Breast metastasis nine years after nephrectomy for renal cell carcinoma: A case report

Takayuki Ishigaki a,*, Satoki Kinoshita b, Naoko Shimada a, Ryo Miyake a, Masaaki Suzuki b, Hiroshi Takeyama c

a Department of Breast and Endocrine Surgery, The Jikei University Kashiwa Hospital, 163-1 Kashiwashita, Kashiwa City, Chiba, 277-8567 Japan
b Department of Pathology, The Jikei University Kashiwa Hospital, 163-1 Kashiwashita, Kashiwa City, Chiba, 277-8567 Japan
c Department of Breast and Endocrine Surgery, Jikei University School of Medicine, Japan

ARTICLE INFO

Article history:
Received 17 June 2017
Received in revised form 12 July 2017
Accepted 8 August 2017
Available online 18 August 2017

Keywords:
Metastatic breast cancer
Renal cell carcinoma
Cryoastration

ABSTRACT

INTRODUCTION: The breast is a rare site for metastatic disease. We report a rare case of breast metastasis 9 years after nephrectomy for renal cell carcinoma (RCC) and include a review of the relevant literature.

PRESENTATION OF CASE: An 82-year-old woman who developed an RCC underwent left nephrectomy in 2005. In October 2014, computed tomography (CT) revealed a mass of approximately 1 cm in the lateral portion of the right breast. Breast ultrasonography (US) revealed a well-circumscribed, hypoechoic mass at the same site. Fine needle aspiration (FNA) was performed, but the sample was inadequate because it did not capture breast duct epithelial cells. In June 2015, follow-up US revealed enlargement of the mass, and core needle biopsy (CNB) was performed to confirm the diagnosis. Histological examination resulted in the diagnosis of breast metastasis from an RCC. The patient underwent surgery for partial mastectomy in November 2015. The patient was asymptomatic and free of detectable disease at 18-month follow-up.

DISCUSSION: The diagnosis of breast metastasis by imaging examination is difficult, and the results of FNA examination are often inconclusive because of the absence of breast duct epithelial cells. Only 22 cases of breast metastasis from RCC have been described in the literature. In almost all the reported cases, lumpectomy or partial mastectomy was performed.

CONCLUSION: It is important that histological diagnosis be determined by CNB and by other methods if the patient has a history of malignancy, and minimal invasive therapy should be performed in accordance with the prognosis.

© 2017 The Author(s). Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

The incidence of breast metastasis from extramammary primary tumors ranges from 0.5% to 2% [11]. Malignant melanoma, leukemia and lymphoma are the most common among all malignancies that have been described as metastasizing to the breast [2]. By contrast metastasis from a renal cell carcinoma (RCC) to the breast is very rare. In line with SCARE criteria, we report a rare case of breast metastasis 9 years after nephrectomy for RCC and provide a review of the relevant literature [28].

Abbreviations: RCC, renal cell carcinoma; CT, computed tomography; US, ultrasonography; FNA, fine-needle aspiration; CNB, core-needle biopsy; MRI, magnetic resonance imaging; ALND, axillary lymph node dissection.

* Corresponding author.
E-mail address: tipdpwr@yahoo.co.jp (T. Ishigaki).

2. Presentation of case

An 82-year-old woman developed an RCC and underwent left nephrectomy for clear cell carcinoma at the Department of Urology of The Jikei University Kashiwa Hospital in 2005. She had no history of malignancy other than RCC, no breast disease and no family history of carcinoma. In October 2014, CT of the chest and abdomen performed as a regular follow-up revealed a mass of approximately 1 cm in the lateral portion of the right breast. The patient was referred to our department for further assessment and treatment. On clinical examination, no swelling was palpable in either breast. Mammography showed a smooth-marginated, high-density mass in the upper outer quadrant of the right breast (see Fig. 1). Breast US revealed a well-circumscribed, hypoechoic mass measuring 10 mm at the same site; this was judged to be a fibrous adenoma (see Fig. 2). FNA of the right breast mass was performed, but the sample was inadequate because it did not contain breast duct epithelial cells. In June 2015, follow-up US revealed enlargement of the mass to 13 mm (see Fig. 2); FNA was conducted for the second time, but the result was undeterminable for the same
The mammogram shows a smooth-margined, high-density mass in the upper outer quadrant of the right breast.

Fig. 1. The mammogram shows a smooth-margined, high-density mass in the upper outer quadrant of the right breast.

