Radiology Case Reports 16 (2021) 945–949

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journal homepage: www.elsevier.com/locate/radcr

Case Report

Metastatic renal cell carcinoma initially presenting as a unilateral breast lump

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ARTICLE INFO

Article history:
Received 12 January 2021
Revised 1 February 2021
Accepted 4 February 2021

Keywords:
Breast
Metastasis
Renal
Carcinoma
Oncology

ABSTRACT

Breast metastasis from primary renal cell carcinoma is a rare entity and infrequently reported in the literature. We present a case of a 65-year-old lady who presented to breast clinic with a 4-month history of rapidly growing right sided breast lump. She previously had a left mastectomy for breast cancer and a hysterectomy for endometrial cancer. Radiological evaluation with mammography and ultrasound revealed a large heterogeneous right breast lump with prominent vascularity which was biopsied. Histopathological and immunohistochemical features were not supportive of a primary breast carcinoma and favored metastasis from a renal tumor. The patient was unfortunately admitted to hospital due to increasing confusion and neurological symptoms and underwent whole-body cross-sectional CT imaging which demonstrated a giant tumor originating from the right kidney with associated intrathoracic, breast and intracranial metastasis. She was diagnosed with eosinophilic variant metastatic renal cell carcinoma. This case highlights the importance of considering alternative diagnoses to primary breast carcinoma in the context of an initial presentation of a unilateral breast lump.

Introduction

Kidney cancers are the seventh most common type of cancer in the UK, and the 13th most common cause of cancer-related deaths. Renal cell carcinoma (RCC) describes those arising from the renal parenchyma or cortex and account for approximately 80% of all kidney cancers. After a number of years of increasing rates, worldwide incidence and mortality are plateauing due to widespread use and high sensitivity of non-invasive imaging techniques (such as ultrasound [US] and computerized tomography [CT]) which allow for the detection of small asymptomatic masses, which are more amenable to treatment [1]. Risk factors include male sex, end-stage renal failure, smoking, obesity and hypertension, with a

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https://doi.org/10.1016/j.radcr.2021.02.006

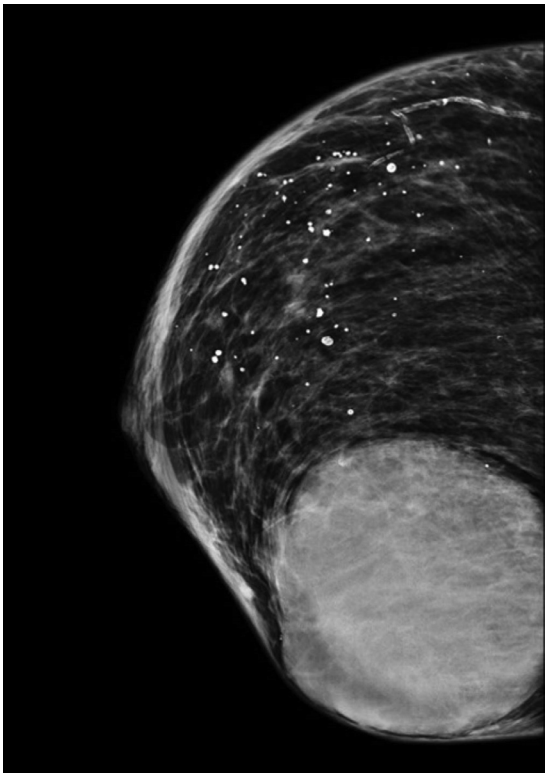

Fig. 1 – Craniocaudal (CC) view of the right breast showing a 6.3 x 5.6cm lesion within the lower inner quadrant as well as peripheral scattered benign calcific foci on a background of mixed density breast parenchyma. The lesion was given a BI-RADS score of M5.

small percentage being associated having a hereditary cause such as von-Hippel Lindau disease. Localized disease is often treated with surgery, with a 5-year survival rate of 92%, whereas metastatic disease has a poor prognosis and is associated with a lower 5-year survival rate of 12% [2].

