

Case Report

Adrenal Gland Metastasis of Breast Invasive Mucinous Carcinoma: A Rare Case Report and Review of Literature

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Keywords

Adrenal gland metastasis · Breast invasive mucinous carcinoma · GATA3 · Laparoscopic adrenalectomy

Abstract

The adrenal gland is a frequent site for metastasis, and the majority of the metastatic lesions of the adrenal gland normally originate from lung cancer, colon cancer, renal cell carcinoma, and melanoma. However, adrenal gland metastasis from breast invasive mucinous carcinoma is extremely rare. This report described a rare case of right adrenal gland metastasis in a 48-year-old female, who was diagnosed with breast invasive mucinous carcinoma and underwent right modified radical mastectomy with axillary lymph node dissection 5 years previously. A mass located on the right adrenal gland was detected during a routine examination 2 months ago. The patient was asymptomatic and adrenal gland MRI revealed a mass in the right adrenal gland. Definitive preoperative diagnosis failed to be established. Right adrenal gland laparoscopic adrenalectomy was performed and the diagnosis of adrenal gland metastasis of breast carcinoma was confirmed by pathological and immunohistochemical examination, especially ER, PR, GATA3, and HER-2. The patient remained in good condition by the time of writing.

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Introduction

The majority of the common primary neoplasms which metastasize to the adrenal gland include lung cancer, melanoma, colon malignant tumor, and renal cell carcinoma [1]. Breast cancer is the most frequently diagnosed cancer in females. Although surgery, chemotherapy, endocrinotherapy, targeted molecular therapy, and radiotherapy have been applied commonly, relapses still have been reported in 30–80% of patients with breast cancer [2]. Breast cancer normally metastasizes to the lung, liver, bone and brain; however, metastasis to the adrenal gland is extremely rare [3]. Metastasis of breast carcinoma often leads to a poorer prognosis and a lower 5-year survival rate. Laparoscopic adrenalectomy (LA), the treatment of adrenal gland metastases, has become more and more acceptable. We report a rare case of right adrenal metastasis from invasive breast mucinous carcinoma that was treated successfully with LA with a summary of the relevant literature.

Case Report

A 48-year-old female was found to have a mass located on the right adrenal gland during a routine examination by computed tomography (CT) in Jining First People's Hospital (Shandong, China) in October 2021. The CT revealed the mass located on the right adrenal gland, measuring about 3.5 cm. The possibility of metastasis was considered and the patient was subsequently admitted to the Department of Urology, Shandong Provincial Hospital, for further examination and therapy on December 27, 2021. The patient had a history of right breast cancer, and she underwent right modified radical mastectomy with axillary lymph node dissection in July 2016 in China-Japan Friendship Hospital. Postoperative histopathological examination revealed an original breast invasive mucinous carcinoma of a size of 3.5 × 2.5 × 2.0 cm with axillary lymph nodes metastasis. Immunohistochemical (IHC) evaluation showed that estrogen receptor (ER), progesterone receptors (PR), and human epidermal receptor-2 (HER-2) were positive, and the patient was followed by endocrinotherapy with the selective estrogen receptor degrader fulvestrant. The patient was asymptomatic with a normal appetite, no abdominal pain, and no weight changes. Additionally, she did not have urinary, respiratory, cardiovascular, or constitutional symptoms. The plasma adrenocorticotrophic hormone and cortisol levels were within the normal range. Extensive imaging evaluations including breast ultrasonography, head CT scan, gastroenterological endoscopy, and isotope bone scanning revealed no other metastasis. Thoracic and abdominal enhanced MRI showed an uneven enhanced, oval mass in the right adrenal gland, measuring 3.5 × 2.3 × 2.1 cm, which was considered to be metastasis (Fig. 1). The right renal vein and inferior vena cava were normal.

The right adrenal gland LA was performed on December 31, 2021. A tumor with clear margin, approximately 3.5 cm in diameter, was located on the superior part of the right kidney and the tumor exhibited mild adhesion with the surrounding tissue (Fig. 2a). The adrenal gland was excised (Fig. 2b). IHC analyses of tumor tissues were performed for ER, PR, HER2, GATA3, Ki-67, CDX2, CK, Syn, GCDFP-15, and mammaglobin (ZSGB-BIO, China) in the Department of Pathology, Shandong Provincial Hospital. Slides of tissues were routinely stained with hematoxylin and eosin (HE). Pathology report showed poorly differentiated adenocarcinoma. The result of IHC staining was as follows: ER, PR, HER2, and GATA3 were positive (Fig. 3). There was 20% positive rate for Ki-67. CDX2, CK (AE1/AE3), Syn, GCDFP-15, and mammaglobin were negative. Such findings were consistent with the IHC staining of primary breast cancer. The diagnosis of adrenal gland metastasis of breast cancer was subsequently confirmed. The patient was discharged 7 days post-surgery.

