Case Report

Perioperative Pneumothorax: A Rare Complication

Karthik Jain M, Kshma Kilpadi

Department of Anesthesiology, St. John's Medical College Hospital, Bangalore, Karnataka, India

Abstract

We present a perioperative case of spontaneous pneumothorax in a 50-year-old female patient. The case report describes the presentation and outlines the management. The patient presented with difficulty in breathing, desaturation, and restlessness immediately after extubation. Decreased chest movements, hyperresonant percussion note, and absent air entry on auscultation on one side of her chest was noted. The patient was hemodynamically stable. Then, 100% O_2 with closed circuit was continued while a portable X-ray of her chest was taken to confirm the diagnosis of pneumothorax. Intercostal drainage was done on the affected side immediately and the symptoms were relieved. The case report discusses a very rare perioperative complication and highlights the importance of clinical diagnosis and swiftness of intervention.

Key words: Intercostal drain (ICD), laminectomy and stabilization, primary spontaneous pneumothorax (PSP), secondary spontaneous pneumothorax (SSP), ventricular bigeminy

Introduction

Spontaneous pneumothorax occurs in the absence of thoracic trauma and is classified as primary or secondary.[1-5] A primary spontaneous pneumothorax (PSP) occurs in people with no lung disorder, whereas a secondary pneumothorax occurs in the setting of an underlying lung disease.[1-5] The incidence of PSP is reported to be 18-28 in every one lakh cases per annum for men and 1.2-6 in every one lakh cases per annum for women.[1] A review of the literature revealed paucity of such cases in the perioperative period. Subpleural blebs and bullae are found in many cases of PSP. Perioperative causes may include activation of O_2 flush during the inspiratory phase of positive pressure ventilation, mucus plug within the endotracheal tube creating a ball valve effect, etc. Diagnosis and urgency of management is crucial to the outcome in these cases.

We present the case of a 50-year-old female who developed respiratory distress perioperatively as a result of pneumothorax and management of the same. Informed consent was obtained from the patient for reporting the case.

Case Report

A 50-year-old female with no known comorbidity diagnosed to have lumbar canal stenosis was posted for L3-L4 and L4-L5 laminectomy and stabilization. The patient was induced with fentanyl injection and propofol injection. Atracurium was used to facilitate endotracheal intubation. The patient was then placed in a prone position. Anesthesia was maintained with 50% O_2 in N_2O and isoflurane. Positive pressure ventilation (manual ventilation) was facilitated by intermittent doses of atracurium. To monitor the patient, electrocardiogram (ECG), peripheral capillary oxygen saturation (SPO_2), and noninvasive blood pressure (NIBP) were used. The anesthesia machine used was Boyle's Basic. Surgical duration was about 3 h. Intraoperative course of the patient was uneventful.

The patient was turned in supine position after skin closure. There was a short run of ventricular bigeminy on the ECG that lasted for about 10 s with simultaneous tight bag and desaturation to about 89-91% from 100%. Fraction of inspired oxygen (FiO_2) was then increased to 100%. The patient was hemodynamically stable. Suspecting that the patient's breathing efforts in a lighter plane of anesthesia were contributing to events like tight bag and ventricular bigeminy, muscle relaxation was reversed. After recovery of the reflexes and good tidal volume, the patient was extubated with preparedness to reintubate in case of necessity.

After extubation, the patient was conscious, agitated, and was complaining of difficulty in breathing. Oxygen saturation was 93-94% with 100% O_2. On physical examination, her chest movements were found to have decreased on the right side. Hyperresonant note to percussion and absent breath sounds on auscultation were noted on the same side. A provisional diagnosis of the right-sided pneumothorax was done. The patient was hemodynamically stable. Anteroposterior (AP)

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Address for correspondence: Dr. Karthik Jain M, Department of Anesthesiology, St. John's Medical College Hospital, Bangalore - 560 034, Karnataka, India.
E-mail: karthikjain@yahoo.com

view of the X-ray of her chest was taken with the help of portable chest X-ray machine. The image was available on the operation theater with picture archiving and communication system (PACS) within a few minutes and it clearly showed a right-sided pneumothorax with collapse of the right lung and shift of the trachea to the opposite side [Figure 1]. Intercostal drain (ICD) of size 32 Fr was inserted on the right side and a gush of air was noted during insertion. The patient symptomatically improved immediately after the insertion of ICD and O_2 saturation improved to 100% on 50% O_2 within 5 minutes of insertion of ICD. Air entry on auscultation was significantly better 30 min later.

The patient was shifted to the recovery area and observed for 1 h. The ICD bottle was connected to low suction. The patient's condition remained stable and she was then shifted to the step-down unit.

On the first postoperative day, the patient was comfortable. No episode of desaturation was noted. There was no air leak from the ICD. Air entry was equally heard on both sides on auscultation. X-ray of her chest showed that her lung had expanded completely and the pneumothorax had resolved [Figure 2]. Computed tomography (CT) of her chest ruled out any blebs, bullae, or lung disease. The ICD was removed on the third postoperative day when her lung had expanded fully. The later course of the patient in the hospital was uneventful and she was discharged on the fifth postoperative day.

Discussion

Perioperative occurrence of spontaneous pneumothorax is rare, as seen by the paucity of such reports in the literature. Our patient was aged 50 years with no history of smoking or any lung disorder. CT of her thorax done later also showed no pulmonary pathology, indicating a PSP in spite of her age. Smoking history is usually seen with the primary type.[1,2,3,6] Other causes proposed for perioperative pneumothorax are the following: 1. Mucus plug obstructing airway acting like a ball valve, and 2. Inadvertent activation of flush during inspiratory phase of positive pressure ventilation raising airway pressure.[7] The first cause cannot be ruled out although inspection of the endotracheal tube after extubation did not reveal any mucus plug or thick secretion.

