

Report

A Case of Pericardial Tamponade Caused from Pericardial Metastasis of Breast Cancer

**Kei AOYAMA, Takako KAMIO, Tetsuya OHCHI,
Masako NISHIZAWA and Shingo KAMEOKA**

Department of Surgery II, Tokyo Women's Medical University

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It is rare to encounter cardiac tamponade caused from pericardial metastasis of breast cancer. It has been reported that cardiac tamponade caused by cancerous pericardial effusion occurs in only 2% of the patients with advanced recurrent breast cancer. Cardiac tamponade resulting from the accumulation of cancerous pericardial fluid needs a prompt and proper medical treatment to prevent sudden death. We describe our experience with a patient who had had breast cancer that spread (metastasis) to the pericardium, with some relevant bibliographic information.

Key words: breast cancer, pericardial tamponade, pericardial metastasis

Introduction

Estimates of the frequency of involvement of the pericardium by malignancy range from 0.1% in clinical studies to as high as 21% in some autopsy series. The incidence of clinically symptomatic malignant pericardial effusion is reported to be 2% in metastatic breast cancer. Malignant pericardial effusions, which are the most frequent manifestation of malignant involvement of the heart, are often asymptomatic and are commonly not recognized until cardiac tamponade develops. If not treated promptly, tamponade can produce acute life-threatening cardiovascular collapse. However, early diagnosis and treatment of this oncologic emergency results in good palliation of symptoms and prolongation of survival. Cardiac tamponade caused by cancerous pericardial effusion is an oncologic emergency that must be promptly treated. We present one case of metastasis breast cancer, who developed cardiac tamponade due to malignant pericardial effusion, which was managed successfully to get a good survival. We report on a patient who had had breast cancer that has spread (metastasis) to the pericardium, with some bibliographic information.

Case Report

Patient: A 52 years old, woman.

Chief complaint: Lack of appetite.

History of present illness: The right breast was diagnosed inflammatory breast cancer, which was treated with 2 cycles of CEF (cyclophosphamide: CPA, epirubicin: EPI hydrochloride, fluorouracil: 5-FU) chemotherapy and then surgery by modified radical mastectomy and axillary lymph node dissection (level I~III). The results of histopathological examination included: invasive ductal carcinoma, scirrhous carcinoma, Iy3 v3 histopathological grading (HG)5, and estrogen receptor (ER)- progesterone receptor (PgR)- human epidermal growth factor receptor type 2 (HER-2)- (triple negative). Lymph node metastasis was found up to level II. (Number of positive lymph node was 8/19.)

After surgery, 4 cycles of CEF therapy were performed and then tegafur uracile was orally administered during follow-up. One year and 8 months after surgery, metastasis to the supraclavicular lymph nodes was found; radiation therapy and 4 courses of docetaxel hydrate were administered.

Two years and 5 months after surgery, metastasis to the brain occurred; gamma knife therapy was

Table 1 Results of blood test

| | | | |
|-----|------------------------------|---------------|------------|
| WBC | 9,000 / μ l | TP | 6.7 g/dl |
| RBC | 3.72×10^6 / μ l | Alb | 3.8 g/dl |
| Ht | 39.9 % | AST | 77 IU/l |
| Hb | 12.8 g/dl | ALT | 25 IU/l |
| Plt | 17.9×10^4 / μ l | LD | 669 IU/l |
| | | γ -GTP | 25 IU/l |
| | | BUN | 39.3 mg/dl |
| | | Creat | 0.82 mg/dl |
| | | CRP | 0.62 mg/dl |

given. Then capecitabine hydrochloride was orally administered during follow-up. Three years and 7 months after surgery, bone metastasis occurred. Three years and 9 months after surgery, the patient had symptoms, including general malaise, lack of appetite, and nausea, and was hospitalized for detailed medical examination and treatment.

