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Subclavian brachial plexus metastasis from breast cancer: A case report

Zeng Zeng, Nan Lin, Li-Tao Sun, Cong-Xian Chen

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Abstract

BACKGROUND

The common area of breast cancer metastases are bone, lung and liver. Brachial plexus metastasis from breast cancer is extremely rare. We report a case of subclavian brachial plexus metastasis from breast cancer 6 years postoperative, which were detected by ultrasound, magnetic resonance imaging (MRI) and ¹⁸F-fluorodeoxyglucose positron emission tomography and computed tomography (FDG-PET/CT).

CASE SUMMARY

Our study reports a 64-year-old woman who had right breast cancer and underwent radical mastectomy 6 years before. Ultrasound first revealed a soft lesion measuring 38 mm × 37 mm which located on the right side of the clavicle to the armpit subcutaneously. The right subclavian brachial plexus (beam level) was significantly thickened, wrapped around by a hypoechoic lesion, the surrounded axillary artery and vein were pressed. MRI brachial plexus scan showed that the right side of brachial plexus was enlarged compared with the left side and brachial plexus bundle in the distance showed a flake shadow. FDG-PET/CT revealed that the right side of brachial plexus nodular appearance with increased FDG metabolism. These results supported brachial plexus metastasis from breast cancer. Ultrasound exam also found many lesions between pectoralis major, deltoid muscle and inner upper arm. The lesion puncture was performed under ultrasound guidance and the tissue was sent for pathology. Pathology showed large areas of tumor cells in fibroblast tissue. Immunohistochemistry showed the following results: A2-1: GATA3 (+), ER (+, strong, 90%), PR (+, moderate, 10%),

HER-2 (3+), Ki67 (+15%), P120 (membrane+), P63 (-), E-cadherin (+), CK5/6 (-). These results were consistent with the primary right breast cancer characteristics, thus supporting lesion metastasis from breast cancer.

CONCLUSION

The brachial plexus metastasis from breast cancer is uncommon. Ultrasound has great value in detecting brachial plexus metastasis of breast cancer. It is an easy, non-invasive and affordable method. Close attention should be paid to new grown out lesions in those patients who had a history of breast cancer when doing ultrasound review.

Key Words: Brachial plexus; Metastasis; Breast Cancer; Ultrasound; Magnetic resonance imaging; ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography; Case report

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Core Tip: Breast cancer metastases are commonly found in bone, lung and liver. Brachial plexus metastasis from breast cancer is extremely rare. We here report a 64-year-old woman who had brachial plexus metastasis from breast cancer. Ultrasound is an easy, non-invasive and affordable method for the detection of brachial plexus metastasis from breast cancer. Attention should be paid to new lesions in patients with a history of breast cancer when performing ultrasound review.

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INTRODUCTION

Breast cancer is the most threatening cancer in women worldwide[1]. Bones, lungs, liver and lymph nodes are common predilection sites of breast cancer metastasis[2]. Brachial plexus metastasis from breast cancer is extremely rare. So diagnosing this metastasis shows great challenging. We report a case of a 64-year-old woman who had subclavian brachial plexus metastasis 6 years after radical mastectomy. Ultrasound was the first exam to find the metastasis lesion both at brachial plexus and muscles. Magnetic resonance imaging (MRI) and ¹⁸F-fluorodeoxyglucose positron emission tomography and computed tomography (FDG-PET/CT) gave further identification of brachial plexus metastasis. Pathology and immunohistochemistry results indicated lesions between pectoralis major and deltoid muscle as metastasis from breast cancer. The diagnosis has clinical importance for the next step of treatment whether by radiotherapy, chemotherapy or hormonal therapy.

CASE PRESENTATION

Chief complaints

A 64-year-old woman went to our ultrasound department with a lesion on the right side of the clavicle to the armpit subcutaneously. Her right upper arm was edema and accompanied by pain, numbness and discomfort in the right finger.

