



Iatrogenic Pneumothorax- The Undervalued Peril in Breast Surgery

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Abstract

Pneumothorax, as a complication arising from breast -related procedures is documented in various literature sources. However, it remains an underestimated issue. We present a case of left-sided pneumothorax following bilateral modified radical mastectomy. The patient was asymptomatic but found to have a left-sided pneumothorax on a postoperative chest x-ray that was ordered to confirm a right-sided chemo port inserted in the same sitting. The patient was treated with an intercostal drain and was discharged several days later. Upon reviewing the events the team believes pneumothorax is related to the thoracic fascial plane blocks that was given at the end of surgery.

Keywords: *pneumothorax, mastectomy, iatrogenic complication, serratus plane block, pecs block.*

Introduction

Breast cancer is the most common malignancy among women globally.

[1] Mastectomy or breast conservation surgery with staging of the axilla is the preferred primary surgical treatment for operable breast cancer. [2] The thoracic fascial plane blocks are widely used for analgesia in breast procedures. [3-4]

Pneumothorax is a known complication in breast surgery. [6-10] Kaye et al. reported a case of iatrogenic tension pneumothorax six hours after breast augmentation surgery, suspecting the most likely cause of pneumothorax as local anesthetic infiltration of breast. [6] Members of the California society of plastic surgeons, based on a fax survey by Osborn and Stevenson in 2005 with 50%

response rate, revealed that one in three members have experienced at least one case of pneumothorax with no relationship between the surgeon's experience and the incidence of pneumothorax.^[7] Franco et al suggest investigating patients who have undergone breast surgery clinically, particularly when they present with subcutaneous emphysema, especially if local infiltration has been performed.^[10]

Different etiologies can cause pneumothorax in breast surgery like accidental needle puncture during local anesthesia injection, intraoperative pleural laceration by dissection or cautery, rupture of pre-existing blebs and high-pressure ventilation [6-10].

Case Report

Our patient was a 62-year-old lady diagnosed with bilateral breast carcinoma. She had received 4 cycles of chemotherapy with docetaxel, adriamycin and cyclophosphamide prior to surgery with good response to chemo. (right breast yct0n1mo, left breast yct0n0). She had no other relevant medical or surgical history. Computed tomography (CT) of the lungs was taken for metastatic workup and showed a lung with no gross pathology. She was scheduled for a bilateral modified radical mastectomy with right sided chemo port insertion. Patient was premedicated with midazolam 1mg, glycopyrrolate 0.2mg, and fentanyl 100mcg. General anesthesia was induced with iv ketofol (50mg ketamine + 50mg propofol) and cis-atracurium 10mg. She was intubated via direct laryngoscopy with a 7.5 mm endotracheal tube. General anesthesia was maintained with air: oxygen: and sevoflurane. Lung protective ventilation was employed. Intraoperatively right chemoport was introduced under ultrasound-guided entry to the right internal jugular vein in single attempt and under continuous c-arm guidance of guidewire, port tip placed in the superior vena cava. Right internal jugular vein is preferred over left because of its larger diameter and straight path to superior vena cava. The chemoport placement was uneventful. At the end of the surgery, a bilateral pectoralis block and serratus

plane block was given by the surgeon with 40 ml 0.2% ropivacaine for post operative analgesia. A 23-gauge subdermal needle was used with a 10-cc syringe and was given just prior to the closure of the wound as is the routine protocol in our department in breast surgeries. Surgery was uneventful, the patient was reversed with neostigmine and glycopyrrolate, extubated, and was shifted to the recovery.

Chest x-ray (CXR) which was obtained postoperatively to confirm chemo port location as a routine and surprisingly demonstrated left pneumothorax. (fig-1). The patient had no complaints of breathlessness, chest pain or dyspnea. Her room air saturation was maintained above 96%. Subsequently after obtaining pulmonologist opinion, 28 French [F] chest tube was inserted between fifth and sixth ribs under local anesthesia. She recovered fully and was discharged on fourth postoperative day. (Fig -2)