Conditions at the time of hospital admission:

General physical examination was within normal limits (respiration, 20/min; Blood pressure, 80-120 mmHg; Pulse rate, 74/min, normal). No edema, cyanosis, cold-extremities and fever were noted. Her liver function was almost normal at the end of this time, except for an abnormal level of serum lactate dehydrogenase (LDH, 669 IU/L: normal range 119-229) and aspartate aminotransferase (AST, 77 IU/L: normal range 13-33) (Table 1). Laboratory tests showed elevated tumor markers; carbohydrate antigen 15-3 (CA15-3), 282 ng/ml (normal range < 25 ng/ml); and carcinoembryonic antigen (CEA), 13.9 ng/ml (normal range < 5.0 ng/ml) (Table 2).

Blood gases: PaO₂, 67.5 mmHg; PaCO₂, 25.3 mmHg.

Electrocardiogram: no ST-T changes were found (Fig. 1).

The patient's chest radiography at hospital admission indicated a mild cardiac dilatation (cardiothoracic ratio; CTR, 58%) but no accumulation of pleural fluid. In the present patient, too, the chief complaints were general malaise and lack of appetite with no typical symptoms of cardiac tamponade observed. From the second day of admission, the patient experienced symptoms such as frequent pulse, decreased pulse pressure, and decreased urine volume. Therefore, chest radiography and

Table 2 Tumor marker

| | |
|------------|------------|
| BCA225 | 99 U/ml |
| NCC-ST-439 | 2.5 U/ml |
| CEA | 13.9 ng/ml |
| CA15-3 | 282 U/ml |

echocardiography were performed again, which established a diagnosis of cardiac tamponade. Chest radiography on the next day revealed that the cardiac dilatation developed and an accumulation of pleural fluid was observed in both pleural cavities (Fig. 2). Chest Computed tomography (CT) examination confirmed the presence of pericardial effusion and the accumulation of pleural fluid (Fig. 3).

Treatment after hospital admission: puncture drainage was performed for removing pleural fluid and pericardial effusion. Continuous drainage was instituted for removing the pleural fluid. A total of 550 ml of pericardial effusion was drained through a single puncture, without continuous drainage performed. The pleural fluid drained was light yellow and the pericardial effusion fluid dark red. Cytological examination showed class V for both of the fluids.

The pleural membranes were not treated. The catheter for pleural fluid drainage was removed but recurrent accumulation of pleural fluid did not occur (Fig. 4).

The patient was discharged 3 weeks after admission, and then visited hospital as an outpatient. Although the survival of patients with neoplastic cardiac tamponade is general limited, we believe that an active approach is warranted in those cases with tamponade secondary to breast carcinoma. Recurrence breast cancer is regarded as general disease having many organs metastasis. Systemic cytotoxic chemotherapy after pericardiocentesis can achieve significant palliation in breast cancer, control pericardial effusion, prolong survival, with minimal toxicity, and give a good quality of life. Patients with breast cancer have somewhat longer life spans than those with other types of solid cancer. It is also important to administer appropriate systemic chemotherapy after local treatment in order to prevent fu-