History of present illness

The patient was diagnosed with right breast cancer 6 years before. Her primary lesion was invasive breast cancer (T₂N₁M₀), immunohistochemistry showed ER (+), PR (+), HER-2 (+++). At that time she had right radical mastectomy and accepted both chemotherapy and radiotherapy.

History of past illness

There is no history of past illness.

Personal and family history

There is no personal and family history.

Physical examination

Scars were seen in the right chest area. The arm circumference was significantly widened. The upper part of the right forearm near to the proximal elbow was edema, with greater tension, accompanied by pain, numbness and discomfort at the end of the fingers. There was no difference in the remaining limbs, and the pathological signs were not elicited.

Laboratory examinations

Blood test showed an elevated tumor marker-cytokeratin (CK) (195.1 ng/mL).

Imaging examinations

Ultrasound found a soft lesion measuring 38 mm × 37 mm which located on the right side of the clavicle to the armpit subcutaneously (Figure 1). Then series of other imaging and blood tests were done. MRI brachial plexus scan showed that the right side of brachial plexus was enlarged compared with the left side and brachial plexus bundle in the distance showed a flake shadow (Figure 2). FDG-PET/CT revealed that the right side of brachial plexus nodular appearance with increased FDG metabolism, an SUVmax of 13.7 (Figure 3). Ultrasound exam also found many lesions between pectoralis major, deltoid muscle and inner upper arm.

FINAL DIAGNOSIS

All imaging examinations suggested brachial plexus metastasis from breast cancer. Pathology showed large areas of tumor cells in fibroblast tissue. Immunohistochemistry showed the following results: A2-1: GATA3 (+), ER (+, strong, 90%), PR (+, moderate, 10%), HER-2 (3+), Ki67 (+15%), P120 (membrane+), P63 (-), E-cadherin (+), CK5/6 (-) (Figure 4).

TREATMENT

The patient underwent lesion punctuation and the lesion was sent for pathology.

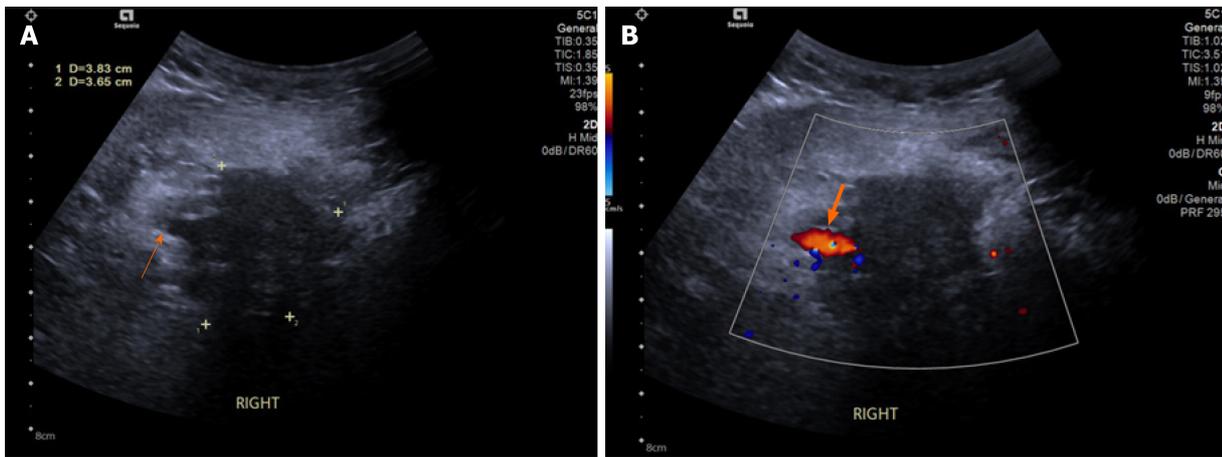
OUTCOME AND FOLLOW-UP

The patient abandoned treatment.

