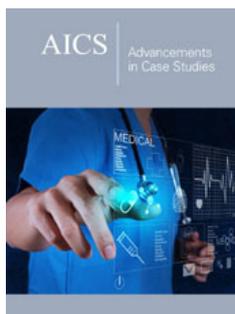


# Pneumomediastinum as a Rare Consequence of Breast Cancer Surgery

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## Abstract

Occurrence of pneumomediastinum and subcutaneous emphysema during breast cancer surgery procedure is very rare. We report a case of a 73-year-old woman who developed pneumomediastinum and subcutaneous emphysema after breast conserving surgery and axillary lymph node dissection. Careful monitoring, immediate diagnosis and proper treatment are crucial for patient safety.

**Keywords:** Breast Conserving Surgery; Breast Cancer; Pneumomediastinum

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## Introduction

Surgical treatment of breast cancer has profoundly changed in the past years, breast conserving surgery being nowadays considered as the gold standard for most patients; it is a safe and cost-effective procedure, with a major decrease in hospital stay and post-operative complications [1]. The management of axillary lymph nodes has also evolved, with standard axillary lymph node dissection (ALND) being now replaced by sentinel lymph node biopsy (SLNB). Actually, ALND is performed only in selected patients with SLNB macro-metastasis, representing a safe procedure but with some post-operative complication such as: lymphedema in approximately 30% of patients; numbness of arm; restriction of movement; pain, and infection [2-3]. Pneumomediastinum (PM) is a clinical entity characterized by the presence of air into the mediastinal cavity; it is a rare complication of non-thoracic surgery and, to the best of our knowledge, there are no reported case after breast surgery.

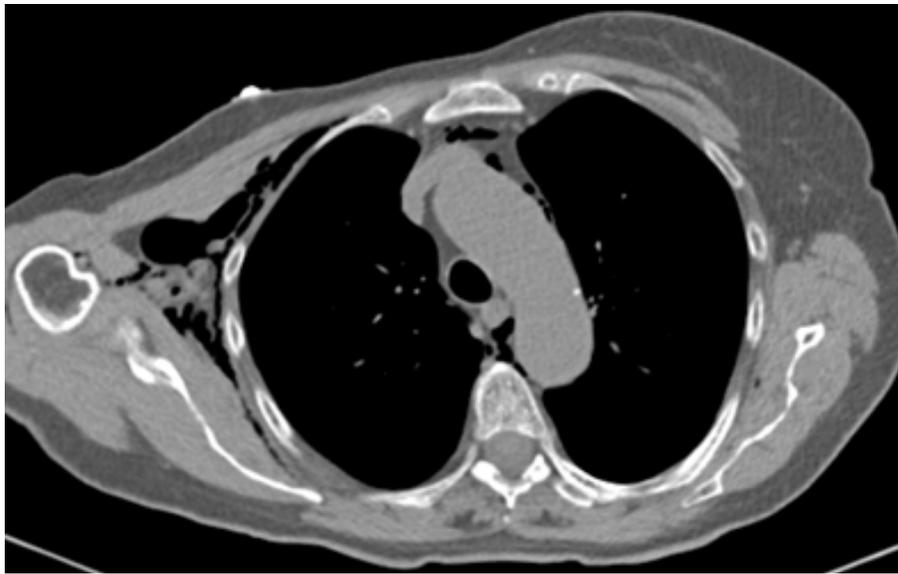
## Case Report

Cutaneous ipsilateral breast cancer recurrence (IBCR) of invasive lobular carcinoma was detected into the right upper-outer quadrant of a 73-year-old female patient with no co-morbidity factors. She had been already treated for breast cancer two years before by means of right nipple-sparing mastectomy with SLNB and immediate breast reconstruction. She was scheduled for local excision and repeated SLNB and she had a more than acceptable

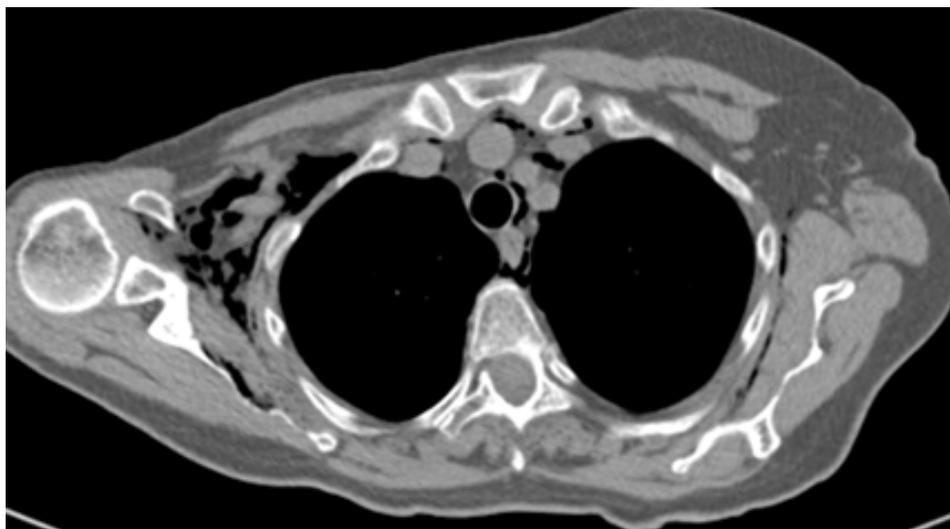
anesthesiologic risk (ASAI); systemic disease was ruled out by means of total body computerized tomography (CT) and bone scan. The surgical procedure was accomplished through a single lateral incision; at intra-operative histology, a macro-metastasis was detected into the SLNB so that immediate ALND was performed; the procedure was completed by single suction drainage positioning into the axilla. No adverse events occurred in the early post-operative hospitalization; the axillary drainage produced 50ml daily, and the patient was discharged without fever on the following day with the axillary drainage still in place with the recommendation of voiding the drainage every 24 hours, as it was carefully explained by a dedicated breast nurse.

