risk of respiratory depression and coma.

• *Combination drugs*. Sedative responses are increased in patients who have received opioides or other benzodiazepines. Level of sedation and risk for respiratory depression are increased in the elderly and in patients with pre-existing respiratory dysfunction.

• *Reversal agents*:

- O Naloxone is a pure opiate antagonist that reverses all effects and side effects of opiates.). The initial dose is 0.1-0.2 mg IV, SQ, IM or via endotracheal tube and can be repeated every 2 minutes. The onset of action is about 30 seconds. Actually, no more than 0.4 mg should be administered because this might lead to increased activity of the sympathetic nervous system from acute termination of analgesia. Consequently, patients may develop hypertension, dysrhythmias, and pulmonary edema.
- O Flumazenil is a benzodiazepine antagonist that should be administered (0.2 mg IV over 15 seconds, then repeated every minute up to a maximum of 1 mg). Low doses of Flumazenil will reliably reverse sedation within 2 minutes, but higher doses are needed to reverse benzodiazepine-related anxiolysis. Duration of action is about 60 minutes. Side effects include nausea, vomiting, tremors, seizures, tears and dizziness. Contrary to naloxone, it does not cause hemodynamic instability.

Dosing guidelines

• *Midazolam* single dose 1 mg IV, onset of action 1-2.5 minutes, total dose 5 mg
• *Lorazapam* single dose 2 mg IV, onset of action 20-30 minutes, total dose 4 mg
• *Morphine* single dose 2-4 mg IV, onset of action 1-5 minutes, total dose 10 mg
• *Fentanyl* single dose 50 mcg IV, onset of action 1-5 min, total dose 100 mcg

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