Metastasis to the breast is an uncommon presentation and often indicates widespread dissemination of the primary malignancy. The most common source of a metastatic breast lesion is a contralateral breast malignancy and well reported extra-mammary sources include ovarian adenocarcinoma, lung adenocarcinoma, melanoma and uterine leiomyosarcoma [3].

We present a unique case in which a 65-year-old patient presenting with a breast lump was diagnosed with advanced RCC with metastatic spread to the breast.

Case description

A 65-year-old lady presented to the breast clinic with a 4-month history of a growing right sided breast lump. She had a past medical history of a previous left breast malignancy for which she had a left mastectomy and left axillary lymph node clearance, hysterectomy for previous endometrial cancer, hypertension and paranoid schizophrenia. She underwent a mammogram of the right breast which demonstrated a large rounded density measuring 6.3 × 5.6 cm within the lower inner quadrant (Fig. 1). The right breast also contained scattered

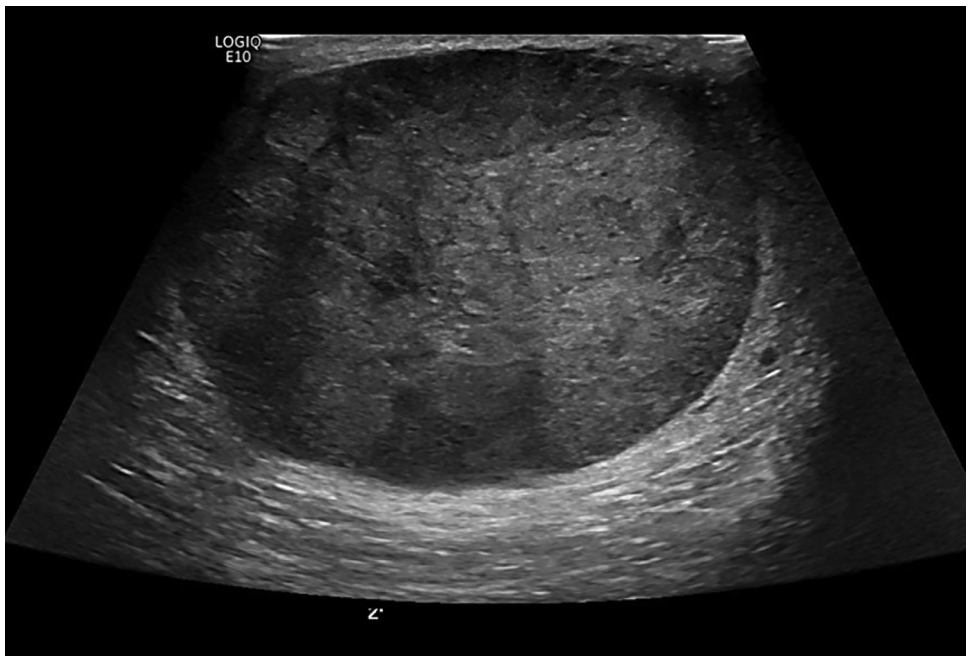

Fig. 2 – Ultrasound of the right breast demonstrating a large, heterogeneous, well-defined lesion within the lower inner quadrant measuring 6.2 x 4.5cm. 4 x 14 gauge core biopsies were obtained.