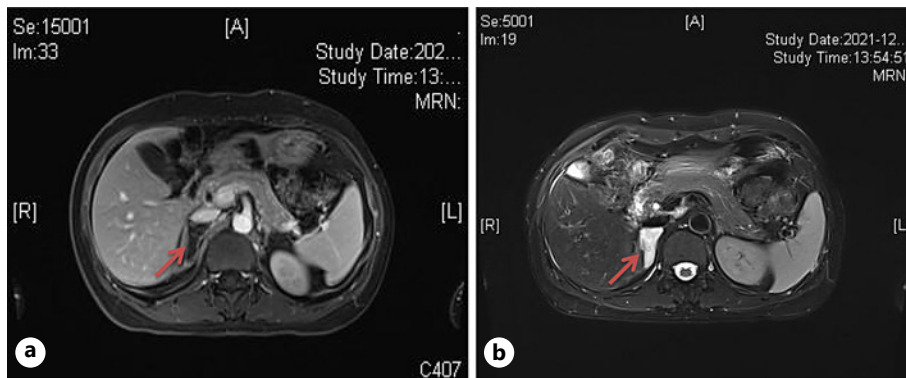


Fig. 1. a, b Enhanced MRI scan showing a 3.5 × 2.1 cm, no obvious enhancement, long-bar shape mass in the right adrenal gland.

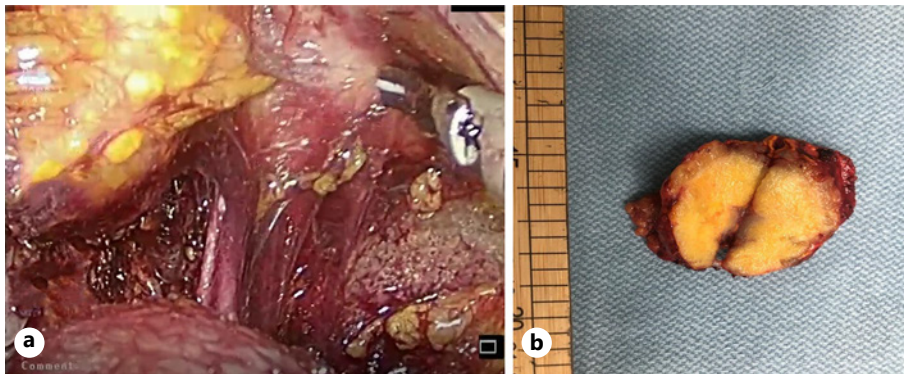


Fig. 2. a Laparoscopic screenshot. This image showed the laparoscopic retroperitoneal view of the right adrenal gland tumor (yellow) with clear margin was located on the upside of the right kidney and the tumor exhibited mild adhesion with the surrounding tissue. The peritoneum (touching with ultrasonic cutter head) was labeled to the right of the adrenal gland tumor, and the right kidney was below the adrenal gland tumor in this view. The vessel in the middle center is IVC. **b** The gross specimen resected by surgery was shown, measuring approximately 3.5 × 2.0 cm.

Discussion

Adrenal gland metastasis from breast carcinoma is extremely rare. Li et al. [4] have reported the incidence of adrenal metastasis from breast carcinoma is 0.25% in Chinese patients. The adrenal gland is the least rare of the uncommon metastatic sites originating from breast carcinoma [5]. Breast invasive mucinous carcinoma is a rare histological type of breast cancer. The mixed breast mucinous carcinoma (with a mucinous component of at least 10%) is more aggressive and more common with nodal involvement than pure breast mucinous carcinoma [6]. Furthermore, mixed breast mucinous carcinoma can develop distant metastasis, and if there is nodal involvement, prognosis is poor with a 5-year survival of 76% [7].