Fig. 2. US performed in October 2014 (top) shows a well-circumscribed, hypoechoic mass measuring 10 mm. US performed in June 2015 (bottom) shows enlargement of the mass to 13 mm.

reason. CNB was performed to confirm the diagnosis. Histological examination resulted in diagnosis of the lesion as breast metastasis from an RCC of the clear-cell type. Contrast-enhanced MRI and contrast-enhanced CT showed a localized, well-enhanced mass at the same site, but no extensive intraductal component and no axillary lymph node metastasis (see Figs. 3 and 4). Other imaging studies revealed no distant metastasis. Although adaptation for cryoablation was initially considered, eventually the patient underwent a partial mastectomy in November 2015. Gross pathology of the cut surface showed a yellowish-brown, well-defined tumor. Histological examination revealed solid alveolar proliferation of tumor cells with small round nuclei and abundant clear cytoplasm, compatible with clear cell type RCC metastasis (see Fig. 5). The patient was asymptomatic and free of detectable disease at 18-month follow-up without any other treatment.

3. Discussion

The breast is a rare site of metastatic disease; the incidence of clinical breast metastasis from extramammary primary neoplasms ranges from 0.5 to 2.0% of all breast malignancies [1]. Metastases from renal adenocarcinoma to the lung and lymph nodes occur most frequently, followed by metastases to the bones, liver, contralateral kidney, ipsilateral adrenal, and pancreas [3], but metastasis to the breast is very rare. It has been suggested that, as a metastatic route to the breast tumor cells transit into the right ventricle from the inferior vena cava and spread to the breast after
passing through the lungs in the arterial circulation. In addition, the paravertebral venous plexus route has been suggested [4].

Including the present case, only 23 cases of breast metastasis from RCC have been described in the literature (see Table 1). The average age at onset is 67.4 years (47–82 years), and all patients have been female. Nine of these patients were diagnosed concurrently with RCC; of these, 2 also had confirmed metastasis to the lung, bone or liver. Fourteen cases developed after nephrectomy for RCC; most were detected palpable breast masses, although some recent cases were detected by imaging studies at follow-up. The average interval from nephrectomy to discovery of breast metastasis was 9.0 years (2–18 years) which supports the understanding that RCC is a very slow-growing type of cancer.

The diagnosis of breast metastasis, including cases originating from RCC, by imaging examination is difficult, and the results of FNA examination are often inconclusive because of the absence of breast duct epithelial cells. Therefore, it is important that histological diagnosis be determined by CNB and by other methods if the patient has a history of malignancy.

In almost all the reported cases of breast metastasis from RCC, lumpectomy or partial mastectomy was performed; only a few cases were treated by total mastectomy or axially lymph node dissection (ALND). ALND was performed in 4 cases, but only one of these showed lymph node metastasis. Axillary lymph node involvement is uncommon because in nearly all cases metastasis to the breast follows the hematogenous route. Generally, breast metastasis from any cancer is associated with a poor outcome; the mean survival of such patients is 10.9 months [1]. Therefore, minimally invasive surgery or nonsurgical ablation should be performed in accordance with the prognosis. On the other hand, a five-year survival rate after ablation in patients with metastasis of RCC has been reported as 53%, compared with 5% in cases in which ablation was not performed [5]. For that reason, aggressive resection should be considered in cases of solitary metastasis of RCC.

We considered that this case had appropriate therapeutic indications for cryoablation, a procedure that is often performed as clinical research in our hospital for small cancers of the breast [6], because the primary lesion in this case was RCC which the Japanese Ministry of Health admitted as an insurance adaption disease of cryoablation. However, we had to abandon cryoablation in accordance with the insurance. It is hoped that in the future insur-
### Table 1
Characteristics of breast metastasis from renal cell carcinoma.