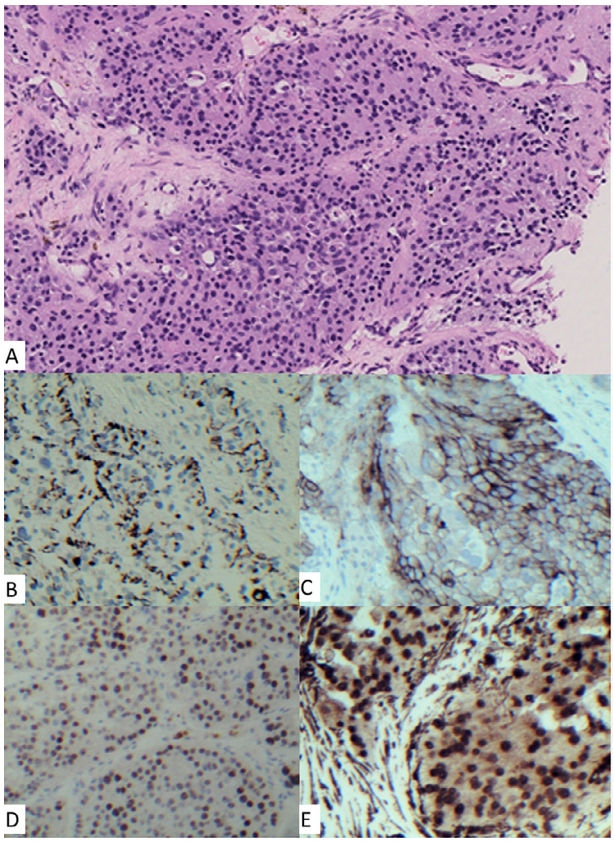

Fig. 3 – (A) The photomicrograph shows a routine haematoxylin and eosin stained section of the breast lesion biopsy. There is nodular proliferation of atypical cells demonstrating cellular pleomorphism, eosinophilic cytoplasm and frequent mitosis. (B) There is high immunoreactivity to the epithelial marker MNF 116. Tumour cells also show immunopositivity for (C) CD 117, (D) PAX-8, and (E) vimentin. Immunohistological features supports origins in renal cell carcinoma.

coarse calcific foci on a background of mixed density breast parenchyma.

An US of the right breast was subsequently performed which showed a large, heterogeneous, well-defined lesion within the lower inner quadrant measuring 6.2 × 4.5 cm which demonstrated significant internal vascularity (Fig. 2). No further lesion was identified within the right breast and there was also no evidence of right axillary lymph node enlargement. Following informed consent, 4 × 14-gauge core biopsies were obtained from the right breast lesion under US guidance.

Histopathological analysis of the core biopsy specimens showed hemorrhagic cores of tissue showing an aggressive tumor formed by nodular proliferation of cells with nuclear pleomorphism and an eosinophilic cytoplasm. A large panel of immunohistochemical markers were performed for further characterization (Fig. 3). The histomorphology and immunohistochemistry did not support a diagnosis of primary breast carcinoma and favored RCC.

Shortly after the discussion of these atypical findings in the breast multidisciplinary team meeting, the patient was

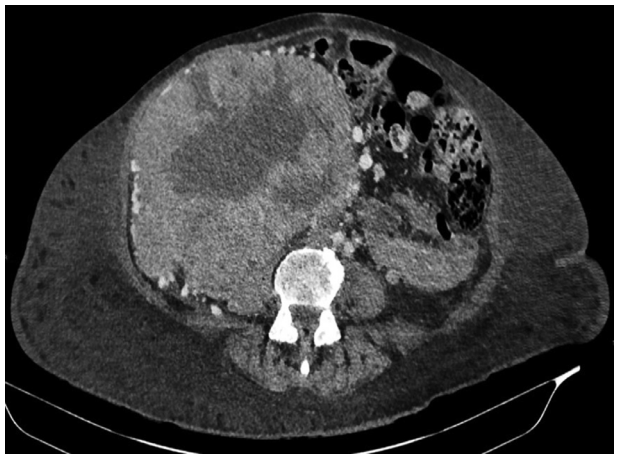

Fig. 4 – Axial CT slice of the abdomen and pelvis demonstrating a giant, centrally necrotic tumour arising from the right kidney causing local mass effect and extensive venous collateralisation.

