The Use of Dexmedetomidine for Rigid Bronchoscopy: A Case Report

Sherwin Pascual, MD; Zenaida M. Mariano, MD, DPBA; Victoria C. Idolor, MD, DPBA and Stephanie Balaoing, MD, DPBA

The use of rigid bronchoscope for airway management in endobronchial tumors mandates the provision of effective and safe sedation. The drug to be used must not aggravate the existing compromised pulmonary condition of the patient. Dexmedetomidine is a novel drug for sedation. The objectives of this report are to present a unique therapeutic approach in sedating a patient with dexmedetomidine for rigid bronchoscopy in the removal of tumors in the airway; and to discuss the anesthesia technique and complications related to rigid bronchoscopy.

A 37 year old male was admitted because of increasing severity of dyspnea with chest heaviness and productive cough. He was diagnosed to have mucoepidermoid carcinoma of the left main bronchus and biopsy revealed non-small cell carcinoma. Rigid bronchoscopy, coring of left bronchus mass and application of stent was done. Anesthetic technique was total intravenous anesthesia (TIVA) using dexmedetomidine. Postoperative chest x-ray showed pneumothorax of the left lung. CTT was done.

Conclusions: Dexmedetomidine can provide adequate sedation for rigid bronchoscopy. Its additional properties like analgesia and respiratory-sparing effect make it the drug of choice for patients with compromised airway undergoing thoracic surgery.

Key words: dexmedetomidine, rigid bronchoscopy

INTRODUCTION

There are various options to approach the airways. But when the surgical procedure is targeted on the airways, the dilemma is how to effectively and safely anesthetize the patient without interfering with the surgical field. The technique of choice is TIVA when inhalational anesthetics cannot be administered successfully and safely for surgeries such as endobronchial procedures using rigid bronchoscopy. It is a procedure which uses a rigid bronchoscope consisting of a long, hollow metal tube and special optics. It is passed through the mouth into the lungs for inspection and removal of tumors in the airway. The use of rigid bronchoscope usually brings about issues regarding the anesthesia technique and complications related to its use. Fiberoptic examination of the bronchus requires a drug that will not further worsen his compromised pulmonary condition. Presently used drugs for sedation such as benzodiazepines, propofol and narcotics are limited by the occurrence of respiratory depression. Dexmedetomidine is a highly selective alpha-2 adrenoreceptor agonist with hypnotic, sedative anxiolytic, sympatholytic, analgesic properties and does not produce significant respiratory depression. It does not cause respiratory depression even in deep levels of sedation and high doses. It has also been used as an effective agent for ICU sedation and analgesia.

Aside from sedation in the ICU, dexmedetomidine has other clinical applications in neurosurgery, pediatric procedural sedation, awake fiberoptic intubation, cardiac surgery, and bariatric surgery. Off-label use
of the drug showed that it has analgesic-sparing effects with the ability to decrease the requirements for anesthetic and opioid in the perioperative period.\(^\text{10}\)

**Complications-Related to Rigid Bronchoscopy**

It is essential for the anesthesiologist to understand the risk associated with the procedure. Most of the potential complications of rigid bronchoscopy can be avoided. These are injury to the teeth or gums, tracheal or bronchial tears, hypoxemia or severe bleeding. Preoperative laboratory examinations can give a clue as to the bleeding profile of the patient. The use of a pulse oximeter intraoperatively readily warns of impending hypoxemia.

The objectives of this report are to present a unique therapeutic approach in sedating a patient with dexmedetomidine for rigid bronchoscopy in the removal of tumors in the airway and to discuss the anesthesia technique and complications related to the procedure.

**THE CASE**

A 37 year old male was admitted in the pulmonary ward because of increasing severity of dyspnea with chest heaviness and productive cough. Patient was tachypneic with asymmetrical chest expansion. Physical examination showed decreased breath sounds and decreased vocal/tactile fremitus on the left lung field. Chest x-ray revealed atelectasis of the left lung field. ABG was partially compensated respiratory acidosis with mild hypoxemia. All other laboratory examinations were normal. Fiberoptic bronchoscopy with bronchial biopsy and washing was done. Bronchial washing showed mucoepidermoid carcinoma of the left main bronchus and biopsy revealed non-small cell carcinoma. There was progressive dyspnea with episodes of hypoxemia. ABG revealed mild hypoxemia with adequate oxygenation. CT scan showed large mediastinal mass extending to the left main stem bronchus.

Patient was then scheduled for rigid bronchoscopy, coring of left bronchus mass and application of stent. Anesthetic plan was total intravenous anesthesia (TIVA).

Patient was classified as ASA II and Mallampanti Class 1. The patient was received in the OR, fully awake, not in distress with the following vital signs: BP - 120/80mmHg, HR - 90’s/min, RR - 22/min and \(\text{SPO}_2\) - 98-99% at 2 LPM nasal cannula. The following parameters were monitored: vital signs and oxygen saturation.

