Breast metastasis from clear cell renal cell carcinoma

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Abstract In Western countries, breast cancer is the most common cancer in women, whereas metastases to the breast from extramammary malignancies are extremely rare. We present the case of a 60-year-old woman, who underwent surgery in 2007 for clear cell renal cell carcinoma and who 4 years later presented with a breast metastasis from clear cell renal cell carcinoma.

Riassunto Il tumore della mammella rappresenta, nei paesi occidentali, la neoplasia più frequente della donna; le metastasi mammarie da tumori extramammary, al contrario, sono estremamente rare [1, 2]. Presentiamo il caso di una donna di 60 anni, operata nel 2007 per una neoplasia del rene a cellule chiare, che 4 anni dopo l'intervento ha presentato una metastasi mammaria da neoplasia renale a cellule chiare.

Keywords Breast metastasis · Clear cell renal cell carcinoma · Breast ultrasound

Introduction

Metastases to the breast from extramammary malignancies are extremely rare [1, 2]. Renal cell carcinoma is considered a rare source of breast metastases and only a few cases are reported in the literature.

As a contribution to the literature, we present a case of a patient treated at the department of medical oncology of our institution for a breast metastasis from clear cell renal cell

carcinoma. The purpose of this article is to increase knowledge about breast metastases originating from extramammary malignancies and to emphasize the usefulness of integrated imaging (mammography, ultrasound and magnetic resonance imaging) in the diagnosis of breast lesions.

Presentation of the case

The patient's history of cancer started in 2007 when her right kidney was removed after an incidental finding of a lesion measuring 5.4 cm located at the upper pole of the right kidney. Histological analysis revealed conventional clear cell carcinoma Fuhrman Grade 2, maximum diameter 5.4 cm. The lesion had invaded the perinephric fat, but did not involve the renal vessels and the ureter.

Subsequent clinical and instrumental follow-up examinations were negative for recurrent disease until 2009. In October 2009, contrast-enhanced computed tomography (CT) scanning showed a right adrenal lesion, and the patient therefore underwent right adrenalectomy. Histological examination revealed adrenal localization of clear cell carcinoma (immunophenotype positive for vimentin and CD10).

Clinical instrumental follow-up was continued until April 2011 when a screening mammogram revealed "... attenuation in the lower left breast where a small area of nonspecific thickening is visible...". Breast ultrasound (US) revealed "... a nodule in the lower inner quadrant characterized by rich intralesional vascularization, elastography pattern E4..." Breast magnetic resonance imaging (MRI) showed "... a small enhanced area in the left breast suggestive of a round nodule with smooth edges, measuring about 5–6 mm in diameter, rapid contrast agent uptake and subsequent plateau...."

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Fig. 1 Neoplastic nodule with well-defined edges characterized by clear cells, intense vascularization and a central area of hemorrhage

Fig. 2 Neoplastic cells positive for CK10 IHC for CK10 (DAKO cl.56C6), 200×

The patient underwent fine-needle aspiration cytology (FNAC), but the sample was inadequate. Owing to the intense vascularity of the lesion and the risk of bleeding, biopsy was not performed and the patient underwent surgery for excision of the nodule. Histological examination revealed richly vascular secondary neoplasm characterized by clear cells and with areas of hemorrhage (Fig. 1) surrounded by a ruptured fibrous capsule with inflammatory infiltrate (Fig. 2). Contrast-enhanced CT scan performed before surgery showed no other distant metastases.

Discussion

Metastases to the breast from extramammary malignancies account for 0.2–1.3 % of all malignant breast lesions, and renal cancer ranks fifth among primary extramammary

malignancies after lymphoma, melanoma, lung cancer and ovarian cancer [3, 4].

Breast imaging is based on three diagnostic tools: mammography, US and contrast-enhanced magnetic resonance imaging (MRI), when required. In most cases, the combination of color and power Doppler, elastography, and contrast-enhanced MRI will define the morphological and dynamic aspects of the lesion indicating the possible need for more invasive investigation methods also including removal of the lesion.

Differential diagnosis of benign and malignant nodules is based on simple and clearly defined parameters for each of the three methods. The outcome of integrated imaging can lead to further preoperative investigation such as FNAC, core biopsy or vacuum biopsy. In this way, it is possible to achieve a diagnosis regarding the nature of the lesion through a cytology test (FNAC) or a histology test (core or vacuum biopsy).

The patient of this case report underwent routine mammography 24 months after the previous mammography. The mammogram evidenced a small opaque area in the left breast of about 1 cm in diameter with a regular and well-defined outline [5]. US examination was therefore performed revealing a solid hypoechoic nodular formation in the same site with quite regular margins; both color and power Doppler showed intense vascularity. Elastography revealed a totally inelastic and stiff lesion which was classified as E4. (Fig. 3).

