

## Chest Wall Implantation of Carcinoma after Fine Needle Aspiration Biopsy

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*Implantation of malignant cells along the needle aspiration tract in patients with lung cancer is a rare but potential complication following percutaneous fine needle aspiration biopsy. Dissemination of cancer cells by aspiration biopsy can change resectable, potentially curable lung cancer to unresectable cancer. We report a 55 year male patient who underwent completion pneumonectomy due to squamous cell carcinoma and one cycle of chemotherapy. He developed outgrowing chest wall tumor at the site of needle aspiration biopsy performed prior to completion pneumonectomy and was pathologically diagnosed as metastatic squamous cell carcinoma. The lesion was successfully treated by radical full-thickness resection of the chest wall and reconstruction with latissimus dorsi musculocutaneous island flap.*

**Key Words:** Needle biopsy, Metastasis, Lung neoplasm, Island flap

Percutaneous fine needle aspiration biopsy (FNAB) has become a popular technique in the diagnosis of bronchogenic carcinoma because it has high diagnostic yield and low morbidity. However, implantation of malignant cells along the needle tract is an extremely rare complication after FNAB which can change potentially resectable localized lung cancer to unresectable carcinoma. We present a lung cancer patient who developed bulging chest wall tumor in the vicinity of the operation scar two months after performing pneumonectomy and it was histologically diagnosed as metastasizing squamous cell carcinoma. En

bloc chest wall resection and musculocutaneous island flap were done and the chest wall lesion seemed to have developed cancer cell seeding during the needle aspiration biopsy performed prior to an operation.

### CASE REPORT

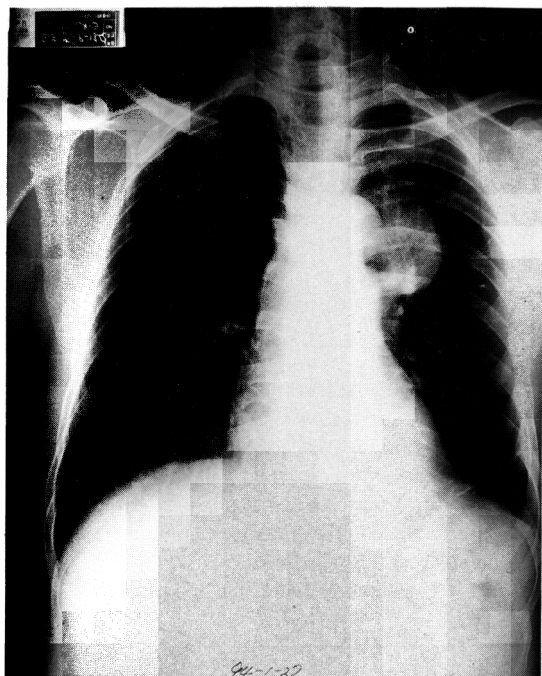
A 55 year old male was admitted due to persistent cough and blood tinged sputum. His past history revealed no specific illness other than smoking 1 1/2 pack per day for 35 years. On plain chest X-ray and chest computerized tomogram, a 4×5cm mass was visible in the left lower lobe and it was diagnosed as squamous cell carcinoma by fiberbronchoscopic biopsy, and he therefore underwent left lower lobe lobectomy with complete mediastinal lymph node dissection. Postoperative histological diagnosis was poorly differentiated squamous cell carcinoma in TNM stage T2N0M0 (stage I). He was discharged in good condition and no adjuvant chemo- and radiotherapy was scheduled.

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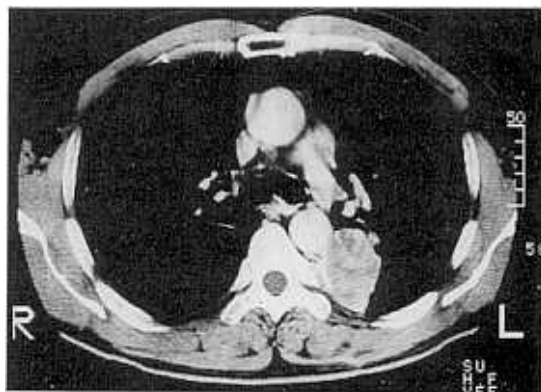
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**Fig. 1.** Plain chest PA prior to pneumonectomy showing tumor which is located in the hilum of the left lung.

One year and nine months after the operation, he visited outpatient department complaining blood tinged sputum with a plain chest x-ray showing a mass in the left lung (Fig. 1) and a computerized chest tomogram showing a 3×4 cm mass in the left upper lobe with no visible lymphadenopathy (Fig. 2). Fiberbronchoscopy revealed that the left main bronchus was compressed by an extrinsic mass and fine needle aspiration biopsy of the tumor using 21 gauge fine needle confirmed it as squamous cell carcinoma.

