



Case Study

Broncopulmonary Lavage through Double Lumen Endobronchial Tube For Re-Expansion of Collapsed Lung Due to Mucus Plug

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ABSTRACT

In this study we describe management of patients with lung collapse due to mucus plug causing weaning difficulty even after the basic pathology is reduced. Here we described a simple bed side procedure bronchopulmonary lavage with help of double lumen endobronchial tube to remove mucus plug.

Aim: *Mucus plug removal with help of bronchopulmonary lavage through endobronchial tube lavage in cases with lung collapse due to mucus plug in airways.*

Subjects: *A prospective study was conducted on 22 patients with unilateral lung collapse due to mucus plug for 36 months duration, from January 2012 to December 2015 in 1000 bedded tertiary centre with 12 bedded ICU.*

Keywords: *Endobronchial Lavage, Double Lumen Endobronchial Tube, Lung Collapse, Mucus Plug, Weaning Difficulty, Chest Physiotherapy.*

INTRODUCTION

One of the causes of lung collapse in intubated patients is mucus plug in the airway. In spite of routine taken to drain lung secretions sometimes severe mucus plugging can still persist, further causing hypoxia, weaning difficulty, infection and high morbidity. ^(1,2) In such cases most of the times bronchoscopy is used to remove mucus plug, but bronchoscopy needs a trained personnel and equipment, which may not be accessible round the clock. In this study we describe simple bed side procedure to remove mucus plug from airways i.e. Endobronchial lavage with help of double lumen Endobronchial tube.

MATERIALS AND METHOD

STUDY DESIGN: After approval from hospital ethics committee, a prospective study of 22 patients was carried out for 36 months period, from January 2012 to December 2015 in 12 bedded multi speciality ICU.

Inclusion Criteria

Patients of both gender with age >18 years

Intubated patients with clinical and radiological evidence of lung collapse

Clinical: on auscultation decreased breath sounds on collapse lung Increased respiratory rate, decrease in oxygenation (spo₂, pao₂)

Radiological evidence: On chest X ray unilateral homogenous opacity with crowding of ribs. (in spite of endotracheal tube in correct position)

Exclusion Criteria:

Age <18 years Collapse due to endobronchial intubation (misplacement of tube) Patients with Ventilator associated pneumonia, lung trauma, tracheal wall growths like carcinomas.

In patients with unilateral lung collapse due to mucus plug, bronchopulmonary lavage was done with 0.9 %normal saline mixed with acetycystine via double lumen endobronchial tube as follows

Left sided lung collapse: Right Double lumen endobronchial tube was inserted, normal saline and Acetylcystine was injected into left bronchus, physiotherapy was done in right lateral position and suctioning of left bronchus was carried out through suction catheter.

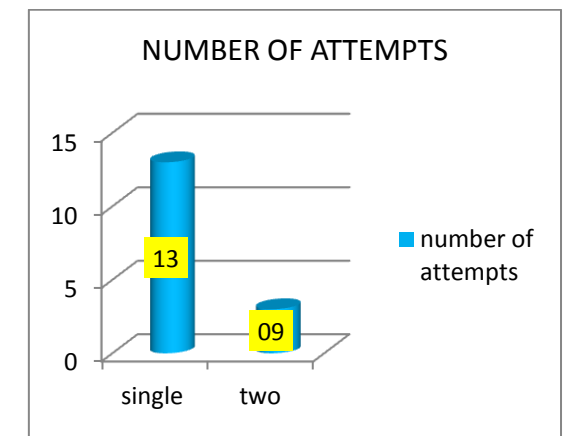
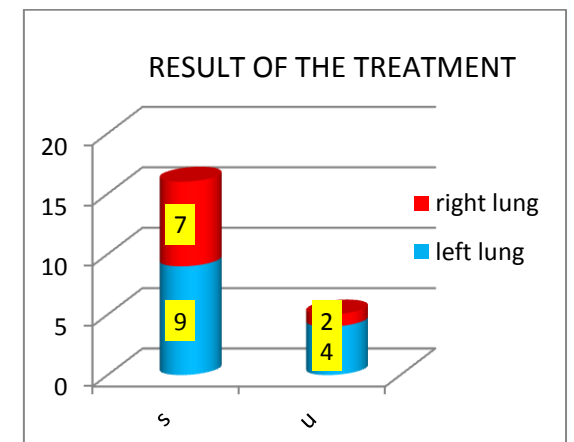
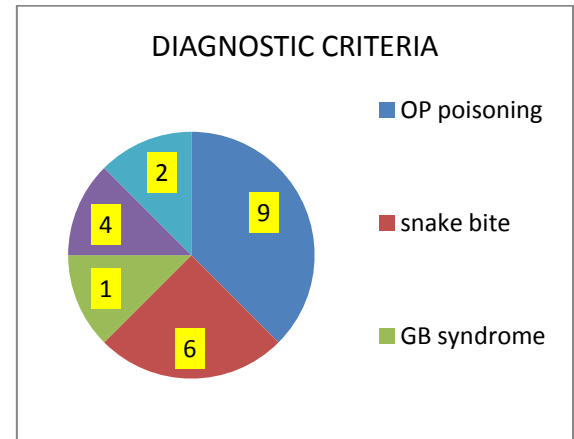
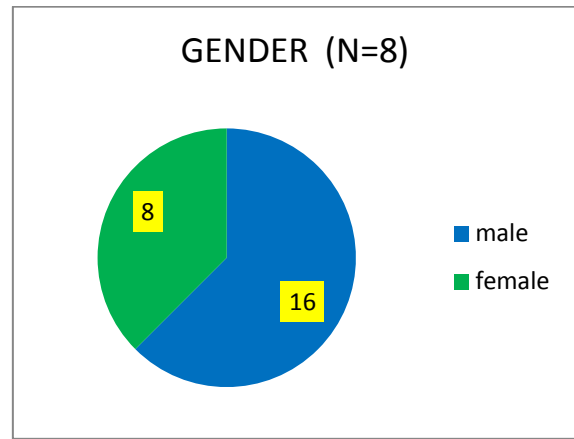
Right sided lung collapse: left Double lumen endobronchial tube was inserted, normal saline and Acetylcystine injected into right bronchus, physiotherapy was done in left lateral position and suctioning of right bronchus was carried out through suction catheter.