DISCUSSION

Breast cancer had the highest incidence rate of cancers in women worldwide[1]. The common area of breast cancer metastases are bone, brain, lung and liver. Brachial plexus metastasis from breast cancer is extremely rare. In this case report, we described a patient of subclavian brachial plexus metastasis after breast cancer. Our patient had a soft lesion located on the right side of the clavicle to the armpit on the chest wall subcutaneously. Ultrasound with high frequency probe (> 10 MHz) is vital in detecting subcutaneous lesions. It can reveal the lesion's size, shape, depth of tissue and the blood supply and give out a tendency diagnosis[3]. In our department, assessment of breast and axilla is a routine for the breast cancer patients both pre-operation and post-operation in order to find and review breast lesions and metastasis lesions. In retrospect of this patient's ultrasound images, many sonographic features suggested that the soft lesion which located on the right side of the clavicle to the armpit subcutaneously was not metastatic lymph node. First, lymph nodes have their own morphological characteristics. Metastatic lymph nodes are no exception, they have clear boundaries and regular shape. However, brachial plexus metastases do not have clear boundaries and regular shape. Second, lymph nodes have their fixed location, mostly within superficial soft tissues. While the brachial plexus nerve is located in the intermuscular space, associated brachial arteries and veins are always around them. Third, lymph nodes are often distributed in clusters and most lymph node metastasis is forward sentinel metastasis. Breast cancer mostly has axillary metastasis firstly[4]. So in view of the above characteristics, this lesion was considered as the brachial plexus metastasis.

FDG-PET/CT revealed that the right side of brachial plexus nodular appearance with increased FDG metabolism, a SUVmax of 13.7. FDG-PET/CT is a noninvasive techniques which play a vital role in cancer with the aspects of staging, restaging and treatment monitoring[5]. It is also a sensitive way to help with identifying the nature of lesions. In this case, we found brachial plexus metastasis after radical mastectomy of a breast cancer patient. This patient had right breast cancer 6 years before and also diagnosed brachial plexus metastasis on the right side this time. Increased uptake was found in right



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Figure 1 Ultrasound showed a soft lesion which located on the right side of the clavicle to the armpit subcutaneously. A: This soft lesion is 38 mm × 37 mm with blurred boundaries and uneven hypoechoic echogenicity. The lesion's boundary with the brachial plexus (orange arrow) is not clear; B: Axillary artery (the thick arrow) can be seen beside this lesion.



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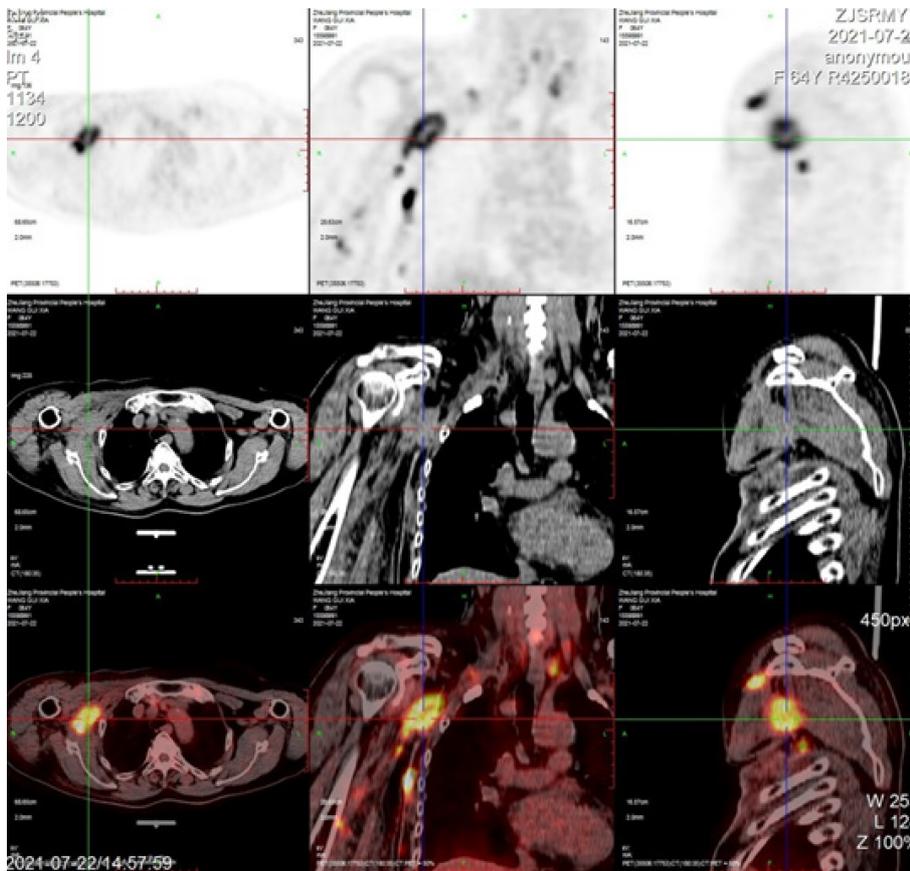
Figure 2 Magnetic resonance imaging brachial plexus scan showed the right side of brachial plexus was enlarged compared with the left side. Brachial plexus bundle in the distance showed a flake shadow.