He had no evidence of distant metastasis that could be detected by abdominal ultrasonogram and whole body bone scan. Pre-operative evaluation of the patient showed relatively good general condition, and pulmonary function test showed forced vital capacity of 3.32 liters (94% predicted value), and forced expiratory volume in one second to be 2.49 liters (91% predicted value). Perfusion lung scan showed 59% perfusion in the right lung



**Fig. 2.** Computerized chest tomogram showing 4×3×3 cm mass located in the posterior segment.

and 41% in the left lung which indicated pneumonectomy possible and therefore we planned completion pneumonectomy.

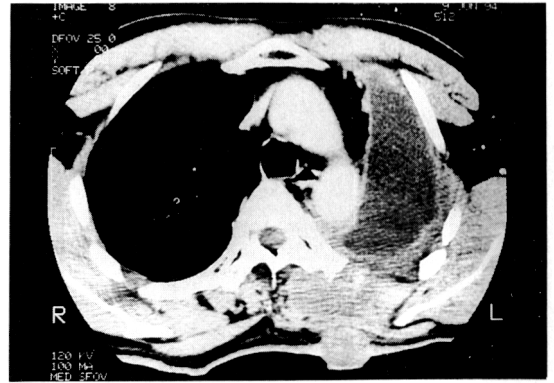
The chest was entered through the postero-lateral incision scar. After dissecting pleural adhesions, 5×6 cm round mass was palpable in the posterior segment of upper lobe which was attached to the inner chest wall and the thoracic aorta. However, the dissection was not difficult and completion pneumonectomy was done. The postoperative course was uneventful and the histological diagnosis was poorly differentiated squamous cell carcinoma with focal extension to the visceral pleura and the lymph node was free from metastasis. The frozen section of the inner chest wall which was attached to the tumor was free of cancer cells and therefore the cancer stage was T2N0M0 (stage I). However, since the cell type is identical with the cell type as in the first operation and the period of second operation is less than two years, the patient was diagnosed as recurrent lung cancer.

We planned postoperative chemotherapy and radiotherapy. Two months after discharge, he was readmitted for one cycle of chemotherapy which consisted of 160 mg of etoposide for three days and 140 mg of DDP for one day. However, he refused further treatment and therefore second Kur chemotherapy and radiotherapy that was planned was abandoned.

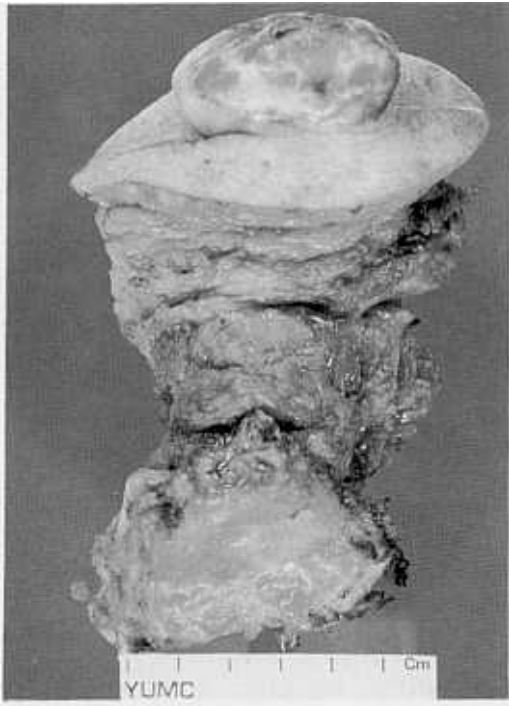
During the follow up in the outpatient clinic, the patient complained of pain and swell-



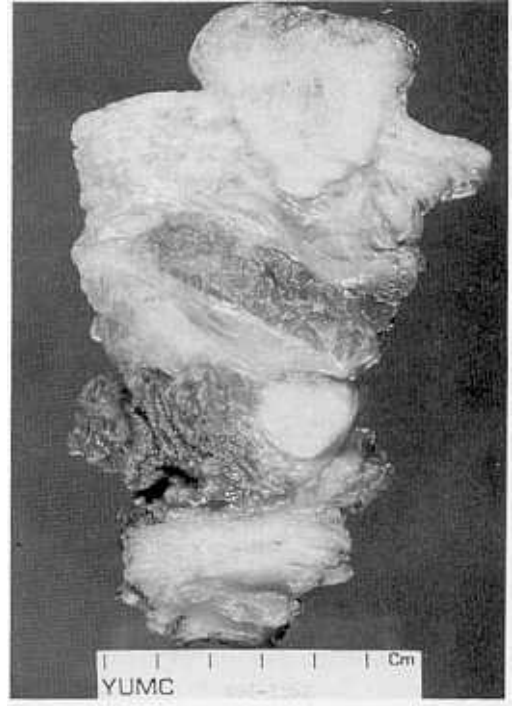
**Fig. 3.** Outgrowing skin lesion located near operative scar in the back two months after the pneumonectomy.



