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Brief Communication

Bronchial stump protective ventilator strategy with low positive end expiratory pressure in post pneumonectomy patient

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Dear Editor,

Acute respiratory distress syndrome in the postoperative period is a deadly complication seen in 4-5% of pneumonectomies.[1] The ventilator management was low Fraction of inspired oxygen, and high Positive end expiratory pressure was well-established.[2] The problem arises in cases where there is a bronchial stump post-pneumonectomy and stump protective ventilation[3] to avoid a leak. We present one such case where stump protective strategy was used, but unfortunately patient was succumbed due to development of severe postoperative acute respiratory distress syndrome.

A 34-years young male presented with chief complaints of shortness of breath and cough with expectoration from five days. On evaluation, he has a history of recurrent left pneumothorax and was diagnosed with cystic bronchiectasis of the left apical lobe. There was a history of pulmonary tuberculosis for which he used anti-tubercular medications for 6months. His American society of anesthesiologist's physiological status was grade 4 with metabolic equivalents <4. His chest X-ray showed a mediastinal shift to the right side, air fluids levels over the left lung (left hydropneumothorax) Figure 1.

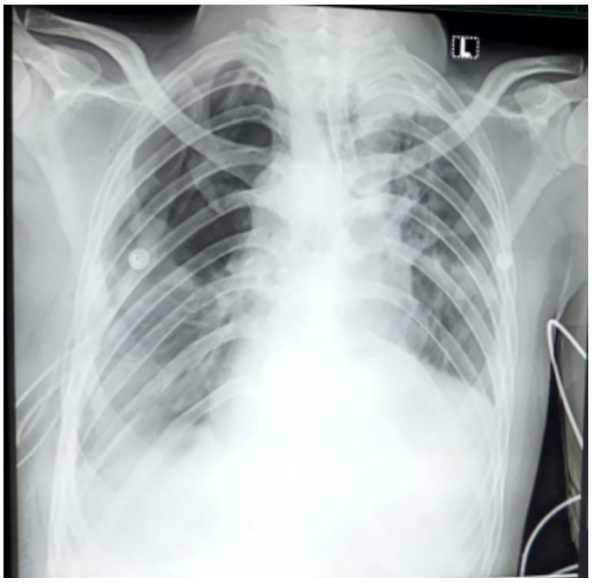

Fig. 1: Preoperative chest x-ray of the patient

Pulmonary function tests revealed forced expiratory volume in 1 sec to be 16% of the predicted, forced vital capacity of 14% of the predicted. The predicted Post operative FEV1 is 2.52% depicting it was a high risk for surgery Figure 2.

Based on the risk versus benefit ratio case was planned for surgery (left apical lobectomy under General Anesthesia). Standard anesthetic induction was planned;

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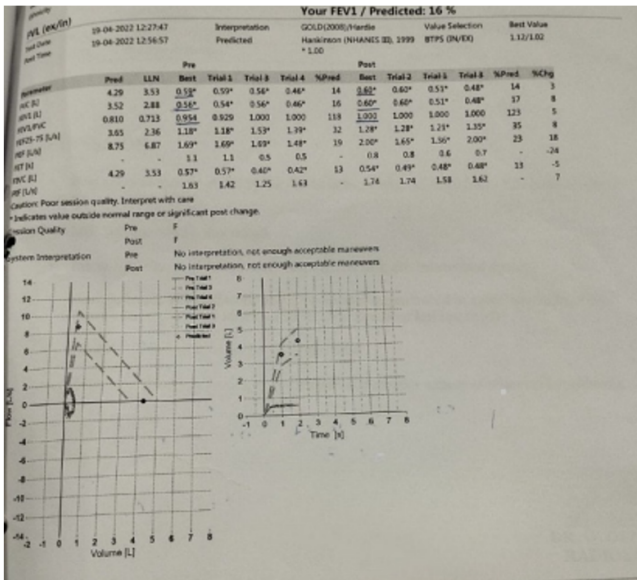

