CASE REPORTS

BILATERAL IATROGENIC PNEUMOTHORAX, PNEUMO-MEDIASTINUM AND PNEUMOPERITONEUM FOLLOWING PER-ORAL ENDOSCOPIC MYOTOMY FOR ACHALASIA TYPE I: A CASE REPORT.

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Abstract

The development of interventional medicine is correlated with an increase in the number of minimally invasive procedures causing iatrogenic pneumothorax. However, some procedures rarely result in iatrogenic pneumothorax, as in the case of carbon dioxide (Co2) insufflation during peroral endoscopic myotomy (POEM) for esophageal Achalasia. The pathophysiology of which is well codified.

This rare complication (pneumothorax) is strongly suspected in cases of sudden drop in oxygen saturation during minimally invasive procedure.

During the procedure, a positive exsufflation test is sufficient to confirm the diagnosis, and its management requires the emergency placement of a chest drain.

We report a rare case of intraoperative bilateral suffocating pneumothorax associated with pneumo-mediastinum and pneumoperitoneum, 2 hours and 40 minutes after the beginning of a POEM for type 1 Achalasia (Chicago classification), in a 34-year-old female patient.

Keywords: *Iatrogenic pneumothorax, CO2 Insufflation, Endoscopy, Achalasia.*

INTRODUCTION

Iatrogenic pneumothorax is defined as the presence of air in the pleural cavity following a medical procedure. According to recent literature, the procedures most commonly associated with iatrogenic pneumothorax include venous cannulation, pleural evacuation puncture and barotrauma through mechanical ventilation [1; 2].

Nonetheless, there are several reports of procedures leading to iatrogenic pneumothorax, though rarely. This is the case of carbon dioxide (CO2) insufflation during endoscopic per oral myotomy for Achalasia[3], the pathophysiology of which is well known.

A sudden drop in oxygen saturation during POEM for esophageal Achalasia should raise suspicion of this rare complication (pneumothorax), which can be life-threatening for the patient.

This suspicion can be easily confirmed either by an exsufflation test or by performing intraoperative fluoroscopy, and requires emergency chest drainage.

We report a case of intraoperatively bilateral suffocating pneumothorax associated with pneumo-mediastinum and pneumoperitoneum from peroral endoscopic myotomy for Chicago type I esophageal achalasia.

CASE REPORT

A 34-year-old female patient, weighing 54kg, was admitted for peroral endoscopic myotomy (POEM) to treat type 1 Achalasia, as classified by the Chicago classification. The gastroenterology department previously followed her up for nine months.

In the operating room, during orotracheal intubation with an 8 mm diameter tube, the patient developed an

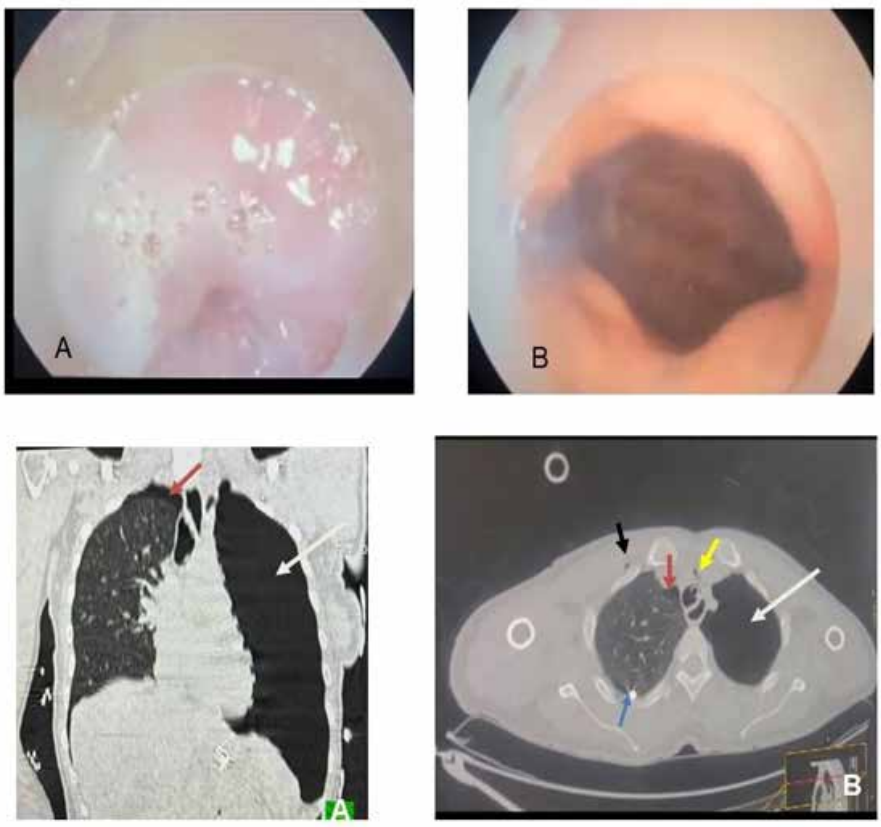

Figure 1

A: Sagittal thoracic CT scan showing a total left iatrogenic pneumothorax, B: Frontal thoracic CT scan revealing right pleural cavity drainage and left pneumothorax
(Red Arrow: apical right residual pneumothorax, White arrow: left total pneumothorax, Black arrow: sub cutaneous emphysema, Yellow arrow: pneumomediasdtinum, Blue arrow: chest tube)

erythematous rash on her trunk and shoulders immediately after the induction phase, suggesting an allergic reaction without hemodynamic instability, which was resolved with 120 mg of methylprednisolone.