Adrenal gland is almost always asymptomatic although a small proportion of patients may present with adrenal gland insufficiency if the tumor destroys the normal adrenal cortex tissues or both adrenal glands are affected [8]. Tang et al. [9] reported that 1 patient suffered from lower backache and the pain got worse during hospitalization. Although primary adrenal gland malignancies like adrenocortical carcinomas usually secrete hormone excessively and cause certain relative symptoms, metastatic adrenal gland carcinomas are often difficult

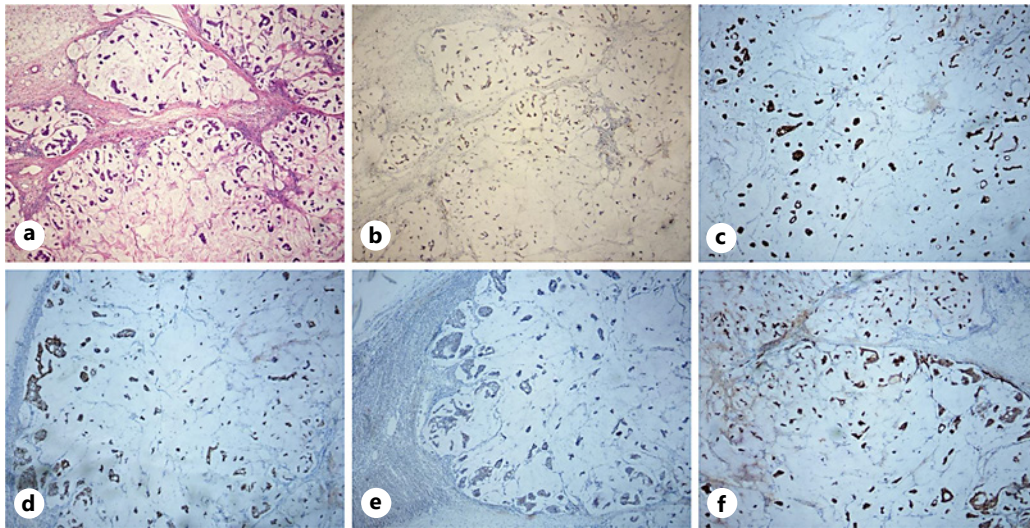


Fig. 3. Results of pathological and IHC examination (magnification, $\times 400$). **a** HE staining showed low differentiated adenocarcinoma in the adrenal metastatic lesion. **b** Ki-67 expression revealed positivity (20%) by IHC analysis in the adrenal metastatic disease. IHC staining of the tumor cells in the adrenal metastatic lesion demonstrated positive staining for GATA3 (+) (**c**), ER (+) (**d**), PR (+) (**e**), HER-2 (++) (**f**).

to identify from primary adrenal gland malignancies, which can lead to misdiagnosis [10]. Patients who have a history of malignancy and mass >2 cm in diameter in adrenal gland would be highly considered as a possible case of adrenal gland metastasis. Wrong diagnosis may delay the early treatment of the disease, leading to unwanted morbidity and mortality. Generally, CT scan or MRI can be used as an early option to identify primary carcinoma and metastases of the adrenal gland. Our patient was asymptomatic with no abdominal pain or other problems, while she had a history of right breast invasive mucinous carcinoma and an MRI revealed a mass located on the right adrenal gland region, measuring 3.5×2.1 cm, which was considered as a possible metastasis. The final diagnosis should depend on pathology from biopsy or metastasectomy. IHC staining of hormonal receptor (ER and PR), HER2, GATA3, and mammaglobin is used to help diagnose metastatic tumor from breast cancer. GATA3 is reported to show a high sensitivity for nodal metastases and distant metastases, which is superior to gross cystic disease fluid protein-15 (GCDFFP-15) and mammaglobin in identification of primary and metastatic breast cancer [11]. In our patient, ER, PR, HER2, and GATA3 were positive in metastatic lesions of adrenal gland, while the GCDFFP-15, CDX2, and mammaglobin staining were negative.

The aim of metastatic breast cancer treatment is to improve the quality of the patients' life and prolong their survival. LA has become the treatment of choice for adrenal gland tumors because it has advantages such as speed recovery and early discharge from hospital [12]. Yoshitomi and Tsuji [13] have reported a patient with adrenal metastasis from breast cancer who underwent adrenalectomy and toremifene endocrine therapy and was followed by 28 months of recurrence-free survival. LA has been used in patients with solitary adrenal metastasis, but this procedure is limited by the tumor size [14]. Usually, surgical excision is recommended in the following situations: solitary metastatic lesion and can be removed or well controlled; there are no metastasis in other organs; and the patient is generally in good condition and can tolerate surgery. It is also important to avoid port-site metastasis and carcinomatosis when performing LA. LA can be performed through an abdominal or retroperitoneal approach, and we chose the latter because it has less effect on intestinal function. When performing LA, surgeons should pay attention to endocrinological complications caused by

adrenalectomy, including iatrogenic Addison's disease [15]. Systemic medical treatment is the main therapeutic regimen in metastatic cases and such treatment should be based on the hormonal receptor and HER2 status of primary and metastatic lesions. Notably, combining operative therapy with radiotherapy, chemotherapy, and hormone replacement therapy can provide an improved outcome and prognosis.