On the second post-operative day she was accepted at a peripheral hospital with acute chest pain and, after a first clinical

evaluation, she was centralized at San Martino Policlinic Hospital with a differential diagnosis between PM or acute heart attack. At re-admission she referred an acute chest pain changing with breathing and rhinolalia; she had dyspnoea, 97% peripheral oxygen saturation, with no fever. Subcutaneous crepitus on upper right chest palpation was detected. COVID-19 test by means of nasopharyngeal swab was negative; high sensitivity troponin test was negative, as well. Chest CT with intravenous contrast medium was performed to rule out pulmonary embolism; diffuse subcutaneous emphysema into the upper right chest was detected (Figure 1) with concomitant PM (Figure 2) and the axillary drainage was still in place (Figure 3). After breast and thoracic surgeon evaluation no indication for surgery was proposed. The patient was admitted into the Pneumo-Clinic and she was given oxygen support and broad-spectrum antibiotic therapy.



**Figure 1:** Sub-cutaneous emphysema.



**Figure 2:** Pneumomediastinum.



**Figure 3:** Drainage tube (⇨).

On the third post-operative day the drainage was removed with an inspiration manoeuvre, its integrity was checked, and the exit site was closed with a transfixing point (Figure 4). A new chest radiography showed partial resolution of PM with no change in the subcutaneous emphysema. As soon as she had oxygen saturation of 99% in ambient air oxygen supplementation was stopped. On

the fifth post-operative day a new chest radiography showed still persistence of subcutaneous emphysema, and on the seventh post-operative day she was discharged. At follow-up visits sub-cutaneous emphysema and rhinolalia were definitively solved, and no surgical site infection did occur.



**Figure 4:** DT after removal.

## Discussion

PM is defined as the migration of air into the mediastinal space, and it may be classified as primary or spontaneous PM, or secondary PM related to external causes, such as: traumas, underlying pulmonary disease, or iatrogenic intervention including intubation, laparoscopic procedures, etc. [4-5]. Although PM is usually regarded as a relatively benign condition, sometimes it can lead to severe complication; so, tension PM is a critical situation that may lead to reduced cardiac output due either to direct cardiac

compression (cardiac tamponade) or reduced venous return, as well as to airway compression [6].

PM following surgery may be regarded as a direct surgical complication or due to anaesthetic procedures following orotracheal intubation; this is most common in women, in patients with tracheal wall weakness, or protracted steroid therapy [7-8]. The mechanisms of injury are related to the use of oversized tubes, over inflation of cuff, sudden movements in the tube, vigorous attempts at intubation in emergency situations, or inappropriate

use of the guide and repositioning of the tube without complete emptying of the cuff [9-10]. The clinical manifestations are represented by subcutaneous emphysema in the chest and neck; PM; pneumothorax and respiratory failure. The diagnosis is confirmed by means of CT-scan and fiberoptic bronchoscopy [11].

PM related to a surgical procedure has been very seldom reported, with only a few cases after laparoscopic surgery. In fact, the use of positive pressure gas to create the laparoscopic chamber can determine PM due to passage of gas through weak points or defects of the diaphragm. In these circumstances sub-cutaneous emphysema can be associated to PM itself or it is due to the detachment of the subcutaneous plane as a consequence of a mis-positioning of Verres-needle [6-12].

To the best of our knowledge there are no reported cases of PM after breast surgery. Mammary emphysema is an uncommon manifestation of PM; in fact, the glandular tissue is separated from the retromammary space by the superficial fascia, in addition the deep pectoral fascia seals and it separates the pectoralis muscles [13]. Mammary emphysema due to breast surgery has been rarely reported and it is generally associated with local anaesthesia during aesthetic breast augmentation [13-14].

It's not so easy to determine in our case report the exact mechanism of the air migration into the mediastinal space and in the subcutaneous tissue, although a peculiarity is represented by the fact that a silicon gel prosthesis had been positioned in the submuscular space at the former post-mastectomy reconstruction procedure, and this may have weakened local anatomy with an increased risk to barotraumas. On the other hand, anaesthetic manoeuvres can be easily ruled out because no difficulty during the intubation nor barotrauma during the ventilation of the patient were reported by the anaesthesiologist and most of all, no perforations of the tracheal-bronchial wall were detected at chest CT.

We could only speculate that PM was determined by an improper manoeuvre during the re-creation of the negative pressure after the reservoir was emptied. The use of closed suction drainage is a common practice aimed at reducing seroma formation; it is a routine manoeuvre that is generally not burdened by severe complications but, in this peculiar case, the specific anatomical conditions of the patient following previous reconstructive procedures may have predisposed to barotraumas [15-17].

## Conclusion

PM is a very unusual complication after breast surgery; clinical monitoring and antibiotic therapy are fundamental in order to avoid serious life-threatening complications, such as mediastinitis and cardiac tamponade. Furthermore, the use of negative pressure

drainage, although standardized, should be carried out with particular care and, in this context, great attention should be devoted to educating patients to prevent such, although rare, complications.

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