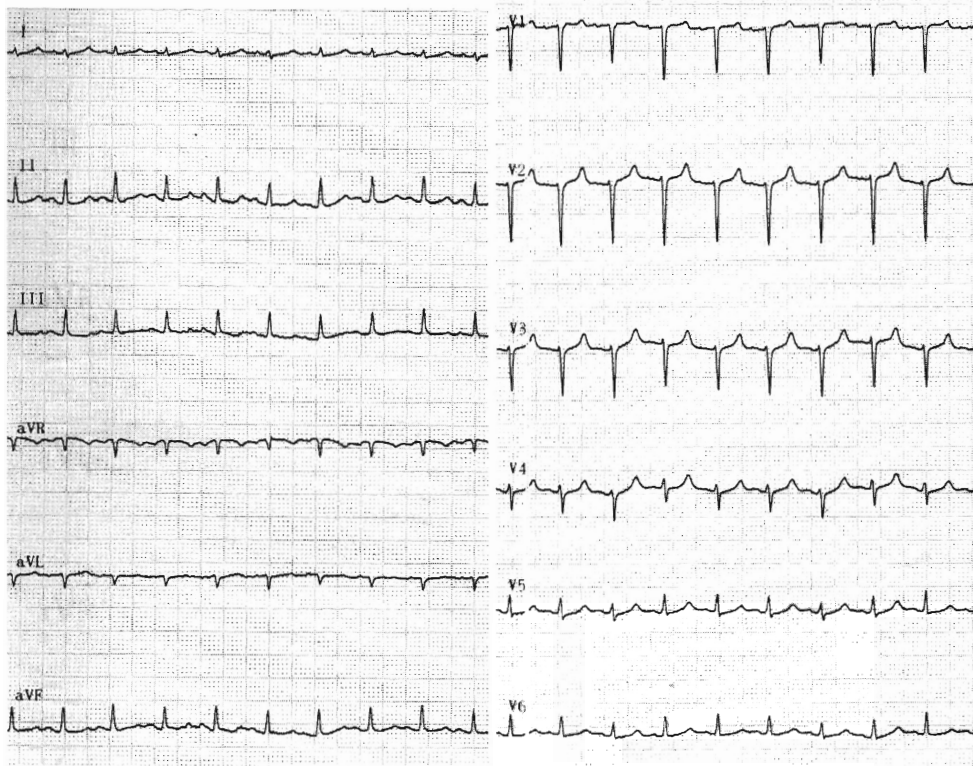


Fig. 1 Electrocardiogram
no ST-T changes were found.

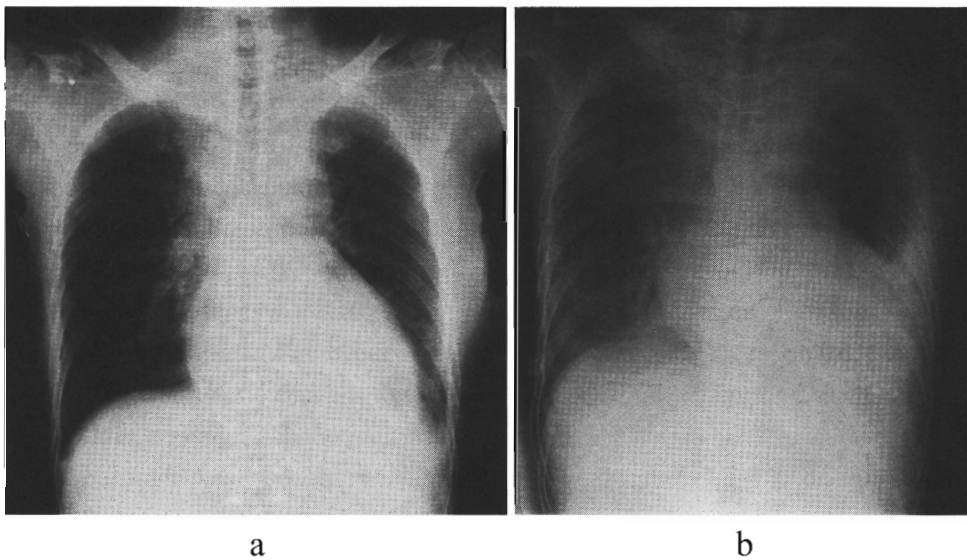


Fig. 2 Chest radiography
(a) At hospital admission: mild cardiac dilation: CTR 58%.
(b) Next day: cardiac dilation developed and an accumulation of pleural fluid.

ture metastases to other parts of the body.