Diagnosis of pneumothorax is mostly clinical, especially in case of tension pneumothorax where hemodynamic compromise is present, along with respiratory findings (such as decreased movement of the chest wall, hyperresonant percussion note, and decreased or absent breath sound on auscultation).[1,2] If the patients are awake as in regional anesthesia, they may complain of breathlessness. The typical symptoms of chest pain and dyspnea may be minor or even absent and so a high index of suspicion is required (in cases of small pneumothoraces).[1] In our case, pneumothorax was not suspected before extubation because tight bag, short run of ventricular bigeminy, and desaturation were attributed to a lighter plane of anesthesia and the patient being uncomfortable on the endotracheal tube. But extubation was done with preparedness to reintubate. It is probable that the most alarming cases of pneumothorax occur in such unanticipated circumstances. After extubation, it was evident that the patient had pneumothorax based on the clinical findings. Because she was maintaining 93-94% saturation with 100% O_2 without any hemodynamic compromise, we could get a X-ray of her chest done to confirm the diagnosis before ICD insertion. A brief run of ventricular bigeminy on ECG before extubation was probably due to sudden hypoxia. The symptoms are greater in secondary spontaneous pneumothorax (SSP), even if the pneumothorax is relatively small in size.[1] The size of a pneumothorax does not correlate well with clinical manifestations and is less important than the degree of clinical compromise for appropriate management.[1] A large pneumothorax is differentiated from a small one by the presence of a visible rim >2 cm between the lung margin and the chest wall (at the level of the hilum) and is easily measured with digital X-rays.[1] Degree of collapse of the lung is also classified as (a) small (if there is a small rim of air present around the lung), (b) moderate (if collapsed lung is halfway toward the heart border), and (c) complete (if it is airless lung,

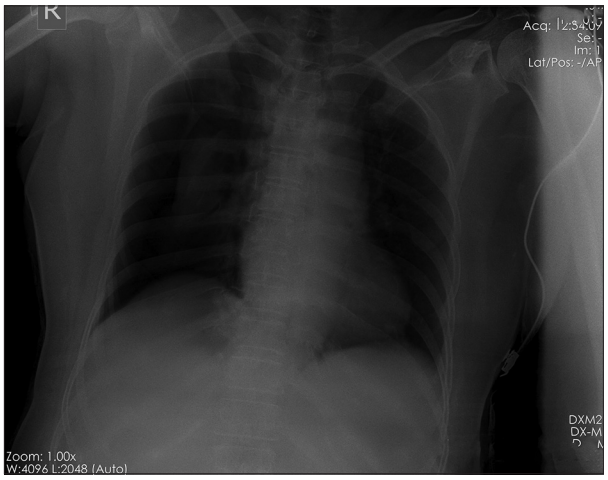

Figure 1: X-ray of the chest (right pneumothorax)

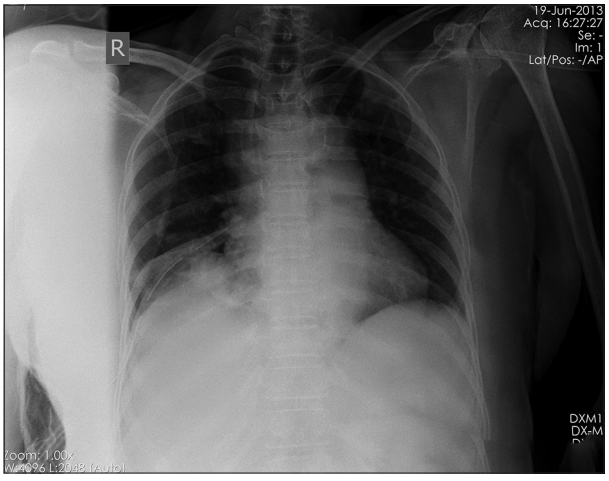

Figure 2: X-ray of the chest after ICD insertion

separate from the diaphragm).[8] Commonly, plain X-ray of the chest with posterio-anterior (PA) view has been used to quantify the size of the pneumothorax. CT scan is regarded as the "gold standard" for diagnosing small pneumothorax, in size estimation and in etiologic assessment.[1,9] We could grade pneumothorax in our patient as large as per the British Thoracic Society (BTS) guidelines.

Management of spontaneous pneumothorax depends on its type and severity. Small PSP need not be treated.[1,8,10] Symptomatic pneumothoraces always need intervention.[1,2,5,8,10] Secondary pneumothoraces also need intervention as patients do not tolerate hypoxia.[1,2] Tension pneumothorax initially needs needle aspiration to relieve distress and later ICD can be inserted.[1,11] Recurrent pneumothoraces need pleurodesis.[1,12,13] Cases of persistent air leak may need surgery.[1,12,13]

Needle aspiration was an option in this case. We decided to insert ICD as soon as X-ray of the chest was available because the patient was hemodynamically stable with good oxygenation. The patient's symptoms and O_2 saturation improved immediately. Air entry on auscultation improved in about 30 min. No air leak was noted in the ICD, suggesting that there was no lung parenchymal injury. After shifting the patient to the step-down unit, an X-ray of the chest done confirmed lung expansion. Secondary causes were ruled out by CT of the thorax done the next day. As there was no air leak in the ICD, no surgical intervention was planned. Low suction through the ICD and O_2 through face mask was continued postoperatively as these are supposed to help in resolution of the pneumothorax.

Conclusion

In conclusion, perioperative spontaneous pneumothorax is an unanticipated complication that can be life-threatening. A quick clinical diagnosis and immediate intervention is the mainstay in management. Knowledge of the guidelines helps in taking timely decisions. Prevention of recurrence necessitates ruling out secondary causes and regular follow-up of these patients.

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