If first attempt was unsuccessful, maximum of 2 attempts were given with gap of 4 hours.

Pre and Post endobronchial lavage clinical examination, ABG, chest x-ray were compared.

RESULTS

In this study of 22 patients 16 patients were males and 8 were females. Among 22 cases 9 patients were organo-phosphorus poisonings, 6 were neurotoxic snake bites, 4 were asthmatic, 2 was post abdominal surgery case, and 1 was GB syndrome case. 16 out of 22 patients were treated successfully with Double lumen endobronchial tube and endobronchial lavage, they recovered (clinically, ABG wise, chestx-ray wise) and were weaned off from ventilator. Among those 22 cases, 9 cases – right lung collapse and 13 cases- left lung collapse. Out of 6 unsuccessful cases, 2 cases were with right lung collapse and 4 with left lung collapse. These 6 cases were later treated with bronchoscopy.





CXR: Pre bronchopulmonary lavage left side lung collapse



CXR: post bronchopulmonary lavage.

DISCUSSION

Respiratory secretions are derived from the sub-mucosal tracheobronchial glands and epithelial goblet cells. They are mixture of water, protein, glycoprotein, lipid and salt. Advantages of respiratory secretions: (a) Antibacterial (b) Acts as humidifier (c) clearance of particulate matter deposited within respiratory tract. These secretions are continuously cleared by airflow, ciliary movements and coughing. ICU patients especially ventilated and comatosed patients are at

high risk of mucous plugging in the airways due to ineffective cough reflex, decrease mucociliary clearance and drying up of secretions. ^(1,2)

Secretions management in mechanically ventilated patients includes regular ET suction, chest physiotherapy, nebulisation with mucolytic agents and postural drainage, humidification of inspired gases. ^(3,4) In spite of taking routine measures sometimes there may be severe mucous plugging which may lead to worsening of gas exchange, increase in inspiratory pressure, infectious complication and high morbidity. ⁽⁵⁾

Significant lung collapse due to large mucus plug occluding major airways have been described in many studies and diseases such as cystic fibrosis, bronchiectasis, asthma etc. ⁽⁶⁾

Fibre optic bronchoscopy and bronchoalveolar lavage are indicated in lung collapse due to mucous plug to achieve lung expansion. ^(2,7) In case report by M shafiq and Ahmed khan authors describe bronchopulmonary lavage using small size ET tubes to clear mucous plug. ⁽²⁾ In koumbourlis and Kurland non bronchoscopic, bronchoalveolar lavage performed via a nasogastric tube in fifteen infants with lung atelectasis. ⁽⁸⁾ Some other authors Bowen, Millen advocate use of insufflations method. ^(9,10)

In this study we describe bronchopulmonary lavage through double lumen endobronchial tube. Endobronchial tube was chosen over ET tube because unaffected lung can be ventilated while performing bronchopulmonary lavage of collapsed lung. These endobronchial double lumen tubes are designed specifically according to anatomy. After bronchopulmonary lavage 0.9% Normal saline mixed with 200 mg N-acetyl cysteine was used. N- acetyl cysteine is used in view of its mucolytic property.

This study was conducted on patients with Clinically and Radiologically evidence of unilateral lung collapse due to mucus plug i.e., in spite of endotracheal tube in normal position tracheal deviation to ipsilateral side, homogenous opacity on collapsed side, clinically decreased breath sounds. In Patients with above criteria endobron-

chial lavage was performed, pre-lavage and post-lavage clinical and radiological parameters were compared. Most of the patients improved and were weaned off from mechanical ventilator.

Cases which were not successfully treated with endobronchial lavage, were treated with bronchoscopy. Here it was found that the mucus plug was not in main bronchus but in terminal small bronchioles where the suction catheter could not be passed.

Though procedure requires skilled personnel, this can be used if bronchoscopy is not available or in patients who were not fit for bronchoscopy.

LIMITATIONS

A few limitations of this study must be acknowledged. As this is a small case series, no statement of association or predictive ability can be made and placement of endobronchial tube needs skill.

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