Capecitabine hydrochloride was orally administered during follow-up period, when metastasis to the liver and bones developed, but no accumulation of either pleural fluid or pericardial effusion fluid

was observed. Four years and 6 months after surgery, the patient reported general malaise again and was hospitalized. At admission, cardiac dilatation was not present, but an accumulation of pleural fluid and a small amount of pericardial effusion

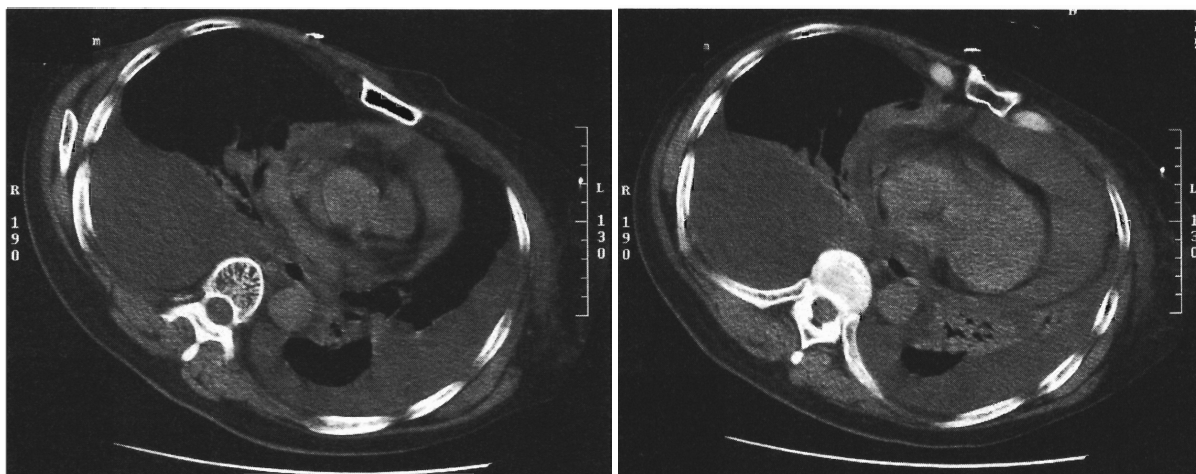


Fig. 3 Chest CT
Pericardial effusion and the accumulation of pleural fluid.

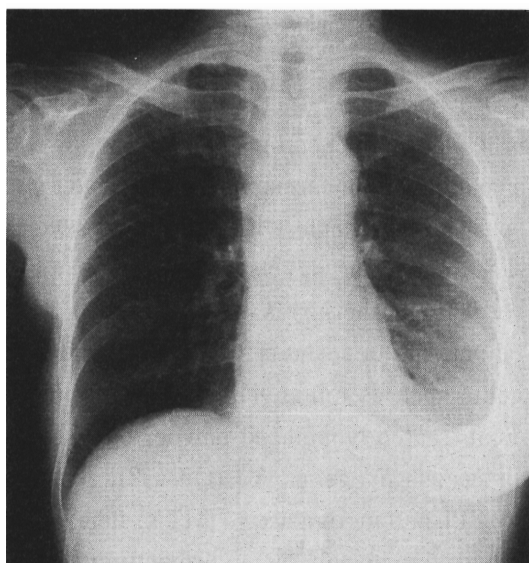


Fig. 4 Chest radiography
Recurrent accumulation of pleural fluid did not occur.

were observed (Fig. 5). However, in spite of introduction of systemic chemotherapy systemic metastasis become overwhelming, whereas there was no reaccumulation of pericardial effusion. The patient died of lymphangitic carcinomatosis 4 years and 8 months after surgery.

Discussion

The causes of pericardial effusion include leaking of blood into the pericardial cavity, heart failure, infectious pericarditis, carcinomatous pericarditis, and uremia. For males, cancerous pericardial effusion is most common in patients with lung cancer; for females, in patients with breast cancer. Other

diseases that may cause cancerous pericardial effusion include malignant lymphoma and melanoma.