| Ref. | Year | Age | Duration(year) | Opportunity | Size(mm) | Operation | LN | Postoperative treatment | Follow(mo) | Outcome |
|------|------|-----|----------------|-------------|----------|-----------|----|-------------------------|------------|---------|
| Chica [7] | 1980 | 47  | same time      | mass        | NS       | excisional biopsy | NS | (-)                      | 55         | DOD     |
| Brian [8]  | 1983 | 64  | 5              | mass        | NS       | NS         | NS | NS                      | NS         | NS      |
| Hardy [9]  | 1987 | 78  | 18             | mass        | 60       | NS         | NS | NS                      | NS         | NS      |
| Lesho [10] | 1992 | 74  | same time      | mass        | 20       | mastectomy + ALND | (-) | NS                      | NS         | NS      |
| Bowdich [11] | 1996 | 62  | 15             | MMG         | NS       | excisional biopsy | NS | medroxyprogesterone acetate | NS         | NS      |
| Haggarty [12] | 1998 | 63  | same time      | mass        | 20       | lumpectomy + ALND | (-) | interferon               | NS         | NS      |
| Kannan [13] | 1998 | 65  | same time      | mass        | 10       | lumpectomy   | NS | NS                      | NS         | NS      |
| Forte [14] | 1999 | 71  | 6              | mass        | 100      | radical mastectomy | (-) | NS                      | NS         | NS      |
| Grossklaus [15] | 2000 | 77  | same time      | MMG         | 25       | excisional biopsy | NS | NS                      | NS         | NS      |
| Vassalli [16] | 2001 | 72  | 9              | mass        | 35       | lumpectomy   | NS | (–)                     | 12         | NED     |
| O’Sullivan [17] | 2005 | 79  | 3              | mass        | NS       | lumpectomy   | NS | interferon              | 10         | NED     |
| Sarah [18]  | 2006 | 76  | same time      | mass        | 11       | lumpectomy   | (-) | interleukin-2 therapy    | 3          | AWD     |
| Alzarra [19] | 2007 | 81  | 5              | mass        | 17       | lumpectomy   | (-) | (-)                     | NS         | NS      |
| Lee [20]  | 2007 | 71  | same time      | mass        | 40       | (-)         | NS | (-)                     | 5          | AWD     |
| Bortnik [21] | 2008 | 55  | 2              | MMG         | 6        | lumpectomy   | NS | (-)                     | 21         | NED     |
| Daneshbod [22] | 2008 | 65  | 8              | mass        | 22       | excisional biopsy | NS | NS                      | NS         | NS      |
| Durai [23] | 2009 | 68  | same time      | mass        | 20       | (-)         | NS | chemotherapy            | NS         | NS      |
| Hairuifaiz [24] | 2009 | 67  | 5              | mass        | 20       | mastectomy + ALND | (+) | (-)                     | NS         | NS      |
| Mahrous [25] | 2012 | 58  | 5              | mass        | 40       | lump excision | (-) | sunitinib               | 14         | DOD     |
| Botticelli [26] | 2013 | 60  | 4              | MMG         | 6        | lump excision | NS | NS                      | NS         | NS      |
| Dhannoon [27] | 2017 | 63  | 5              | MMG         | 6        | lumpectomy + SLND | (-) | (-)                     | 3          | NED     |
| Present case | 2017 | 82  | 2              | CT          | 13       | partial mastectomy | (-) | (-)                     | 12         | NED     |

Duration: duration until breast metastasis from nephrectomy, LN: axillary lymph node metastasis, MMG: mammography, NS: not stated, SLND: sentinel lymph node dissection, DOD: death of disease, NED: no evidence of disease. AWD: no operation for RCC and alive with disease.

4. Conclusion
We reported an extremely rare case of breast metastasis from RCC. In such cases, it is important that the differential diagnosis of a breast mass is not limited to carcinoma of the breast, and rare metastases should be considered.
of primary breast cancer and metastatic breast cancer be determined by histological examination, and minimally invasive therapy should be performed in accordance with the prognosis.

Conflict of interests

The authors declare no conflict of interest.

Funding for your research

Nothing to declare.

Ethical approval

No ethical approval needed for the case study presented and submitted.

Consent

Our patient consented for publication of the case.

Author contribution

Takayuki Ishigaki: study concept, data collection, writing the paper.
Satoki Kinoshita: review and correct the manuscript.
Naoko Shimada: review and correct the manuscript.
Ryo Miyake: review and correct the manuscript.
Masaaki Suzuki: review and correct the manuscript.
Hirosi Takeyama: review and correct the manuscript.

Funding

Nothing to declare.

Registration of research studies

I has got unique identifying number (UIN) of this study.
UIN is researchregistry2760.

Guarantor

Hirosi Takeyama is guarantor.