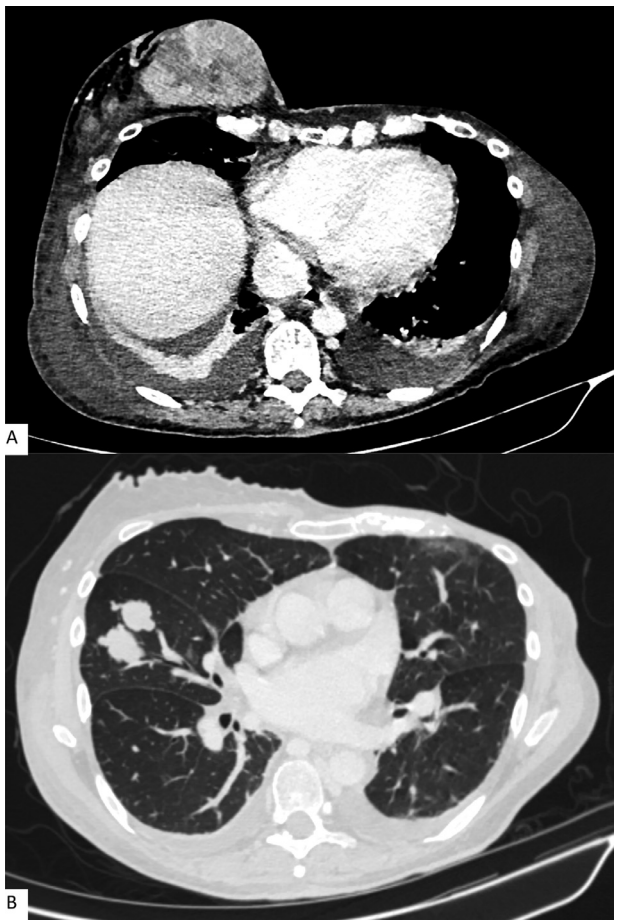

Fig. 5 – (A) Axial CT slice of the thorax depicting the large, heterogeneous right sided breast lesion and bilateral pleural effusions. (B) Axial CT in lung windowing reformat illustrating multiple metastatic deposits in the right lung.

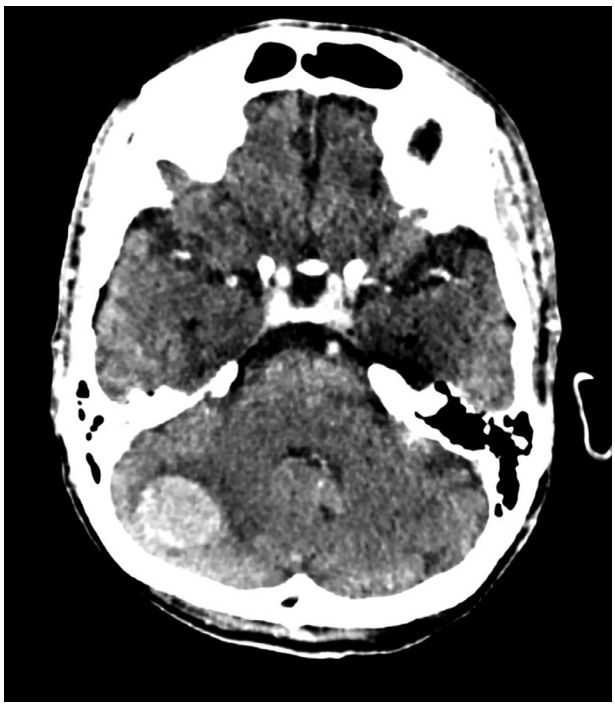

Fig. 6 – Axial CT head slice demonstrating a 22 × 19 × 18 mm rim enhancing lesion, with surrounding vasogenic oedema within the right lobe of the cerebellum, exerting mass effect within the fourth ventricle.

admitted to hospital with confusion and a reduced glasgow coma score. A CT head, thorax, abdomen and pelvis scan with contrast was performed which revealed a giant right intra-abdominal, heterogeneous mass arising from the right kidney causing inferior vena cava compression and extensive venous collateralization (Fig. 4). The large right sided breast lesion was once again demonstrated alongside bilateral pleural effusions and metastatic deposits in the right lung (Fig. 5). Furthermore, within the right lobe of the cerebellum, there was a 22 × 19 × 18 mm rim enhancing lesion, with surrounding vasogenic oedema exerting mass effect within the 4th ventricle (Fig. 6). After correlating the radiological and pathological findings, the patient was diagnosed with eosinophilic variant metastatic clear cell carcinoma.