In conclusion, we present a case of adrenal gland metastasis of breast invasive mucinous carcinoma. Metastases of breast cancer to the adrenal gland is extremely rare, so it is important to identify them and primary adrenal gland tumors. For patients with this condition, we suggest that early recognition and necessary investigations including CT or MRI will help in the diagnosis and pathological examination will yield an accurate diagnosis. Selection of appropriate treatment options could benefit the survival of these patients.

Statement of Ethics

This case report was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. Ethical approval is not required for this study in accordance with local or national guidelines.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Dingqi Sun and Hui Zhang are responsible for the surgical care and Jinhua Wang for the oncologic care of the patient. Keqin Zhang and Tongxiang Diao proposed the conception of study and drafted the manuscript. Qiang Fu is responsible for the pathological analyses of the patient. All authors were involved in writing the final manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

References

- 1 Suzuki H. Laparoscopic adrenalectomy for adrenal gland carcinoma and metastases. *Curr Opin Urol*. 2006 Mar; 16(2):47–53.
- 2 Signorelli C, Pomponi-Formiconi D, Nelli F, Pollera CF. Single colon metastasis from breast cancer: a clinical case report. *Tumori*. 2005 Sep–Oct;91(5):424–7.

- 3 Liu XJ, Shen P, Wang XF, Sun K, Sun FF. Solitary adrenal gland metastasis from invasive ductal breast cancer: an uncommon finding. *World J Surg Oncol*. 2010 Jan;8:7.
- 4 Li Q, Xu BH, Li Q, Zhang P, Yuan P, Wang JY, et al. Clinical analysis of 34 patients with adrenal metastasis from breast cancer. *Zhonghua Zhong Liu Za Zhi*. 2013 Nov;35(11):855–7.
- 5 He T, Liu J, Li Y, Jin JU, Sun SL, Ni LC, et al. Left adrenal gland metastasis of breast invasive ductal carcinoma: a case report. *Mol Clin Oncol*. 2016 May;4(5):859–62.
- 6 Di Saverio S, Gutierrez J, Avisar E. A retrospective review with long term follow up of 11,400 cases of pure mucinous breast carcinoma. *Breast Cancer Res Treat*. 2008 Oct;111(3):541–7.
- 7 Diab SG, Clark GM, Osborne CK, Libby A, Allred DC, Elledge RM. Tumor characteristics and clinical outcome of tubular and mucinous breast carcinomas. *J Clin Oncol*. 1999 May;17(5):1442–8.
- 8 Netelenbos T, Nooij MA, Nortier JW. Diabetes insipidus and adrenal insufficiency in a patient with metastatic breast cancer. *Neth J Med*. 2006 Sep;64(8):310–3.
- 9 Tang T, Zhang L, Li C, Zhou T. Gastric and adrenal metastasis from breast cancer. Case report and review of literature. *Medicine*. 2020 Jan;99(3):e18812.
- 10 Demirci U, Buyukberber S, Cakir T, Poyraz A, Baykara M, Karakus E, et al. Isolated mucinous adrenal metastasis in a breast cancer patient. *J Oncol Pharm Pract*. 2011 Dec;17(4):444–7.
- 11 Ni YB, Tsang JYS, Shao MM, Chan SK, Cheung SY, Tong J, et al. GATA-3 is superior to GCDPF-15 and mammaglobin to identify primary and metastatic breast cancer. *Breast Cancer Res Treat*. 2018 May;169(1):25–32.
- 12 Shoji S, Usui Y, Nakano M, Hanai K, Sato H, Uchida T, et al. Surgical management of metastatic adrenal gland tumors: decision-making factors in imaging. *Oncol Lett*. 2010 Nov;1(6):967–71.
- 13 Yoshitomi S, Tsuji H. A case of recurrent breast cancer with solitary adrenal metastasis treated with surgery and endocrine therapy. *Gan To Kagaku Ryoho*. 2012 Nov;39(12):2074–6.
- 14 Güler SA, Şimşek T, Pösteği G, Güreşin A, Çınar S, Onbaşılar U, et al. A very rare reason for gastric perforation, caused by gastric metastasis of breast cancer: case presentation. *Eur J Breast Health*. 2018 Nov;15(1):59–62.
- 15 Öztürk H. Bilateral synchronous adrenal gland metastases of renal cell carcinoma: a case report and review of the literature. *Oncol Lett*. 2015 Apr;9(4):1897–901.