Fig. 2: Pulmonary function tests

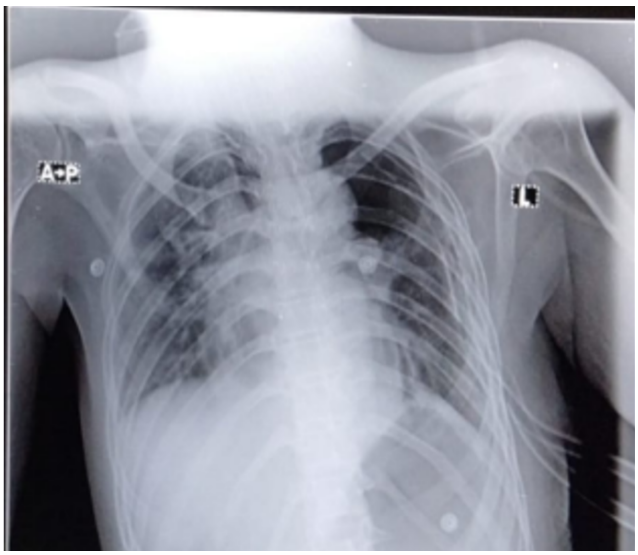

Fig. 3: Post operative chest x-ray of the patient

Intubation was done with a left-sided Double lumen tube 37 size fixed at 28cm at the mouth. All efforts were made to maintain Peak Pressures<35mm of Hg and Plateau pressure<25 mm of Hg. After clamping the pulmonary artery, a fall in saturation was noticed to around 60%. Immediately all anesthetic gases were cut down, and Fio2 was increased to 100%. Both lung ventilation was resumed. The position of the double-lumen tube was checked and confirmed. Suction was done through 2ports. Bronchodilators were added through the Endotracheal tube. After all these maneuvers, saturation improved to 92 and hemodynamics were maintained. At the end of the surgery, arterial blood gases showed carbon dioxide retention. The double-lumen tube was changed to single-lumen tube, and the patient was shifted to the postoperative intensive care unit on mechanical ventilation. Extubation was attempted on the second day when routine criteria were met.

After 4 hours post-extubation, we noticed a fall in saturation and increased work of breathing, for which re-intubation was done. Arterial blood gas analysis showed a Pao2/Fio2 ratio <100 depicting acute respiratory distress syndrome. Chest X-ray revealed ARDS Figure 3. The patient was kept on volume control mode with bolus doses of vecuronium with low tidal volume and low PEEP to protect the bronchial stump from dehiscence. We have chosen to avoid PEEP to stop the bronchial stump from opening, although a high PEEP strategy is advised with ARDS, but there has not been much improvement. The patient passed away with ARDS (according to berline criteria) on the third postoperative day.

The patient was a high-risk patient with predicted postoperative Forced expiratory volume in 1 second to be 2.5% of normal, clearly contraindications for surgery. The patient was considered for surgery after consultation with a pulmonologist, a cardiac surgeon and an anesthesiologist. The patient quality of life was poor, and it was considered to give a chance to the patient even though he is at high risk.

The incidence of acute respiratory distress syndrome is nearly 4-5%in all pneumonectomies, but it increases as the duration of surgery, fluid shifts and other factors are increased. Even though a surgical procedure may have been performed for the appropriate indication and in a technically perfect manner, patients are threatened by preoperative organ injury. ARDS can result from direct injuries, such as pneumonia, aspiration, or pulmonary contusion. Indirect insults causing ARDS include sepsis, transfusion of blood products, shock, or pancreatitis. Breakdown of the alveolar-capillary membrane causes the accumulation of proteinaceous intra-alveolar fluid that was accompanied by the formation of hyaline membranes on the denuded epithelial basement membrane of the alveolus. Washout of alveolar surfactant predisposes the lungs to atelectasis and decreased compliance.[4] A fundamental dilemma in the therapeutic approach to ARDS is the double-edged nature of the most commonly applied treatment - mechanical ventilation.

ARDS in pneumonectomy poses a challenge to anesthesiologists, the bronchial stump needs to be protected from high pressure, as high pressure can lead to rupture of the stump. The stump Protective ventilator strategy may not deliver adequate tidal volume, and high PEEP, as advocated by ARDS.net. So, dilemma is to give high PEEP for ARDS or low PEEP for stump protection prevail in such cases? There is no adequate answer to this question, it is recommended to manage each patient's condition on a case-by-case basis until the solution to this problem is more evident.

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