Dexmedetomodine was started at 2ug/kg/hr. Vital signs were BP: 110/70mmHg, HR: 90/min, RR: 20/min, \(\text{SPO}_2\): 99-100%. Induction was done with the administration of intravenous (IV) Fentanyl 25 microgram, Midazolam 0.5mg and Thiopental 200mg. Mask ventilation with 100% oxygen was done. Once surgical plane was reached, the patient was intubated with the rigid bronchoscope and inspection of the airway was done. Ventilation was initiated via the side port of the rigid bronchoscope with intermittent oxygen delivery. Coring out of the tumor in the left mainstem bronchus was started. Vital signs were BP: 110-120/70-80mmHg, HR: 90/min, \(\text{SPO}_2\): 100%. Intraoperatively, patient was given Lidocaine 50 mg IV for the occasional PVCs and Atropine 0.5mg IV for the increased secretions. Patient was maintained on Atracurium 10mg IV every 20 mins with a total dose of 50mg. Surgery lasted for two hours. Patient was spontaneously breathing five minutes prior to the end of the surgery. ABG was respiratory acidosis. Vital signs were BP: 110-120/70-80mmHg, HR: 90/min, \(\text{SPO}_2\): 100%. The use of a pulse oximeter intraoperatively readily warned of impending hypoxemia. Intraoperatively, there was appearance of PVCs which resolved with the administration of lidocaine.

Postoperative pain management included mefenamic acid 500mg tab every six hours; and tramadol 50mg IV for pain scores of four and above. Repeat chest x-ray showed pneumothorax of the left lung. CTT was done. Ketorolac 30mg IV was given after the procedure.

On the first postoperative day, patient was conscious, coherent, comfortable, not in distress with the following vital signs BP: 132/86mmHg, HR: 85/min, RR: 19/min \(\text{SPO}_2\): 100%. Repeat chest x-ray revealed that the lungs are fully expanded with hazy infiltrates on the left lower lobe. Patient was transferred to the ward. He was referred to the Oncology service.
DISCUSSION

Proper airway maintenance is one of the primary concerns during anesthesia. Intubation with an endotracheal tube (ETT) guarantees safe airway management and adequate ventilation for the anesthetized patient. But some surgical procedures in the airway may not allow the use of an ETT and only permit ventilation through an accessory port of a rigid bronchoscope. This scenario constitutes the greatest challenge for the anesthesiologist. Intubation with the rigid bronchoscope must take into consideration the following - anesthesia technique and complications related to the procedure. Rigid bronchoscopy is an invasive procedure for visualization of oropharynx, larynx, vocal cords and tracheal bronchial tree to diagnose and treat lung disorders. It remains to be the procedure of choice for removing obstruction in the airway such as thick mucus foreign body and tumor.

In most cases, rigid bronchoscopy requires general anesthesia. Although anesthesiologists often prefer the use of TIVA which avoids the use of potentially noxious gases. The combination of TIVA and assisted spontaneous ventilation is currently the most frequently used anesthesia technique for rigid bronchoscopy. Recent literatures recommend general anesthesia with adequate sedation and muscle relaxants for this procedure. In our patient, adequate sedation and muscle relaxation were provided to ensure patient's comfort and optimal surgical condition.

Dexmedetomidine is associated with decreases in HR due to its sympatholytic effects and vagal mimetic effect. There were no episodes of bradycardia and hypoxemia intraoperatively in our patient. There was also no respiratory depression. In a similar report, Bergese, et al. showed that the use of Dexmedetomidine in four patients with difficult airways for awake fiberoptic intubation provided moderate level of conscious sedation without causing respiratory distress or hemodynamic instability during the procedure.11 In another report by Kuroda, et al. they showed in two cases where one is for placement and the other one for removal of a tracheobronchial Dumon stent that dexmedetomidine provided adequate sedation, amnesia and analgesia with low respiratory depressant effect.12

Adequate sedation for our patient who presented with dyspnea, occasional episodes of hypoxemia and a tumor on the left mainstem bronchus requires a drug that will not further worsen his compromised pulmonary condition. A rare but serious risk is pneumothorax which leads to collapse of the affected lung. Complication rates are < 0.1%. Procedure-related mortality is very low. Post-surgery chest x-ray revealed pneumothorax of the left lung in our patient. This was immediately treated with the insertion of CTT. The lung expanded and on the 4th POD, the CTT was removed and the patient discharged as improved.

CONCLUSION

We conclude that dexmedetomidine can provide adequate sedation for rigid bronchoscopy. Its additional properties like analgesia and respiratory-sparing effect make it the drug of choice for patients with compromised airway undergoing thoracic surgery.

RECOMMENDATION

Recent literatures, mostly case reports, have described dexmedetomidine as a useful adjunct in both regional and general anesthesia, effective substitute for opioids and with minimal or absent respiratory depressant effect.13 We recommend that large-scale randomized controlled trials will be done. We further recommend that thorough understanding of the pharmacokinetic and pharmacodynamic of this drug is essential to guide the anesthesia provider on the use of dexmedetomidine as an adjunct or as a sole agent.

REFERENCES