brachial plexus with an SUVmax of 13.7. The radioactivity uptake also increased in many lesions between pectoralis major and deltoid muscle, with an SUVmax of 16.8. Thus FDG-PET/CT confirming brachial plexus and chest wall metastases.

We reviewed the literature on some novel location metastases from breast cancer. We summarized many case reports of rare metastasis of breast cancer (Table 1)[6]. It includes patients' basic characteristics, tumors' size and location. Liu *et al*[7] reported a soft tissue nodule which was located on the top left side of the scalp subcutaneously in a woman who underwent a mastectomy after diagnosed as right breast cancer. They concluded that soft tissue lesions should be given special attention in those patients with malignant cancer history. KANEKO *et al*[8] described a female patient of right invasive lobular breast carcinoma. This patient had a rare isolated gastric metastasis 7 years after right mastectomy and axillary lymph node dissection. Apodaca-Rueda *et al*[9] reported a 64-year-old female who had pancreatic metastasis 2 years after neoadjuvant therapy, mastectomy and adjuvant radiation therapy. They concluded that although pancreatic metastasis from breast cancer was rare, when the patient was detected a pancreatic lesion with breast cancer history should be considered carefully. Bakraoui *et al*[10] presented a rare case of a triple-negative breast cancer patient who was found orbital metastasis 2 mo after the end of adjuvant therapy. A case of bladder metastasis during treatment for recurrent breast cancer was reported by Yoneyama *et al*[11]. Bladder metastasis usually originates from peripheral organs such as the colon and rectum, cervix and prostate. Cancer metastasis from distant organ such as breast to bladder is really rare[11]. In these patients, early detect metastasis and treatment can help the clinical management thus influencing the prognosis and increasing patients survival. So we strongly recommend that women with breast cancer history should have a thorough examination of many

Table 1 Literature review of rare metastasis from breast cancer

Ref.	Age (year)	Gender	Size (cm)	Location
Liu <i>et al</i> [4]	52	Female	1.0 × 0.7	Scalp
Kaneko <i>et al</i> [8]	45	Female	—	Stomach
Fu <i>et al</i> [6]	63	Female	—	Stomach
Apodaca-Rueda <i>et al</i> [9]	64	Female	6.6 × 6.0 × 7.0	Pancreas
El Bakraoui <i>et al</i> [10]	43	Female	—	Orbital
Yoneyama <i>et al</i> [11]	68	Female	—	Bladder
Our case	64	Female	3.8 × 3.7	Brachial Plexus

