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A Rare Case Scenario and Literature Review on Breast Cancer and Renal Cell Carcinoma

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Abstract

It is generally known that primary cancer can develop in multiple organ systems. Kidney cancer has been most frequently linked to synchronous tumors. The most frequent synchronous primary cancers known to date with Renal Cell Cancers are bladder, prostate, colorectal, and lung cancer. In our study of the literature, which included both metastatic cancer and second primary, we discovered metachronous breast tumors with Renal Cell Carcinoma. The literature has discussed breast cancer occurring simultaneously with one or more other cancers, such as those of the colon, vulva, lung, larynx, liver, uterus, and kidneys. However, breast and kidney cancer occurring simultaneously is extremely rare. We are describing a case of synchronous breast cancer presentation with Renal Cell Carcinoma in this article, which is quite uncommon given that the majority of multiple malignancies documented in the literature are either metastatic tumors or metachronous breast cancers with Renal Cell Carcinoma.

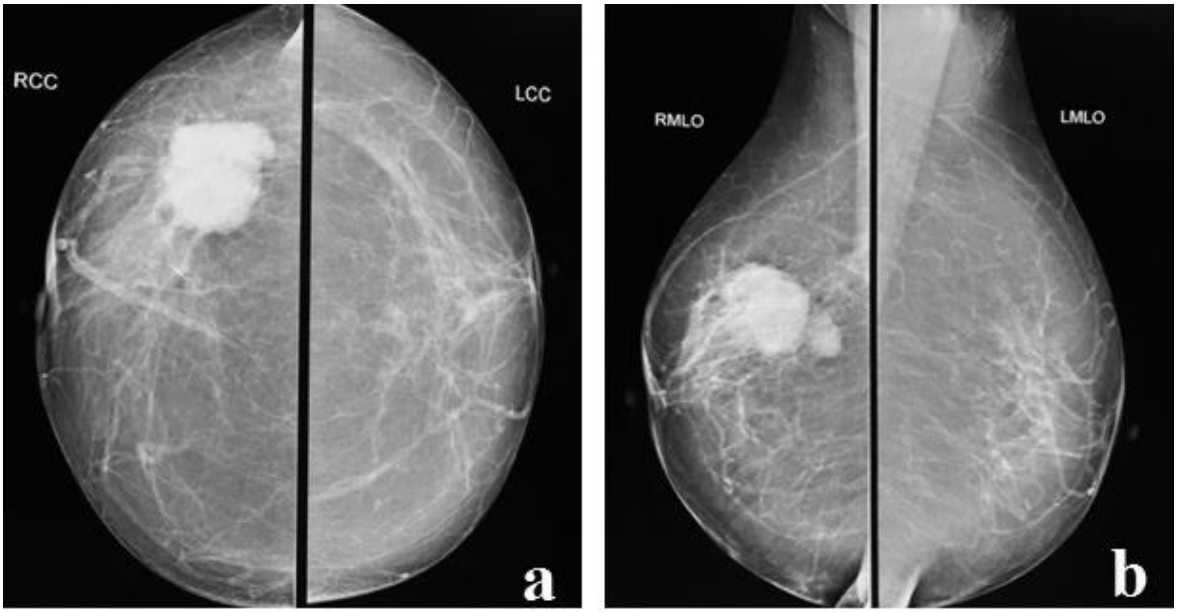
Introduction

Multiple malignancies in one patient are an uncommon occurrence, and the prevalence of synchronous neoplasms is lower than that of metachronous tumors (1). Synchronous tumors are defined as the occurrence of a second tumour at the same time as the first or during the first 6 months after diagnosis (2). Metachronous tumors are secondary neoplasms that do not follow this norm. Multiple primary malignant tumors become more common as people become older. In addition to this, the presence of a family history and genetic susceptibility are risk factors.(3)

