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Case report

Sedation for linear endobronchial ultrasound☆

Inmaculada Benítez Linero[a,*], *Juan Luis López Romero*[b], *Ignacio Rodríguez Carretero*[a]

[a] *M.D. Specialized in Anesthesiology and Resuscitation, Department of Anesthesiology, Resuscitation and Pain Therapy, General Hospital, Virgen del Rocío University Hospital, Seville, Spain*
[b] *Head of the Department of Anesthesiology and Resuscitation, Department of Anesthesiology, Resuscitation and Pain Therapy, General Hospital, Virgen del Rocío University Hospital, Seville, Spain*

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ABSTRACT

Introduction: Endobronchial ultrasound is a new diagnostic technique for the detection of lung cancer. The technique enables a fine needle aspiration of mediastinal and hilar adenopathies to help stage the pathology. This is a minimally invasive technique performed under conscious sedation and does not require admission.
Objectives: Presenting a clinical case using this new diagnostic technique and illustrate the anesthetic management outside the operating room.
Material and methods: Presentation of the clinical case.
Conclusions: The main objective of sedating the patient undergoing the procedure is proper analgesia and total patient immobility, while maintaining hemodynamic and respiratory stability. The anesthetist should provide maximum comfort and safety to the patient, facilitating the work of the physician doing the exploration. Communication between the two specialists is of essence.

Sedación para la realización de ecobroncoscopia lineal

Palabras clave:
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RESUMEN

Introducción: La ecobroncoscopia es una nueva técnica diagnóstica en la detección del cáncer de pulmón. Permite realizar la punción aspirativa con aguja fina de adenopatías mediastínicas e hiliares lo que ayuda a determinar el estadío de la enfermedad. Es una técnica mínimamente invasiva que se realiza bajo sedación consciente y que no requiere ingreso.
Objetivos: Presentación de un caso clínico en el que se emplea esta nueva técnica diagnóstica y exposición del manejo anestésico fuera del área quirúrgica.
Material y métodos: Exposición del caso clínico.
Conclusiones: El principal objetivo de la sedación durante la realización de esta prueba es la correcta analgesia acompañada de la inmovilidad completa del paciente, todo esto manteniendo la estabilidad hemodinámica y respiratoria. El anestesiólogo debe proporcionar

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* *Corresponding author at*: C/Faustino Álvarez n° 21, piso 2° A. 41002 Sevilla, Spain.
E-mail address: ibl000@hotmail.com (I. Benítez Linero).

al paciente el mayor confort y seguridad posibles, facilitando la labor del médico explorador. La comunicación entre especialistas es fundamental.

Introduction

A new technique is now available for Lung cancer staging: endobronchial ultrasound, a procedure for quick lung cancer diagnosis and staging of the disease.

Endobronchial ultrasound enables visualization beyond the limits of the bronchial wall and guidance of the fine needle aspiration biopsy of mediastinal and hilar adenopathies. Two methods are available: radial endobronchial ultrasound which provides orientation without guiding the aspiration in real time; and the linear which does direct the needle path under direct ultrasound vision. Radial endobronchial ultrasound was the first technique used to approach the mediastinum using ultrasound and it has been replaced by linear or sectorial ultrasound because of the potential to puncture the structures adjacent to the bronchial wall, under direct visual control in real time.[1,2]

The main indications for linear endobronchial ultrasound are staging and restaging of mediastinal lymph nodes, the study of adenopathies suspicious for lymphoma or sarcoidosis and the diagnosis of intrapulmonary tumors adjacent to the central airway, that may be accessible to needle aspiration using this technique.[2,3]

Advantages: This is a minimally invasive technique done in real time. It has 85–96% sensitivity, does not require general anesthesia but simply conscious sedation and is an outpatient procedure because the patient does not need to be admitted. Complications are rare and bleeding is one of them; however, bleeding is more frequent in the conventional technique – needle aspiration with no ultrasound – doing the procedure with real time visualization prevents large vessel puncture.[2]

It does require sedation of the patients undergoing the procedure for maximum profitability of the study at the lowest possible risk, in addition to providing comfort and calmness to the patient.

Clinical case

A 56-year-old male, with no known allergies, smokes 20–30 cigarettes per day and a history of chronic obstructive pulmonary disease (COPD) visited our clinic. The patient was admitted with a diagnosis of pneumonia and imaging tests were done, including:

- Chest X-ray: left lower lobe condensation and enlargement of the mediastinum mainly at the expense of the left hilum and blurring of the costodiaphragmatic sinus on the same side.
- Chest ultrasound: left and subcarinal paratracheal mediastinal adenopathies, in addition to alveolar infiltrate at the level of the basal segments of the left lower lobule.
- Sputum culture: *H. influenza* was isolated.
- Fibrobronchoscopy: no findings. Transtracheal specimens were harvested (fine needle aspiration biopsy) and were negative.