Based on autopsy data, the incidence of metastasis of malignant tumor to the pericardium is reported to be 10 to 20%. More specifically, the incidence of breast cancer metastasis to the pericardium is about 10 to 35%. It is also reported that, for about 4% of the patients who died of breast cancer, carcinomatous pericarditis was the direct cause of death¹⁾⁻³⁾.

Metastasis of breast cancer to the epicardium occurs through several ways as follows: pulmonary metastasis that causes mediastinal lymph node metastasis, resulting in retrograde lymphatic metastasis due to lymphatic blockade, direct permeation, and hematogenous metastasis.

In general, typical symptoms and signs of cardiac tamponade include pulsus paradoxus, pulsus alternans, frequent pulse, weak heartbeat, and exertional dyspnea. However, patients with cardiac tamponade often have carcinomatous pleurisy or carcinomatous lymphangiosis, requiring careful examination and correct diagnosis at first visit.

Cardiac tamponade caused by cancerous pericardial effusion is an oncologic emergency that must be promptly treated. It has been reported that cardiac tamponade caused by cancerous pericardial effusion occurs in 2% of the patients with advanced recurrent breast cancer⁴⁾. Cancerous pericardial effusion usually presents with certain clinical symp-

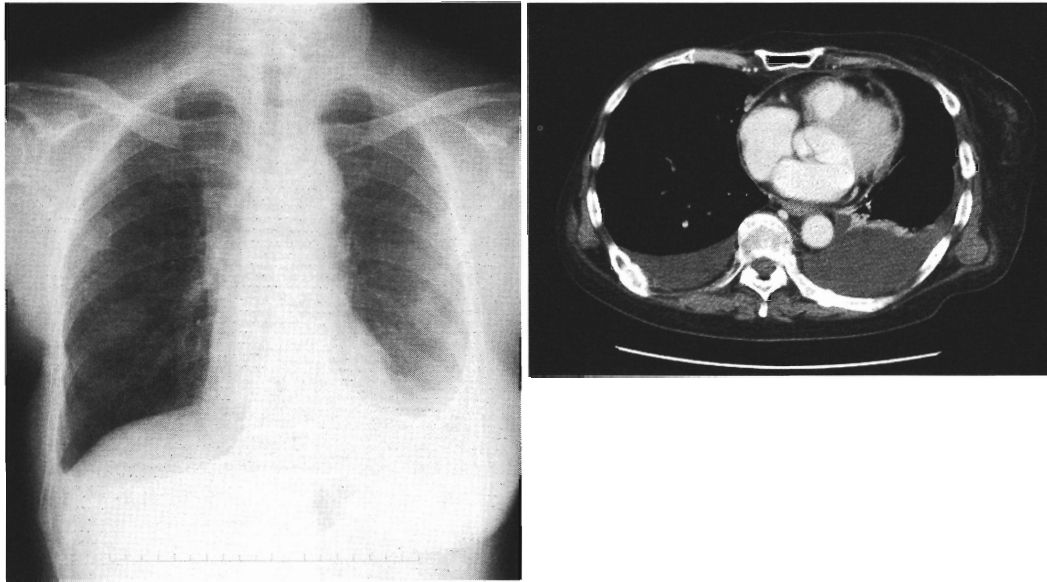


Fig. 5 Chest radiography and chest CT

Cardiac dilation was not present, but an accumulation of pleural and a small amount of pericardial effusion were observed.

toms, and needs urgent treatment. It is important to pay attention to the symptoms of this disease in order to prevent a patient's sudden death through proper medical care and judgment. It is reported that pericardial metastasis in cancer is a poor prognostic sign, but early diagnosis and treatment may result in prolonged survival.

In general, patients with solid cancer and malignant pericarditis have a poor prognosis (mean survival, 6 months). However, patients with breast cancer have a longer survival time of 10 to 13 months. Suitable systemic chemotherapy and local treatments will be effective in these patients³⁾.