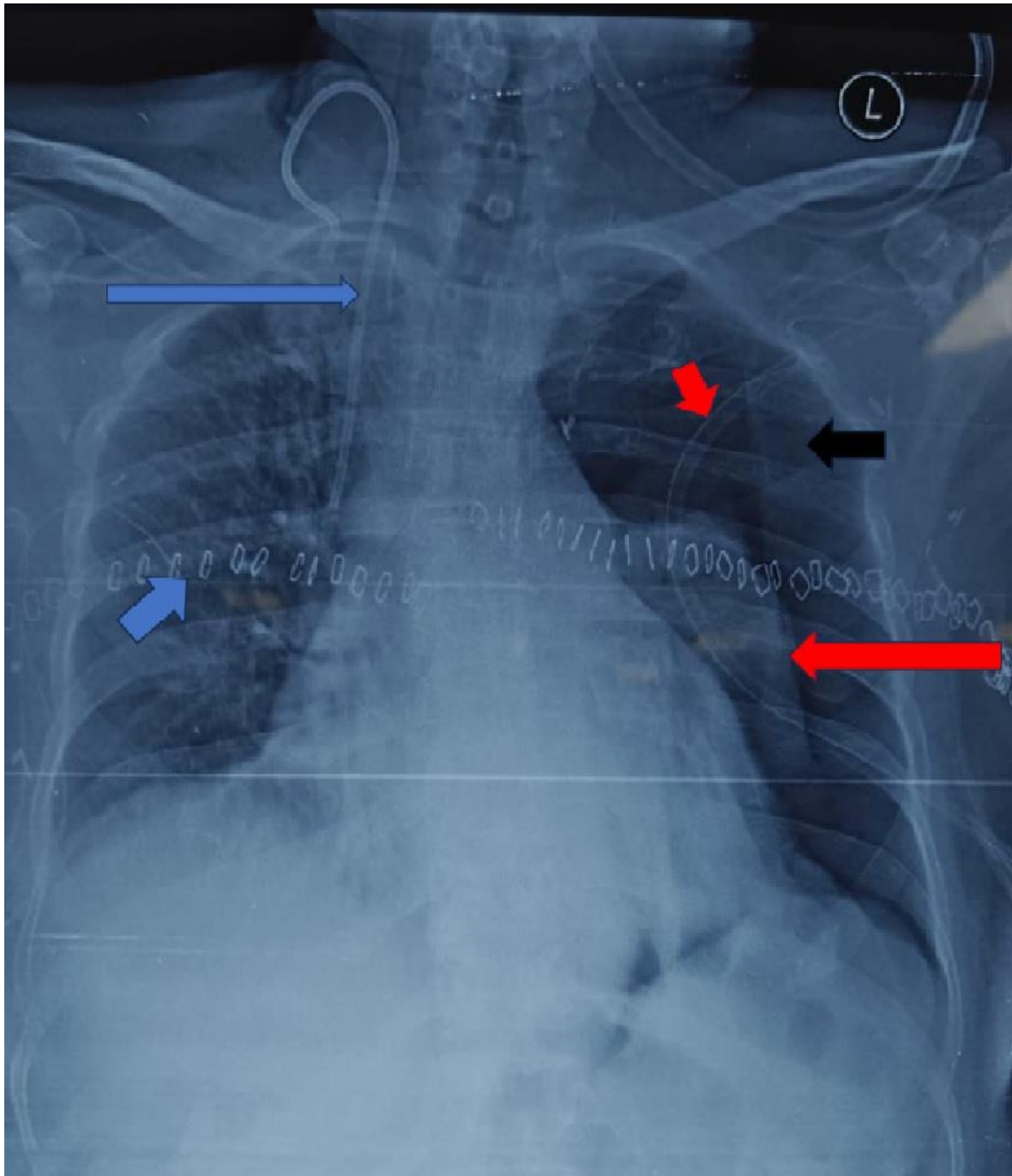


Fig .1: chest xray showing pneumothorax. black arrow showing pneumothorax, long red arrow the collapsed lung margin, short red arrow showing the post operative drain in the subcutaneous plane, long blue arrow showing chemoport in superior vena cava and the short blue line shows mastectomy wound skin clips.