**Fig. 4.** Computerized chest tomogram taken two months after pneumonectomy showing 3×3cm sized bulging mass in the back which is located within rhomboid major muscle.



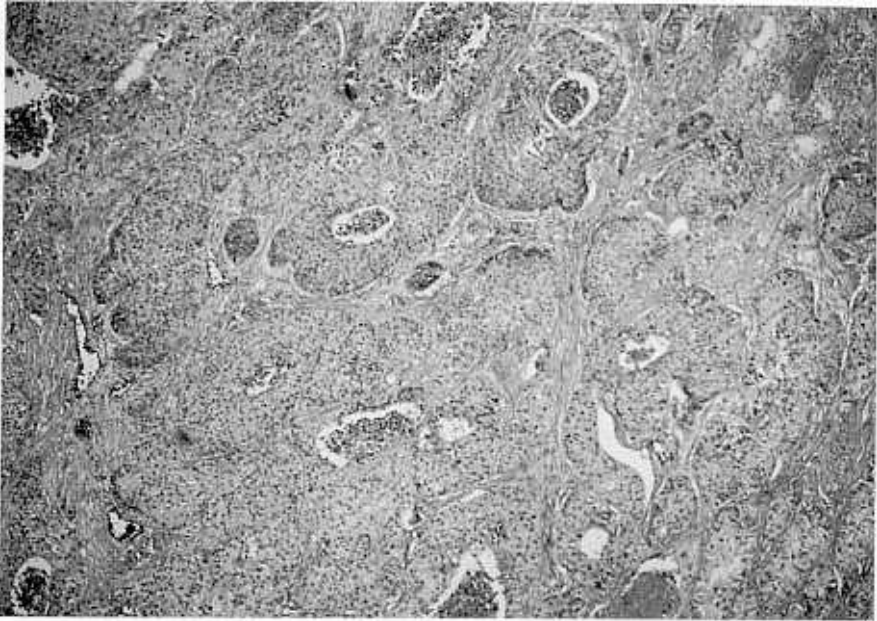
**Fig. 5.** Gross findings of chest wall tumor after en bloc chest wall resection showing large bulging mass near the operative scar line.



**Fig. 6.** Cut section of the resected chest wall showing two separate lesions along the straight tract from skin to pleura.

ing in the operative wound site in the back (Fig. 3) and the biopsy of the wound was diagnosed as metastatic squamous cell carcinoma.

ma. Computerized tomograms of the chest showed 2×2cm sized outgrowing mass which was located in the muscle of the chest where



*Fig. 7. Microscopic finding of chest wall tumor showing squamous cell carcinoma which is histologically identical with lung cancer.*

the protruding skin lesion is exactly on straight line with the location of left upper lobe tumor mass prior to completion pneumonectomy and needle aspiration biopsy site but there was no tumor connection or continuity into the pleural space (Fig. 4). Since the possibility of cancer cell implantation into the chest wall during fine needle aspiration biopsy could not be ruled out and the lesion was thought as resectable, after thorough investigation of the absence of metastatic lesion elsewhere, the chest wall tumor was resected by radical en bloc full-thickness excision of the chest wall and ribs directly underneath the chest wall lesion (Fig. 5). The defect in the chest wall was reconstructed by latissimus dorsi musculocutaneous island flap.

Gross pathological findings revealed multiple cancer cell implantation along the tract of FNAB and the parietal pleura showed no evidence of remaining cancer lesion (Fig. 6). Microscopically, the chest wall tumor was poorly differentiated squamous cell carcinoma which is histologically identical with previous-

ly resected lobectomy and pneumonectomy specimens (Fig. 7).

## DISCUSSION

Due to the increasing population of cigarette smokers, the incidence of lung cancer is rising continuously and early diagnosis and accurate diagnostic tools are pertinent in acquiring early detection and long term survival. In order to confirm tumor as inflammatory, benign, or a malignant lesion, a needle aspiration biopsy (NAB) has been used frequently because it is simple, easy to perform, yield high rate of diagnosis, and has low morbidity rate.