Unlike mammography which only raised a diagnostic suspicion because the image was different from the one obtained 2 years earlier, US clearly showed a lesion with suspicious morphological characteristics due to the intense vascularization (Fig. 4) and absence of elasticity. US-guided FNAC was performed, but the sample was inadequate due to the presence of blood cells. It was therefore decided

Fig. 3 Elastography shows a lesion classified E4

Fig. 4 Power Doppler shows intense intralesional vascularization

not to perform a tru-cut biopsy, as the intense vascularization of the lesion increased the risk of bleeding. However, the likelihood of an angioma was quite remote owing to the opacity shown on the mammogram and the elastography score of E4.

Contrast-enhanced MRI was then performed showing a very rapid uptake of contrast agent at the site of the lesion, thereby confirming the previous hypothesis of an expansive lesion. The perfect regularity of the margins combined with intense vascularization furthermore led the clinicians to suspect that the lesion might be a breast carcinoma with unusual morphological characteristics.

The patient underwent surgical removal of the nodule which was non-palpable and therefore localized by the radio-guided occult lesion localization (ROLL) technique. Possible detection of the sentinel lymph nodes was prepared by sentinel node and occult lesion localization (SNOLL) in case extemporaneous histological examination should identify the presence of a primary carcinoma of the breast.

Extemporaneous histological examination diagnosed metastasis from clear cell renal cell carcinoma. This diagnosis was later confirmed by the definitive histological examination which revealed the morphology of the cells and their immunohistochemical positivity for vimentin and CD10. Resection margins were not further enlarged and sentinel nodes were not removed. In case of metastatic renal carcinoma, surgery [6] is aimed at freeing the patient from all metastatic lesions and at achieving long-term survival in patients with a good performance status.

In 1939 [7] Barney and Churchill reported the first case of a patient who underwent nephrectomy and pulmonary resection because of metastases from renal cell cancer and died 23 years later from cardiovascular disease. Since then,

numerous studies have been conducted and have permitted certain prognostic factors to be identified, such as the number of metastatic sites, the possibility of complete resection, the patient's performance status and disease-free survival (DFS) from the first operation for the primary tumor [8].

These studies have shown that patients with a good performance status, a single metastasis (above all pulmonary) and DFS >1 year [9] have the possibility to achieve a longer overall survival than other patients. The Progrebniak et al. [10] study demonstrated that patients with removable metastases have a longer overall survival than patients with non-removable metastases. In addition to this, the Memorial Sloan-Kettering Cancer Center (MSKCC) study evidenced that the average survival of patients undergoing nephrectomy followed by resection of a metastasis is about 30 months.

Although the curative effect of resection of metastasis is still uncertain, its role in palliative care is indisputable, particularly in case of symptomatic metastases.

In conclusion, it can be said that the peculiar natural history of the disease and the different characteristics of the imaging methods make it clear that a correct diagnosis is achieved through a combination of the different techniques and that management of these diseases requires a multi-disciplinary approach (surgeon, oncologist, radiologist, anatomical pathologist).

Conflict of interest Andrea Botticelli, Gian Paolo De Francesco and Domenica Di Stefano declare that they have no conflict of interest in relation to this paper.

Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

References

1. Gacci M, Orzalesi L, Distant V, Nesi G, Vezzosi V, Livi L et al (2005) Renal cell carcinoma metastatic to the breast and breast cancer metastatic to the kidney: two rare solitary metastases. *Breast J* 11(5):351–352
2. Alzarra A, Vodovnik A, Montgomery H, Saeed M, Sharma N (2007) Breast metastasis from a renal cell cancer. *World J Surg Oncol* 5:25
3. Forte A, Peronace MI, Gallinaro LS, Bertagni A, Prece V, Montesano G et al (1999) Metastasis to the breast of a renal carcinoma: a clinical case. *Eur Rev Med Pharmacol Sc* 3:115–118

4. Durai R, Ruhomaulu SN, Wilson E, Hoque H (2009) Metastatic renal cell carcinoma presenting as a breast lump in a treated breast cancer patient. *Singapore Med J* 50:e277–e279
5. Lee WK, Cawson JN, Hill PA, Hoang J, Rouse H (2007) Renal cell carcinoma metastasis to the breast: mammographic, sonographic, CT, and pathologic correlation. *Breast J* 13:316–317
6. Kavolius JP, Mastorakos DP, Pavlovich C, Russo P, Burt ME, Brady MS (1998) Resection of metastatic renal cell carcinoma. *J Clin Oncol* 16:2261–2266
7. Russo P, Synder M, Vickers A, Kondagunta V, Motzer R (2007) Cytoreductive nephrectomy and nephrectomy/complete metastasectomy for metastatic renal cancer. *ScientificWorld J* 7:768–778
8. Eggener SE, Yossepowitch O, Kundu S, Motzer RJ, Russo P (2008) Risk score and metastasectomy independently impact prognosis of patients with recurrent renal cell carcinoma. *J Urol* 180:873–878
9. Motzer RJ, Mazumdar M, Bacik J, Berg W, Amsterdam A, Ferrara J (1999) Survival and prognostic stratification of 670 patients with advanced renal cell carcinoma. *J Clin Oncol* 17:2530–2540
10. Pogrebniak HW, Haas G, Linehan WM, Rosenberg SA, Pass HI (1992) Renal cell carcinoma: resection of solitary and multiple metastases. *Ann Thorac Surg* 54:33–38