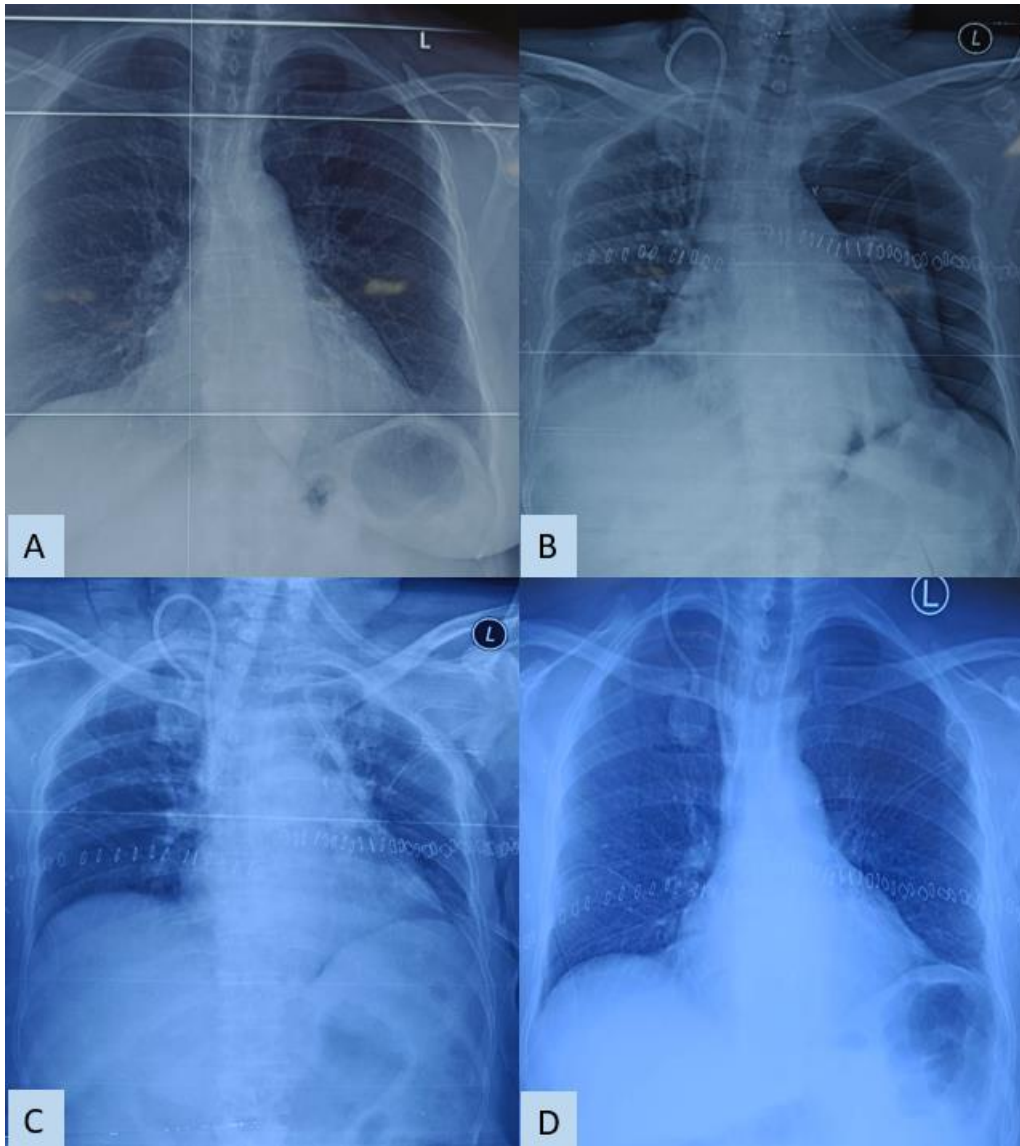


Fig -2: serial x rays. a- preoperative chest x-ray showing normal lung. b -on the night of surgery showing pneumothorax. c - after intercostal tube insertion and d - intercostal drain tube removed and expanded lung.

Discussion

Thoracic fascial plane blocks are frequently utilized for analgesia for a range of surgeries involving anterior thoracic wall, with breast surgery being the most common application. Pectoral nerve (PECS) blocks I and II are techniques designed to block the pectoral nerves, intercostal nerves 3 to 6, intercostobrachial nerves and long thoracic nerve by injecting local anesthetic between pectoralis major and minor (PECS I) and between the pectoralis minor and serratus anterior muscles (PECSII). The serratus plane block (SPB) blocks the intercostobrachial nerve, lateral cutaneous branch intercostal nerve, long thoracic nerve, and thoracodorsal nerve. In SPB, local anesthetic is injected into the fascial

plane either superficial to the serratus anterior muscle, between the latissimus dorsi and serratus anterior muscles, or deep to the serratus anterior muscle, between the serratus anterior muscle and intercostal muscles and ribs. Potential complications associated with these blocks encompass failure, vascular puncture, pneumothorax, local anesthetic toxicity/ allergy, and infection. [3-5]. In this case report, we elaborate on an instance of pneumothorax occurring following bilateral mastectomy with chemoport insertion, where an intraoperative fascial plane block was administered by surgeon.

