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ABSTRACT

A 12 year old female child presented to the emergency department with fever and lower respiratory tract infection was found to have right lower lobe atelectasis, required high dependency unit admission and impending bronchoscopy, and was improved subjectively and objectively following respiratory care maneuvers and pharmacological support.

Keywords: Chest physiotherapy, Continuous positive airway pressure, Atelectasis.

1. INTRODUCTION :

Bronchial hygiene therapy helps to mobilize and remove secretions and thereby improves gas exchange [1]. It is one of the most effective forms of non-invasive airway clearance technique [2]. Bronchial hygiene therapy includes postural drainage, percussion and vibration collectively known as chest physiotherapy, combined with sputum expulsion techniques. Newer techniques include both modified breathing/coughing routines and the use of mechanical devices designed to augment secretion clearance.

2. THE CASE REPORT :

A 12 year old female child was presented to the emergency department with fever and productive cough since a week and worsening breathlessness since 2 days. She had noticed increased in cough while lying in left lateral position. Vitals taken in the emergency department were as follows: Heart rate – 125 beats/minute, Respiratory rate – 29 breaths/minute, Oxygen saturation (SpO₂) – 90% on room air, Temperature – 101oF, Blood pressure – 100/70 mmHg. Blood and sputum were sent for investigation. On examination, this moderately build female child was appeared to be breathless and tired on the initial appearance. Intermittent productive

cough was present. The child appeared to be dehydrated, but was not on respiratory distress and symmetrical chest movement was also observed. On auscultation of right and left supra-mammary zones, the air entry was present with minimal crepitation and occasional rhonchi on the right side. While the infra-mammary auscultation of left lung was clear with no adventitious lung sounds, whereas right lung auscultation revealed coarse crepitation to no air entry towards the lower zone. Breath sounds were clearly heard on the left axillary zones, with absent sounds on the right side. Posterior auscultation was positive for air entry on the left side with no added sounds, whereas absent air entry on the right infra-scapular zone. Dull percussion notes were felt over the 6th and 7th right intercostal space anteriorly and over the 5th and 6th right axillary intercostal space. Chest x-ray was taken (posterior-anterior view) which revealed a complete collapse out of the right lower lobe with consolidative appearance of right middle zone, with right hemi-diaphragm elevated. The mediastinum and rest of lung zones appeared to be normal. A slight shift of the cardiac shadow to the right was also observed. Blood investigation showed all the evidences of infection with a raised white blood cell count and elevated neutrophils.

Sputum gram stain showed numerous pus cells and gram positive cocci in cluster and single. Sputum showed growth of staphylococcus aureus and was further sent for culture and sensitivity. Provisionally, the child was diagnosed to have community acquired pneumonia with right lower lobe collapse possibly due to mucus plugging. She was admitted to the high dependency unit under pulmonary care and was started on antibiotics (cephalosporin and macrolides), mucolytic, bronchodilators and 2 LPM of oxygen via nasal prongs. Respiratory therapy consultation was given. Bronchoscopy was scheduled, if there is no symptomatic improvement/worsening of clinical scenario. The respiratory therapist visited her three times a day. She was given left lateral position with a trendelenburg position of the cot and pillows under her legs for 15-20 minutes and chest physiotherapy (CPT) with percussion and vibration was performed. She expectorated copious thick yellow sputum. After the procedure noninvasive ventilation (NIV) on continuous positive airway pressure (CPAP) mode was given for the next half an hour. Though there are various newer devices available to aid airway clearance and to provide positive pressure to open the collapsed airways, the unavailability of these devices led to the decision to use CPAP for a short time to reopen the collapsed airway. At the end of the first day after the third treatment session, symptomatically and subjectively the patient was feeling better. The treatment outcome was monitored by observing her vitals and her auscultatory findings were positive for increased air entry to the previously affected right lower zone. The next day after the second session of bronchial hygiene therapy and noninvasive ventilation a chest x-ray was performed prior to assess the outcome and to plan the need of bronchoscopy. Chest x-ray showed a complete reopening of the collapsed area of the lungs. An effective bronchial hygiene therapy, with a short period of NIV helped to open the collapsed lung zones and thereby to turn down the requirement of an invasive and expensive bronchoscopy to open the collapsed lung zone.

3. DISCUSSION :

CPT is considered to be an inevitable modality

to manage airway clearance in mechanically ventilated patients. For patients with respiratory dysfunction, like in chronic lung diseases such as cystic fibrosis, bronchiectasis and primary ciliary dyskinesia syndrome CPT remains to be a 'gold standard' for the clearance of airway secretion [3]. Chest percussion, vibration and compression with or without postural drainage and assisted coughing are the primary components of bronchial hygiene therapy. However, CPT is really uncomfortable for the critically ill patients and may not be tolerated by many.

Many new devices have been developed to replace the conventional CPT techniques, and to name some are flutter, positive expiratory pressure devices, acapella etc. [4, 5, 6]. These devices are extensively researched on for its effectiveness and is found to be useful and comfortable [5, 6]. Though these devices are found to be effective in airway clearance they are not widely used in developing countries considering the cost expense. The traditional CPT techniques are widely used in such situations rather than investing on single patient use devices.

A trial of bronchial hygiene therapy with short term CPAP application was tried in this child to try and avoid the need of bronchoscopy, and resulted in recruiting the collapsed right lower lung zone [7, 8, 9]. Hence we reinforce the importance of a trial of effective bronchial hygiene therapy with an addition of CPAP, prior to bronchoscopy in patients who are able to tolerate the subjective and objective clinical scenario, which required the hospital admission.

4. CONCLUSION :

Bronchial hygiene therapy with an addition of continuous positive airway pressure (CPAP) prevents the need for bronchoscopy in children with right lower lobe atelectasis.

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