One of the emergency procedures for patients with cardiac tamponade is to perform percutaneous pericardial catheter drainage from below the xiphisternum under echo guidance. The present patient underwent this procedure with a single puncture (one-time withdrawal) and had no recurrent pericardial effusion. However, it is reported that this approach results in recurrent pericardial effusion at a rate of 40 to 90%⁵⁾. In the present case, the pleural membranes were not treated. The catheter for pleural fluid drainage was removed but recurrent accumulation of pleural fluid did not occur. There was no enlargement of cardiac silhouette afterwards, although the left pleural effusion associated

with the pleural thickening appeared.

For patients with carcinomatous cardiac tamponade, pericardial drainage is required to save their life. To prevent the development of metastases in the body, chemotherapy is usually performed.

The patients undergo intrapericardial instillation of agents such as mitomycin C (MMC), penicillin and heat-treated lyophilized powder of Su-strain of *Streptococcus pyogenes* A3 (OK-432), adriamycin (ADR), EPI, and methotrexate (MTX). These agents are reported to be effective in preventing the recurrent accumulation of pericardial fluid rather than in prolonging the patient's life⁶⁻⁸⁾. One of the action mechanisms of such agents is adhesion between the epicardium and the pericardium, which is caused by secondary fibrosis induced by the lesions and inflammation associated with tumor cells inside the pericardium. However, some reports have indicated that the use of these agents may lead to complications such as further reaccumulation of pericardial fluid and constrictive pericarditis (usually fatal), so medication must be done carefully¹⁾⁻⁸⁾. It has also been reported that radiotherapy is effective in 60% of the patients with this disease^{8,9)}.

Many of the patients with breast cancer and metastasis to the pericardium usually have metastases to other organs as well; their prognosis or survival

time is not always favorable. However, it is important to manage cardiac tamponade, a potentially life threatening condition, to maintain a high level of quality of life (QOL).

Conclusion

Patients with recurrent breast cancer and its associated carcinomatous pericarditis may experience cardiac tamponade, which must be diagnosed quickly and correctly, and treated promptly to prevent sudden death. Metastasis to pericardium may signal systemic metastases but does not always mean a terminal illness. Patients with breast cancer have somewhat longer life spans than those with other types of solid cancer. It is also important to administer appropriate systemic chemotherapy after local treatment in order to prevent future metastases to other parts of the body.

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心膜転移を来した乳癌の1例

東京女子医科大学医学部第二外科学

アオヤマ ケイ カミオ タカコ オオチ テツヤ ニシザワ マサコ カメオカ シンゴ
青山 圭・神尾 孝子・大地 哲也・西澤 昌子・亀岡 信悟

乳癌の心膜転移による心タンポナーデは稀であり、進行再発乳癌症例で癌性心嚢液による心タンポナーデは2%と報告される。癌性心嚢液貯留による心タンポナーデは、迅速な対応を要し、突然死を回避すべく的確な初期治療が要求される。今回我々は心膜転移を来した乳癌の1例を経験したので、若干の文献的考察を加えて報告する。症例は52歳、女性。右炎症性乳癌の診断にて術前化学療法を施行後に、手術（兎玉変法）を施行した。病理組織検査結果はinvasive ductal carcinoma scirrhous carcinoma fl y3 v3 HG5 ER-PgR-HER2-リンパ節転移はレベルIIまで認められた。術後化学療法施行後は経過観察をしていた。術後1年8ヵ月目に鎖骨上リンパ節・脳・骨転移を来し、その後は化学療法を継続していたが、術後3年9ヵ月目に全身倦怠感、食欲不振、嘔気出現し精査加療目的に入院となった。精査にて心膜転移による心タンポナーデと診断され、エコーガイド下に緊急心嚢穿刺術およびドレナージを行った。ドレナージ後は心嚢液の再貯留は認めず軽快退院となった。術後4年8ヵ月目に癌性リンパ管炎にて死亡した。