Pneumothorax is the accumulation of air within the pleural cavity, outside the lung. This air build up can exert pressure on lung, leading to its collapse.

The clinical presentation of pneumothorax varies depending on the degree of lung collapse [11,12]. It is a potentially dangerous complication that can be challenging to diagnose.[13]

Iatrogenic pneumothorax can occur due to various medical procedures, including positive pressure ventilation, central venous catheter insertion, upper extremity blocks, pleural biopsy, transbronchial lung biopsy and surgical entry into the pleural space.

The most frequently observed symptoms during perioperative period encompass chest pain, shortness of breath, dyspnea, hypoxia, hypotension, and cardiovascular collapse. The physical examination findings include tachypnea, decreased, absent or uneven breath sounds, hyperresonance upon percussion and presence of crepitus. If the patient is in hemodynamically unstable condition with strong clinical suspicion of pneumothorax, it is imperative to perform needle compression without any delay. [11-14]

Diagnosis of pneumothorax can be done with chest radiography, ultrasonography, or CT scans. Chest radiography is the foremost diagnostic method for pneumothorax. It is characterized by certain key features such as absence of lung markings in the surrounding peripheral area, appearance of a slender, sharp white line representing the visceral pleural edge, the presence of radiolucent peripheral space compared to adjacent lung and the potential for complete lung collapse. In case of tension pneumothorax, there may also be observable signs of mediastinal shift. [14]

Ultrasound chest examination is a cost efficient, simple, swift and radiation free diagnostic approach. Ultrasound can reveal various signs that suggest the presence of pneumothorax, including absence of b lines, identification of lung point and lack of lung sliding and lung pulse.[15] Intraoperatively, ultrasound is the preferred diagnostic tool.

Interestingly, our patient remained asymptomatic despite the presence of pneumothorax, which might have gone unnoticed if not for the routine chest xray performed for the assessment of the right chemo port. There was no significant medical

history or red flags in intraoperative period which raised suspicion of pneumothorax. The plateau pressure and airway pressure were in acceptable levels.

Anesthesiologists must have indispensable capability to swiftly diagnose pneumothorax and should maintain high index of suspicion for pneumothorax both intra operatively and post operatively. In context of breast surgery, significant proportion of pneumothoraces are iatrogenic in nature. [6-10] When a patient exhibits symptoms or have moderate to large pneumothorax, it is imperative to consider chest tube placement as the treatment measure. In case of tension pneumothorax, immediate decompression is essential[11-14].

In our case , we identified the most likely cause of pneumothorax is an intrapleural puncture resulting from local anesthesia infiltration needle. This may have been preventable with a more tangential approach during infiltration. We recommend tangential direction of needle to chest wall rather than perpendicular while performing local anesthesia infiltration into deeper breast tissues and to exercise extreme caution.

We further recommend the following precautions:

- 1) Use a low-diameter needle for local anesthetic injection.
- 2) Introduce the needle tangentially when performing blocks.
- 3) Consider using ultrasound guidance during block procedures.
- 4) Pause the ventilation and temporarily cease the application of positive end expiratory pressure [PEEP] while introducing needle for infiltration.
- 5) Perform the fascial plane blocks preoperatively using ultrasound.
- 6) Inform the patient about the potential risk of iatrogenic pneumothorax as part of the informed consent process.
- 7) Ensure that the operating theater is well-equipped to manage pneumothorax cases.

These recommendations aim to enhance patient safety during local anesthesia infiltration.

Conclusion

Pneumothorax as a complication of breast surgery is more prevalent than commonly acknowledged, and proactive steps should be taken to prevent iatrogenic pneumothorax. It is crucial to consider pneumothorax as a potential cause when a patient exhibits symptoms such as shortness of breath, desaturation and cardiovascular collapse. Anesthesiologists must maintain a high index of suspicion for this condition.

Intraoperatively, diagnosis can be effectively confirmed using ultrasound, allowing prompt initiation of treatment. Therefore, it is essential that the operation theatre is well equipped to facilitate rapid diagnosis and treatment of pneumothorax.

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