Due to the patient's comorbidities and rapid deterioration, the patient was deemed an unfit candidate for neurosurgical intervention and unfortunately passed away due to effects of raised intracranial pressure.

Discussion

In a patient presenting with a breast lump with a history of breast cancer, it is reasonable to have a high suspicion for recurrence. Secondary breast tumors account for 2%-3% of all mammary malignancies and the contralateral breast is by far the most common source [3,4]. In a recent American study of 332 patients with a history of breast cancer, contralateral breast/chest wall disease comprised 3% of all recurrences [5].

Extramammary sources of secondary breast tumors have been described – the most common solid tumors being melanoma, lung cancer, gynecological tumors, and intestinal tumors. The exact proportions of each vary in the literature [3,4,6]. They typically present in the fifth or sixth decade in patients with a known history of cancer. Approximately three quarters of patients have other metastases at the time of diagnosis and in 11%, the breast lesion is the first presenting feature. In those with a known history of extramammary cancer, the median interval between diagnosis of a primary non-mammary malignancy and secondary breast disease is 4.5 years [3]. These factors are particularly important to consider since the patient in this case report had a previous history of uterine malignancy and contralateral breast malignancy which one may assume as the initial culprit malignancies causing breast metastasis.

Metastatic disease in the breast from an extramammary source is an indicator of poor prognosis, as it is generally associated with disseminated disease [7]. Hematogenous spread typically forms well-circumscribed masses and may mimic benign breast masses such as fibroadenomas. Lymphatic dissemination often causes more diffuse changes, such as oedema and skin thickening, mimicking inflammatory breast conditions [8]. The size of the mass on examination tends to be more representative of the true size confirmed on imaging as compared to primary breast tumors. This is because of surrounding fibrous proliferation in the latter [6].

Radiologically, lesions are typically singular and round or oval in shape with well-circumscribed margins. As opposed to primary breast lesions, calcifications and spiculated margins are uncommon [9]. Specific histological features of the tissue of origin are present in two-thirds of cases. However, in the remaining one third, a detailed history and cross-sectional imaging of the rest of the body are essential [7]. Solitary deposits may be amenable to surgical excision, with or without adjuvant systemic therapy or radiotherapy. In disseminated disease, the suitability of systemic therapy depends on the source tissue of the malignancy and its biomarkers. In some, a palliative approach will be most appropriate.

Population-based data suggests the vast majority of metastases in renal cancer are accounted for by just a few sites. In a study of 180,000 patients from the Swedish Cancer Registry, over half of metastases were found in the lung, a third in bone and a quarter in the liver. Approximately a third of patients have metastatic disease at the point of diagnosis [10].

To our knowledge, there are a total of 29 published cases of breast metastases from RCC, with ages ranging from 14 to 88 [median age 66). In 7 cases (24%), the diagnosis of RCC and breast metastasis was made simultaneously. In the remaining 22 cases (76%), there was a known history of RCC, all of whom had previously been treated with nephrectomy. The interval between initial diagnosis and finding of breast metastasis ranged between 10 months and 21 years, with a median interval of 5 years [11].

The gold standard of diagnosis is histopathology and supplementary immunohistochemistry. Intracellular proteins such as vimentin [12] and PAX-8 [13] have excellent diagnostic sensitivity for the detection of RCC, both of which were positive in the biopsy of our patient and raised the initial suspicion of an extramammary metastatic source.

Although breast metastases are uncommon, this case highlights the importance for radiologists to consider extra-mammary primary causes of breast lesions as a diagnosis in the context of a unilateral breast lesion, especially those displaying atypical radiological features.

Patient consent

The authors of this manuscript have obtained written, informed consent from the patient to write up the case report and for the use of images pertinent to the case. We have ensured anonymity of all clinical and graphical data used.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2021.02.006.

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