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A Rare Case of Primary Breast Cancer with Isolated Renal Parenchymal Metastasis Mimicking Primary Renal Cell Carcinoma

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Abstract

Breast cancer is the most frequent cancer and the leading cause of cancer-related death among females. Up to 30 percent of women with early-stage, non-metastatic breast cancer at diagnosis will develop distant metastatic disease. Renal metastasis from the breast cancer is a rare entity. We report a case of synchronized double primary breast cancer with isolated solitary metastatic to the kidney. Non-specific symptoms were occurred in routine surveillance after 4 years of initial diagnosis. 3-phase-CT and 18-F FDG PET-CT was performed subsequently. Left radical nephrectomy was performed. The histo-pathological diagnosis with immunohistochemistry was confirmed the metastasis from breast cancer. Breast cancer metastatic to the kidney may present a solitary renal mass, which mimics a primary renal tumour.

Keywords: Breast cancer; Kidney; Metastasis

Introduction

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer-related death among females worldwide. With improvements in cancer screening, therapy and supportive care, an increase in the number of cancer survivors has been seen widely. This increase in the number of cancer survivors, coupled with the widespread use of non-invasive imaging techniques, leads to an increase in the number of patients with a renal mass diagnosed during surveillance for non-renal malignancies. Despite the gains in early detection, up to 5% of women diagnosed with breast cancer in the United States have metastatic disease at the time of first presentation. In addition, up to 30% of women with early-stage, non-metastatic breast cancer at diagnosis will develop distant metastatic disease. Although metastatic breast cancer is not curable, meaningful improvements in survival have been seen, coincident with the introduction of newer systemic therapies. Women who were treated for invasive breast cancer are at risk of both a loco-regional recurrence and distant metastases [1]. Although approximately 15 to 40% of recurrences involve the chest wall and axillary or supraclavicular lymph nodes, breast cancer has the potential to metastasize to almost every organ in the body. The most common sites of distant metastases are bone, liver, and lung that have no immediate direct vascular connections with the mammary gland tissue. Organ-specific spread cannot be explained by only vascular structures, rate of blood flow, and number of tumor cells delivered [2]. The non-random pattern of metastases was explained "seeds and soil" hypothesis by Paget [3]. This hypothesis has been supported by experimental data, in which the unique properties of particular tumor cells ('seeds') and the different characteristics of each organ microenvironment ('soil') collectively determine the organ preference of metastasis [4]. Subsequent clinical researches revealed that several molecular mediators and genes whose expression specifically promotes seeding and metastatic colonization of breast cancer to bone, lung and brain underlying reason of metastatic tropism and organ-specific regrowth [5]. Approximately 50-75% of patients who relapse distantly do so in a single organ; the remainder will develop diffuse metastatic disease.

Although metastasis to the kidney is not uncommon event in postmortem series [6,7], there is limited data about renal metastases of breast cancer in the literature. We presented a case with presented with renal metastases of breast cancer after 4 years of the initial diagnosis. In the literature we have limited data about insulated renal metastasis of breast cancer. Our case is a rare breast cancer patient presented solitary renal metastasis 4 years after of initial diagnosis.

Case Report

A 45-year-old premenopausal woman had undergone right mastectomy and level 1 axillary dissection for a right-sided breast lump. The diagnosis was invasive ductal carcinoma staged at pT3N1. With immunohistochemistry, the tumor was positive (%95+++) for estrogen, (%95+++) progesterone receptors and (score 2+) HER2. Fluorescence in situ hybridization (FISH) test was performed additionally and resulted positive. Adjuvant chemotherapy with three course of fluorouracil, epirubicin and cycloposphamide (FEC) and followed by docetaxel with trastuzumab was planned. After three cycles of FEC, she admitted to the hospital with a left breast mass. 18F-FDG PET-CT was performed. There was a new primary cancer detected. Than she had undergone left mastectomy and axillary dissection for a left sided breast lump. The second tumour diagnosis was invasive ductal carcinoma staged at T1N0. With immunohistochemistry, the tumor was positive (%10+) for estrogen, (%90+++) progesterone receptors and (score 1+) (negative) HER2. After the second operation, adjuvant chemotherapy began again with three cycles of docetaxel administered, than radiotherapy was performed to the right breast and one year of trastuzumab treatment was ultimately completed. She underwent surveillance every 3 months, including breast physical examination, breast ultrasound, chest X-ray and blood test; however, no clinical or

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radiological signs of recurrence were found for 2 years. In the fourth year of diagnosis she admitted to hospital with non-specific abdominal complaints including abdominal pain and intermittent bloating. Abdominal ultrasound was demonstrated a 2 cm cortical, regularly demarcated, hypoechoic solid mass in the left kidney. Serum tumor markers (Ca15-3 and carcinoembryonic antigen (CEA) were in normal ranges as before recurrence. 3-phase dynamic computed tomography (3D-CT) and 18-F FDG PET-CT was performed subsequently. There was an exophtic cortico-medullary mass located in the middle region of left kidney (Figure 1A-1C). A hyper-metabolic solitary mass in 17×18 mm diameters was detected on 18F-FDG PET (Suv max: 7.8) (Figure 2A-2B).