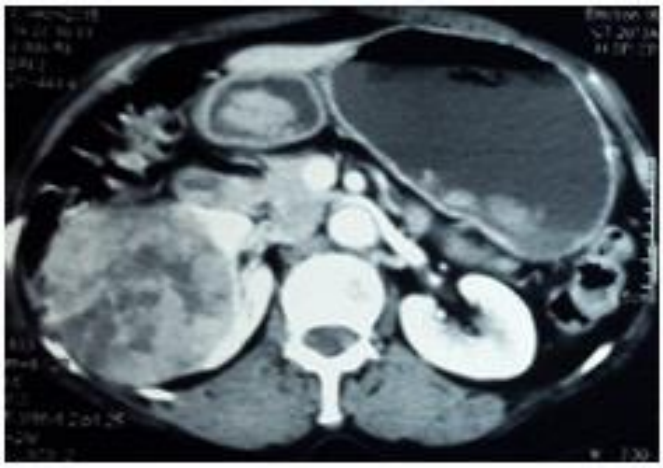
Breast cancer is the most frequent kind of cancer in women. Renal Cell Carcinoma, on the other hand, is the most frequent kidney tumour, accounting for 2-3% of all malignancies in adults (4). The occurrence of breast cancer in conjunction with one or more other types of cancer, such as the colon, vulva, lung, larynx, liver, uterus, and kidneys, has been reported in the literature (4). The relationship of kidney cancer with synchronous and metachronous cancer in homologous organs has been established in the literature (1, 5). However, cases of simultaneous breast and kidney cancer are extremely rare (1, 4).

Case Report

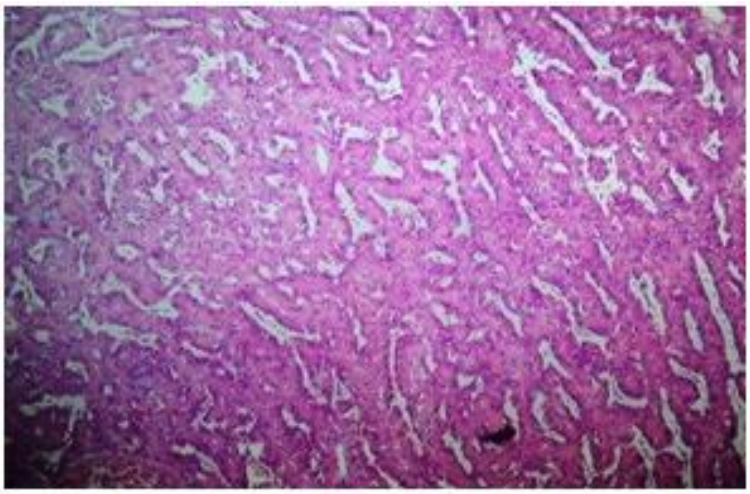
A 45-year-old female patient reported to the Department of Radiation Oncology with main symptoms of abdominal discomfort and lack of appetite that had been eased by oral analgesics for the previous six months. There is no pertinent history or family history. The abdominal and pelvic examinations were normal clinically. During the general examination, we discovered a 2.5 x2.5 centimetre mobile, hard lymph node in the right axilla, as well as an 8x6cm mobile mass in the upper outer quadrant of the ipsilateral breast. The axilla and contra lateral breast were normal. According to our institution protocol, a regular and metastatic workup of ultrasonography abdomen and pelvis, X-ray of chest, and bone scan were performed. Mammogram revealed nodular, irregular, homogeneous density with tail-like extension measuring 3 cm x 2.6 cm and a satellite lesion measuring 1.6 cm x 1.3 cm in the right axillary tail, both of which were strongly indicative of malignancy (BIRADS V category; [Table/Fig-1a&b]).



[Fig-1a,b] Represents Breast Mammography in (a) Cranial - caudal view. (b) Medio-lateral view. The Breast Mammogram shows nodular irregular homogeneous density present in upper outer quadrant of right breast (Birads v – highly suggestive of malignancy).



[Fig-2]: Contrast Enhanced Computed tomography scan showing heterogeneously enhancing mass lesion in upper and middle pole of the right kidney.



[Fig-3]: (haematoxylin and eosin stained Nephrectomy specimen showing papillary renal cell carcinoma

There were many axillary nodes, the largest measuring 1.8 cm × 1.2 cm. The presence of FNAC in a breast lump suggested ductal cancer. An ultrasound of the abdomen revealed a tumour in the upper pole of the right kidney. Other metastatic workups, such as an X-ray of the chest, a bone scan, and standard hematological testings were normal. To evaluate the renal mass, a contrast enhanced computed tomography scan of the abdomen was performed, which revealed a heterogeneously enhancing mass lesion in the upper and mid pole of the right kidney abutting the liver and ascending colon with focal loss of fat planes [Table/Fig-2]. A Multidisciplinary Tumour Board met to discuss the case.

After informed consent and adequate counselling of the patient regarding the nature of the illness, a right modified radical mastectomy with a right radical nephrectomy was performed in a single setting. Intraoperatively, a right kidney mass of about 7.5 cm × 4.3 cm was discovered, with fat planes maintained with the colon, IVC, and liver. There were no enlarged nodes seen. She tolerated the treatment well and had an uncomplicated postoperative phase. The final histology report of the kidney revealed signs of papillary Renal Cell Carcinoma (RCC) with foamy macrophage aggregates and Fuhrman nuclear grade III. The capsule was complete, with tumor-free margins [Fig-3].