Most of complications that occur after NAB are pneumothorax, bleeding, infection, and air embolism (Voravud *et al.* 1992). Very rarely however, implantation of cancer cells in the NAB site has been reported (Berger *et al.* 1972; Seyfer *et al.* 1989) and this seeding of cancer cells can be devastating to the patient

with resectable primary carcinoma.

Oschner *et al.* (1942) first reported the possibility of cancer cell seeding after NAB, and Sinner *et al.* (1976) reported one case of cancer cell implantation after 5300 cases of NAB which resulted in 0.02% incidence. This rare complication is reported to occur more frequently when large Vim-Silverman needle is used although it can also occur when fine needles smaller than 21 gauge are used (Hix *et al.* 1990; Voravud *et al.* 1992).

In order to avoid this devastating complication, the needle should be smaller than 21 gauge and the biopsy should be localized to a single entrance rather than multiple. Many clinicians recommend using biopsy needle which comes with covering sheath so that aspirated needle is withdrawn into the sheath first before removing it from the patient in order to preclude direct cancer seeding into the chest wall which is the main cause of chest wall implantation. Some have reported the advantage of resecting the chest wall where the needle has passed through in combination with the main operation (Sacchini *et al.* 1989).

Because of this rare but significant complication, the role of immediate radiotherapy after biopsy to prevent tumor seedings in the needle track was reported (Wolinsky *et al.* 1969).

The method of choice for metastatic chest wall tumor has not been described. However, resection of metastatic carcinoma by en bloc resection of chest wall and reconstruction of chest wall by musculocutaneous island flap using large rectus abdominis muscle has been reported (Seyfer *et al.* 1989). Therefore, if there is no other metastatic lesion except in the chest wall, a wide en bloc chest wall resection and muscular flap followed by radiotherapy can be the best form of treatment.

Surgical resection in a case of primary lung carcinoma abutting the parietal pleura has been debated. Some only recommend radiation therapy, but some recommend pulmonary resection plus resection of parietal pleura that is in contact with the primary carcinoma, and some recommend en bloc resection of primary carcinoma of the lung with chest wall

(McCaughan *et al.* 1985). Albertucci *et al.* (1992) has reported low recur rate and good prognosis after en bloc resection of the lung and the chest wall. McCaughan however has reported that there was no effect at all after the en bloc resection and that it is not a good form of treatment (McCaughan *et al.* 1985).

The newly developed chest wall tumor needs to be differentiated from direct seeding during the operation or from the hematogenous spread. The skin lesion which overlies the operative scar can be thought as seeding during the operation. However, the tumor mass as shown in cut section (Fig. 6) is exactly on straight line with another smaller lesion closer to the inner chest cavity and parietal pleura where the needle aspiration biopsy probably had been undertaken. It is less likely that intraoperative cancer seeding or hematogenous spread occurred on a straight tract. Since the parietal pleura was negative for malignancy on frozen section and the chest CT revealed no abnormal findings, the skin lesion should be thought as cancer seeding during fine needle aspiration biopsy.

Pulmonary carcinoma abutting parietal pleura combined with the mediastinal lymph node or bone metastasis has very poor prognosis (Albertucci *et al.* 1992) and they are not a good candidates for surgery. However, patients in N0 or N1 with chest wall involvement can acquire at least 30% long term survival by en bloc resection and they should be recommended for resectional surgery. If the lung cancer patients are believed to be in stage T3, they should be carefully evaluated preoperatively for the metastatic lesion in the mediastinum and bone. If the preoperative x-rays show same density for both primary tumor and inner chest wall, then the possibility of chest wall en bloc resection should always be kept in mind although preoperatively performed studies have low sensitivity and specificity rate in detecting inner chest wall involvement unless there is a definite bony destruction (DeMeester *et al.* 1989).

The best way of detecting chest wall involvement and mediastinal lymphadenopathy is by thoracotomy or by thoracoscopic evaluation. Persistent localized chest pain strongly suggest chest wall involvement even though

the absence of pain does not mean an absence of chest wall involvement.

More than 50% of tumor in smokers over 40 years old are malignant carcinoma(Hix *et al.* 1990) and the rate of malignancy increases if the previous chest x-ray finding was normal. Performing NAB in these group of patients with high probability of malignancy is not necessary, and for the group of inoperable patients or high risk group due to old age or poor cardiopulmonary function, NAB is a useful method in acquiring a diagnosis of the pulmonary lesion. However, since the incidence of needle site implantation of cancer cells are very low, the physicians should not hesitate in performing NAB in the diagnosis of benign or malignant lesions of the lung.

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