With these findings, the decision was made to proceed to an ultrasound-guided fibrobronchoscopy under sedation in order to sample the mediastinal adenopathies. An anesthesiologist is required for this procedure.

The technique is administered under local anesthesia and sedation; an oropharyngeal cannula is placed at the buccal level to preserve the patency of the line and facilitate going through the vocal folds, inserting the ultrasound bronchoscope through the mouth.

The patient is monitored with five-leads electrocardiogram, pulse oximetry and non-invasive arterial pressure monitoring. No neurological monitoring was done because depth of anesthesia monitoring (Bispectral Index) which is usually done in the OR, is not available in the diagnostic rooms that are distant from operating area.

A peripheral catheter is placed and the patient is premedicated with midazolam 3 mg and atropine 0.7 mg as antisialogogue. An oropharyngeal tube is placed for inserting the ultrasound bronchoscope through the mouth. Simultaneously, an external oxygen source is connected at 2–3 l/min. IV remifentanil is started at around 0.08–0.13 μg/kg/min and propofol 2–4 mg/kg/h; the perfusion dose should be raised when the stimulus and pain increase maintaining the vital signs within the normal limits.

The test was successfully accomplished and with fast recovery of patient's awareness. The patient was discharged at the end of the usual surveillance period. The analysis of the samples collected provided the final diagnosis of stage IIIA non-small cell lung adenocarcinoma. The decision was made to administer chemotherapy and assess future surgical resection.

Discussion

Sedation provides an adequate balance between the patient's comfort and safety during certain diagnostic and therapeutic procedures. Linear endobronchial ultrasound is one of these procedures. The need to get the patient's cooperation and total immobility means that the anesthetist has to be present. Patient selection, adequacy of the procedure and proper location are all key elements that contribute to the safety of anesthesia outside the operating room.[4]

The primary objectives of conscious sedation include adequate sedation with minimal risk, absence of anxiety, amnesia and protection against pain and noxious stimuli. It requires careful dosing of the analgesics and sedatives and proper monitoring of the cardiovascular and respiratory systems, in addition to effective communication with the surgeon of the doctor doing the exploration. Short acting drugs and drugs

that can be titrated are the most appropriate agents; i.e. remifentanil and propofol.[4]

Remifentanil is an ultra-short acting opiate metabolized by plasma and tissue stearases into non-active metabolites that results in a predictable effect not influenced by the length of administration[5]; side effects frequent with other morphine-like agents are only present when used at high doses. Some of their key advantages are the rapid onset and fading of their clinical effects (peak effect if obtained at 90–120 s in the receptor, and the analgesic plasma concentration if 0.5–1.5 $\mu g\,ml^{-1}$). This makes them particularly useful for sedation-analgesia techniques.[6]

The adequate control on hemodynamic, somatic or autonomic responses during the procedure should also be stressed; it has also been associated with minimal catecholamine response to surgical stress. Furthermore, the higher infusion rate at times of maximum painful stimulus is not accompanied by a longer recovery time; this makes it most appropriate for outpatient procedures.[6]

The combination with midazolam or propofol has the potential of reducing the remifentanil infusion rate.[7] The association of remifentanil, midazolam and propofol could be interesting because of midazolam's amnesic effect, remifentanil's analgesic effect and propofol's hypnotic/antiemetic effect for all those diagnostic and therapeutic procedures that require the patient's immobility and during which there are certain specific points in time – frequently predictable – of painful stimuli. The speed of remifentanil's action allows for adapting the dose at times of pain and during the rest of the procedure, and the low infusion rates minimize any side effects.

The use of sedation for this procedure provides a smooth induction, keeping a constant drug concentration at certain time periods and allowing for rapid and precise dose changes while in the end results in quick recovery of the autonomic functions.

In addition to the above-mentioned advantages, intravenous sedation of patients undergoing endobronchial ultrasound is associated with high satisfaction,[8] which is an indicator of quality of healthcare provided at an institution.[9]

Conclusions

Having a specialist in anesthesiology and resuscitation on board when performing this type of procedure is increasingly more frequent. The anesthetist is expected to administer profound sedation, proper analgesia and patient immobility, while maintaining hemodynamic and respiratory stability in a hostile environment that is usually unfamiliar to the anesthetist. Hence, the anesthesiologist must be thoroughly prepared for this type of procedures in order to ensure maximum patient safety.

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Conflicts of interest

The authors declare not having any conflicts of interest.

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