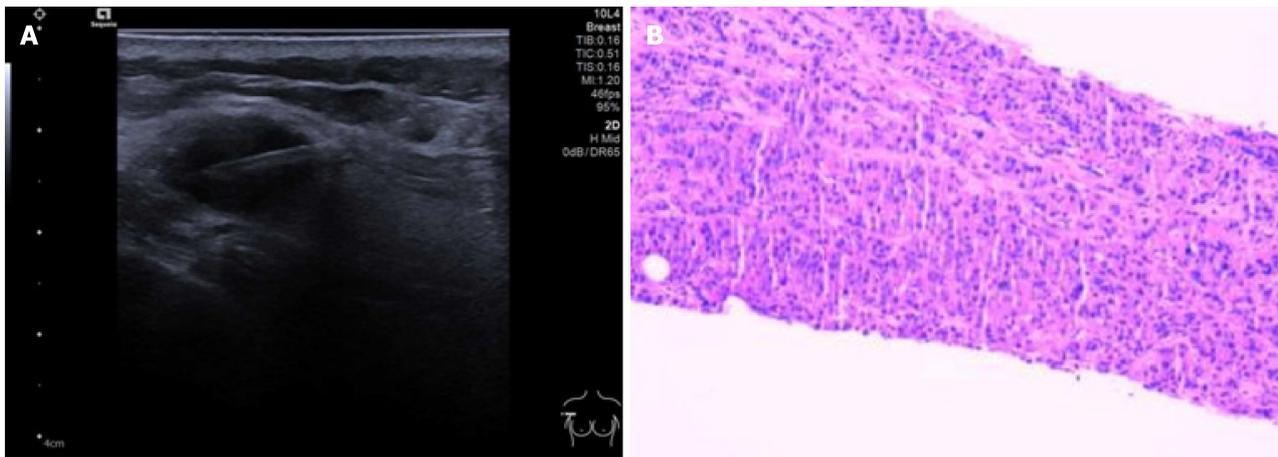


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Figure 3 ^{18}F -fluorodeoxyglucose positron emission tomography and computed tomography revealed that the right side of brachial plexus nodular appearance with increased ^{18}F -fluorodeoxyglucose metabolism, a SUVmax of 13.7.

organs not only breast but also armpits, subclavian area, abdomen, urinary system and so on once a year or more frequently.

Brachial plexus is the plexus of nerves which can supply the upper limb. It is made by the union of ventral rami of C5, C6, C7, C8 and T1 spinal nerves. Brachial plexus has roots, trunks, cords, divisions and branches. The roots and trunks variation of brachial plexus are rare, however, the origin and distribution of the branches of brachial plexus are very common[12,13]. More attention should be paid to these variations which can mislead to the assessment of the metastasis. Another important thing we should pay attention is that in the absence of breast lesions, diagnosis of metastatic cancer will be challenging and even delayed. When we diagnose a disease, we need to think logically, including understanding the patient's past and current disease history, because these are important basis for diagnosis. Physical examination and extensive investigations are needed when diagnosing metastatic carcinoma[14]. Multidisciplinary team also shows great value in diagnosing.



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Figure 4 Brachial plexus metastasis from breast cancer. A: The patient underwent lesion punctation under ultrasound guidance and the lesion was sent for pathology; B: Pathology showed large areas of tumor cells in fibroblast tissue. Immunohistochemistry showed the following results: A2-1: GATA3 (+), ER (+, strong, 90%), PR (+, moderate, 10%), HER-2 (3+), Ki67 (+15%), P120 (membrane+), P63 (-), E-cadherin (+), CK5/6 (-).

CONCLUSION

Brachial plexus metastasis from breast cancer is extremely rare. When a healthy appearance patient who had breast cancer history complains about newly grown out lesion, ultrasound and further imaging tests such as MRI or FDG-PET/CT should be carefully applied. Ultrasound is an easy, non-invasive and affordable method in detecting metastasis lesions. FDG-PET/CT is an expensive method which can help to identify the nature of the lesion. Pathology is the golden standard to identify the metastasis lesion.

FOOTNOTES

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