Surgical intervention of the kidney was planned by multidisciplinary approach. Left radical nephrectomy was performed with negative surgical margin. The pathologic diagnosis was confirmed invasive ductal carcinoma metastasizing to the kidney. The histological characteristics of the specimen demonstrated in Figure 3. With immunohistochemistry in renal tissue, the tumor was positive (%90+++) for estrogen, (%90+++) progesterone receptors, (score 1+) (negative) HER2, focal positive GCDFP-15 and negative for (CD-10/vimentine/CK7/CK20 /CA-125). Post-metastasectomy, adjuvant chemotherapy (consisted or taxan-platinum combination) started again and hormonal treatment was planned sequencly (Figures 1-3).

Discussion

Historically, the kidney was considered to be an organ tumours rarely metastasized. In a study of 1000 autopsies in 1948, Abrams



phase.



Figure 2: (A) there was no pathological uptake of 18F-FDG except of left kidney mass, (B) hyper metabolic mass on the left kidney.

Figure 3: (A) (HEx4) at the top lymphatic tumour embolism and renal paranchyma; at the bottom tumour cells that forms ductus structures, (B) (HEx10) tumour cells invading the glomerul structures, (C) (x20 objective) ER nuclear positive tumour area and ER negative glomerul structure, (D) (x20 objective) cerb- B2 weak positive tumour area and cerb- B2 negative glomerul structure, (E) (x4 objective) CD10 positive glomerulus and renal paranchyme; CD10 negative tumour area, (F) macroscopic image: the white areas are tumour metastases; the grey areas are renal paranchyme (HE:Hematoxylin eosin staining).

et al. [6] found that the kidney was only the 12th most common organ involved with metastatic disease, with an incidence of 12.6%. Additional autopsy studies seem to support these findings; Bracken et al. [7] reported a frequency of 7.2% in >10,000 autopsies, while Klinger [8], who excluded lower gastrointestinal and gynaecological tumours, reported a more conservative rate of 2.36%.

Although microscopic metastases to the kidney from breast cancer are fairly common at autopsy, clinically manifested renal metastasis is rare [9,10]. There are a few case reports on the symptoms and radiological appearance of breast cancer metastatic to the kidney [11-15]. The majority of patients with renal involvement by other tumours also have widely metastatic disease to other organs [16,17], on the contrary the renal tumor in our patient was a regularly demarcated solitary mass, and this is a less common appearance for a metastatic renal tumor. The presence of solitary renal metastasis without evidence of a disseminated non-renal malignancy is rare and the role of nephrectomy in patients with such disease is not well established [18]. CT and USG findings are non-specific. Some studies have found exophytic masses to be more indicative of metastasis on CT [19,20]. More frequent renal masses such as angiomyolipomas can be detected at conventional imaging methods in the patient with solid tumor history. Clinicians should be careful about the differential diagnosis between benign and malignant renal masses and also despite of rarity malignant tumor metastasis in to benign renal mass. Diego at al. reported an unusual case of breast cancer metastatic to a benign renal mass [21]. PET-CT findings were critical for these cases. Similar to our case, pathological FDG uptake was observed and post-surgical pathology confirmed a 2 cm metastatic mammary carcinoma with in a 6 cm angiomyolipoma [21].

The presentation of renal recurrence is usually asymptomatic,

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as it seems in our patient. In different studies, median time between initial diagnosis and of renal recurrence was reported as 26-63 months [21,22]. In our case, this time was 48 months as expected from Luminal like tumors. In the literature, renal metastasis was accomplice by disseminated disease. Our case is presented with solitary renal metastasis; there is no evidence of other metastatic sites. Similarly there were two retrospective studies of surgical databases, kidney as the first site of metastasis was found in significant ratio, 54% and 37% respectively [22,23]. As well as the breast carcinomas, metastasis to the kidney was reported as a part of disseminated disease and aggressive clinical course of malignant phyllodes tumor of breast [24].

In conclusion, metastases to the kidney are still a rare entity. The most common primary tumour sites are lung (43.7%), colorectal (10.6%), head and neck (6%), breast (5.3%) and thyroid (5.3%). Renal metastases are typically solitary and asymptomatic. Surgical intervention in carefully selected patients with oligo-metastatic disease and good performance should be considered. Although bone, lung and liver are still the most common sites of distant metastases in patients with breast cancer; renal metastases become conspicuous sites in the literature findings. This information should be in mind during active surveillance.

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