Breast specimen revealed grade III invasive ductal carcinoma (no special kind) with cancer free margins and metastatic deposits from ductal carcinoma of the right breast were found in seven of the twelve right axillary lymph nodes. Hormonal receptor study revealed oestrogen receptor positivity in the breast but not in the kidney, ruling out the possibility of metastasis to the kidney or vice versa. We established a definitive diagnosis of carcinoma right breast pT2N2Mx with synchronous renal cell carcinoma pT1N0M0 (stage I) based on this histological result and the other clinical and Radiological data. She was also scheduled for four cycles of adriyamycin and cyclophosphamide-based chemotherapy for the breast cancer, followed by four rounds of Paclitaxel chemotherapy, followed by adjuvant radiotherapy to the chest wall and drainage site. The patient was put on a three-month follow-up schedule thereafter.

Discussion

The aetiology of multiple primary malignant tumors is complex, encompassing not only environmental factors such as tobacco, occupation, pollution, and ultraviolet light, but also genetic predisposition and medical treatment in the form of radiotherapy or chemotherapy, gender-specific factors, hormonal factors, and the interactions of these factors with the host environment [1]. Other primary tumors may be asymptomatic and undetected in the patient's usual metastatic workup.

Synchronous cancer occurs when another primary malignancy is discovered in the same patient or within 6 months of the first cancer's diagnosis. The association of breast cancer with synchronous renal cell carcinoma is extremely uncommon, with just a few instances recorded [2]. Synchronous malignancies are characterized as malignant tumors that appear concurrently or within six months of the initial tumor's diagnosis. According to the research, the frequency of multiple primary cancers ranges between 4.5 and 11.7% [3]. The following criteria must be met in order to classify a case of dual malignancy as synchronous: 1) The tumors must be pathologically separate from one another; 2) there must be clear signs of malignancy; and 3) metastasis must be ruled out [4,5]. In our situation, oestrogen receptor study was performed after the final histopathology report of Renal Cell Carcinoma by Immunohistochemistry analysis to rule out metastasis from breast to kidney.

The causes of synchronous cancers are several. These factors are classified into three categories based on their aetiology: 1) As a result of treatment, for example, a second tumour after chemotherapy or radiation; 2) as a result of genetic alterations; and 3) as a result of common environmental variables [1]. Eight instances of synchronous breast primary with RCC were described in a population-based investigation by Jiao F et al., with a prevalence of 13.1% [2], which was lower than the earlier studies, which showed a prevalence of 26% by Christian B et al., [6].

Piccinini L reported two examples of synchronous Renal Cell Carcinoma in breast primary in 1996 [7]. Breast metachronous tumors with renal primary have been documented in the literature, as have metastatic and secondary primaries. In his population-based research of various malignancies in Norway, Christian B reported 8 instances of carcinoma breast in RCC patients from 1987 to 2002 [6].

Breast metastasis from RCC is uncommon, occurring in just 3% of all metastatic RCC cases [8]. In all, 25 similar instances have been documented in the literature: 11 cases with breast metastasis as the first manifestation of the disease and 14 (two of which were bilateral) as metachronous lesions [9-14]. Falco et al. described a case of breast metastasis from renal primary in 2014 [15]. One such instance of cancer breast with synchronous RCC was reported in 2014 [16]. Sato et al. revealed that the presence of additional primary at the time of nephrectomy for RCC was an independent predictive factor for overall survival following the procedure. Furthermore, individuals with localised RCC and coexisting malignancy had a worse overall survival rate than those with localised RCC alone [17]. Treatment of RCC in individuals with multiple primary tumours should be based not only on the stage and operability of the kidney tumour, but also on an assessment of the other malignant illness's clinical state. Because of the scarcity of

therapeutic and diagnostic options, synchronous malignancies, when discovered, present a slew of issues for both doctors and patients [18].

Conclusion

The study of synchronous malignancies may provide important evidence not only for clinical evaluation and future treatments of these tumors, but also for the aetiology, pathogenesis, and future management of cancer, including the development of effective screening and surveillance protocols with the goal of effectively treating patients. After a diagnosis of breast cancer, screening for distant metastasis should be done according to disease stage, and it should be remembered that current or subsequent masses may represent secondary malignancies as well as metastatic lesions. It should also be noted that people with primary breast cancer or cancer of any other organ may acquire secondary tumors later in life.

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