Two hours and 40 minutes after the start of the procedure, the patient presented with pneumoperitoneum and subcutaneous emphysema, associated with sudden desaturation and marked by an SpO2 of 27% and hypercapnia of 71mmhg. This was associated with hemodynamic instability (BP 70/50 mmHg and HR 120 bpm), suggesting a bilateral pneumothorax requiring an urgent exsufflation test in the 2nd right and left intercostal spaces. These tests were positive and confirmed the diagnosis of bilateral pneumothorax.

Then, after placing a 20 Fr chest tube in the fifth right intercostal space on the mid-axillary line, SpO2 improved to 100% so we deem it not necessary to place a chest tube on the left side. In addition, the hemodynamic instability did not respond to saline infusion, and noradrenaline was administered to achieve a mean arterial pressure equal to or greater than 75 mm Hg, allowing for adequate tissue perfusion.

The patient improved with SpO2 to 100%, Fi O2 to 50% under mechanical ventilation and normocapnia to 38 mm Hg.

Immediately after the procedure, the patient was not extubated. She was taken to the radiology department for a chest CT scan (Figure A, B), showing a return to the wall of the drained lung, with a worsening of the left pneumothorax, which had become very abundant and associated with a pneumo-mediastinum. She was then taken to the intensive care unit, where she underwent emergency chest drainage in the fifth left intercostal space, on the middle-axillary line, using a 20 FR chest drain.

The patient was extubated on the first day after surgery. She was then transferred to the thoracic surgery department, where the drains were removed 48 hours after they were inserted.

DISCUSSION

The development of interventional medicine in our training hospitals has led to an increasing number of minimally invasive procedures, which can be associated with complications, including iatrogenic pneumothorax. In the case of peroral endoscopic myotomy (POEM) for Achalasia, it's very rarely complicated by pneumothorax, as confirmed in the study by Benjamin et al [3], where

1 out of 173 patients, or 0.6% of patients, presented with iatrogenic pneumothorax. This shows how rare this complication is.

It is important to emphasize that PEOM in the treatment of oesophageal achalasia also exposes patients to other complications that are more common than pneumothorax, namely: subcutaneous emphysema, pneumomediastinum and pneumoperitoneum [4,5,6].

Our case corroborates the data in the literature, as these complications were associated with bilateral suffocating pneumothorax. This case differs from the clinical case reported by Nisha Rajmohan et al [7], in which bilateral suffocating pneumothorax in the first patient and unilateral suffocating pneumothorax in the second patient were _the only _complications of PEOM in the treatment of oesophageal achalasia.

The complications described result from the insufflation of carbon dioxide (CO2) through the endoscope, which normally contributes to the dissection of the submucosal tunnel. However, at certain times, it can escape through a non-resistant barrier made of muscle fibers and adventitia when the myotomy is performed, especially when the flow of CO2 is above 2L/min, causing damage that can be life-threatening [6,7,8].

Furthermore, according to the literature, the clinical expression of suffocating or tension pneumothorax, apart from respiratory distress and auscultatory silence, is associated with tachycardia and hypotension, by compressing the cardiac cavities, causing a drop in preload and requiring air evacuation [9]. In this case, the patient presented with the same clinical symptoms, which led us to strongly suspect suffocating pneumothorax during the operation, given the respiratory and circulatory failure. The exsufflation test performed on both pleural cavities confirmed the diagnosis of bilateral pneumothorax, and the clinical improvement after chest drainage on the right led us to believe that the pneumothorax was more severe on this side than on the left. This differs from the clinical case of Nisha Rajmohan et al [7], where the diagnosis was made in the operating room by immediate fluoroscopy.

However, this clinical picture could lead to confusion with anaphylactic shock, especially as the patient had initially presented with an erythematous rash of the trunk and shoulders during anesthetic induction.

Finally, the duration of chest drainage in our patient was 48 hours. This is in line with the literature, which recommends the removal of the chest tube for iatrogenic pneumothorax 48 h after drainage. [9,10], provided that the clinical and paraclinical progress is satisfactory (air bubble stop and return of the lung to the wall).

CONCLUSION

Iatrogenic pneumothorax is a rare complication of peroral endoscopic myotomy for esophageal achalasia, for which the main risk factor is carbon dioxide (CO2) insufflation. It is therefore crucial to regulate the Co2 flow during this procedure, and to have a well-equipped interventional gastrology and intensive care unit teams to manage not only this complication, but also the other complications that may be life-threatening for the patient intraoperatively.

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