References

[1] L. Vassalli, V.D. Ferrari, E. Simoncini, et al., Solitary breast metastases from a renal cell carcinoma, Breast Cancer Res. Treat. 68 (2001) 29–31.
[2] B. Vergier, M. Trojani, L. de Mascarel, et al., metastases to the breast: differential diagnosis from primary breast carcinoma, J. Surg. Oncol. 48 (1991) 112–116.
[3] S. Pagano, F. Franzoso, P. Ruggeri, Renal cell carcinoma metastases. Review of unanomaous clinical metastases: metastatic borderline and clear cell renal cell carcinoma, Cancer Metastasis Rev. 15 (1996) 165–172.
[4] G.V. Batson, The function of the vertebral veins and their role in the spread of metastases, Ann. Surg. 112 (1940) 138–149.
[5] S. Noguchi, T. Shuin, K. Takase, et al., Surgical treatment of renal carcinoma with metastases, Nihon Gannaiyougaku kaishi 31 (1996) 5–13.
[6] S. Kinoshita, J. Harada, Y. Kanetsuna, A. Fushimi, S. Kyoda, A. Hirano, et al., Initial experience of percutaneous cryoablation to treat small cancer of the breast, Low Temp. Med. 40 (1) (2014) 4–10.
[7] C.A. Chica, D.E. Johnson, A.G. Ayala, Renal cell carcinoma presenting as a breast lump, Urology 15 (1980) 389–390.
[8] I. Brian, Renal cell carcinoma manifesting as breast mass, Urology 21 (2) (1983) 166–167.
[9] S.C. Hardy, Solitary breast metastasis from a hypernephroma, Eur. J. Surg. Oncol. 13 (1987) 365–366.
[10] E.P. Lesho, Metastatic renal cell carcinoma presenting as a breast mass, Ppstgrad. Med. 91 (7) (1992) 145–146.
[11] M.G. Bowditch, R. Peck, A.J. Shorthouse, Metastatic renal adenocarcinoma presenting in a breast screening programme, Eur. J. Surg. Oncol. (1996) 641.
[12] F. Heggarthy, et al., Bilateral breast metastases from a renal carcinoma, JCP 52 (6) (1998) 443–444.
[13] V. Kannan, Fine-needle aspiration of metastatic renal-cell carcinoma masquerading as primary breast carcinoma, Diagn. Cytopathol. 18 (1998) 343–345.
[14] A. Forte, M.I. Peronace, L.S. Gallinaro, et al., Metastasis to the breast of a renal cell carcinoma: a clinical case, Eur. Rev. Med. Pharmacol. Sci. 3 (1999) 115–118.
[15] D.J. Grossklas, J.M. Holzbeierlein, B.J. Roth, J.A. Smith, Abnormal mammogram as the presenting sign of renal cell carcinoma, Urology 163 (2000) 1239–1240.
[16] A.W. O’Sullivan, P.M. Kelly, J.M. Smith, T.F. Gorey, Renal cell carcinoma metastasis to breast, Ir. J. Med. Sci. 172 (2003) 48.
[17] M. Gacci, L. Orzalesi, V. Distante, et al., Renal cell carcinoma metastatic to the breast and breast cancer metastatic to the kidney: two rare solitary metastases, Breast J. 11 (2005) 351–352.
[18] S.A. McClanagin, D.D. Thiel, S.L. Smith, M.J. Wehle, D.M. Menke, Solitary breast mass as initial presentation of clinically silent metastatic renal cell carcinoma, Breast 15 (2006) 427–429.
[19] A. Alzaraa, A. Vodovnik, H. Montgomery, M. Saeed, N. Sharma, Breast metastasis from a renal cell cancer, World J. Surg. Oncol. 5 (2007) 25.
[20] W.K. Lee, J.N. Caswell, P.A. Hilt, J. Hoang, H. Rousse, Renal cell carcinoma metastasis to the breast: mammographic, sonographic, CT, and pathologic correlation, Breast J. 13 (2007) 316–317.
[21] B. Svetlana, et al., Breast metastasis from a renal cell carcinoma, Breast J. 14 (4) (2008) 388–390.
[22] Y. Daneshhobb, et al., Renal cell carcinoma presenting as a solitary Breast mass, a diagnostic pitfall on aspiration cytology of clear cell tumors of the Breast, Breast J. (2008).
[23] R. Durai, S.N. Ruhomauly, E. Wilson, H. Hoque, Metastatic renal cell carcinoma presenting as a breast lump in a treated breast cancer patient, Singapore Med. J. 50 (2009) e277–e279.
[24] H. Hairuifenzi, et al., Breast and axillary lymph nodes metastasis five years after radical nephrectomy for renal cell carcinoma a case report and review of the literature, Lijn (2009) 120–122.
[25] M. Mahrous, et al., Breast metastasis from renal cell carcinoma: rare initial presentation of disease recurrence after 5 years, J. Breast Cancer 15 (2) (2012) 244–247.
[26] A. Botticelli, et al., Breast metastasis from clear cell renal carcinoma, J. Ultrasound 16 (2013) 127–130.
[27] S.M. Dhamoon, et al., Renal cell carcinoma with isolated breast metastasis, EML Case Rep. (2017), http://dx.doi.org/10.1136/hr-crc-2016-219124.
[28] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmoham, D.P. Orgill, for the SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, Int. J. Surg. (2016).

Open Access

This article is published Open Access at sciencedirect.com. It is distributed under the IJSSCR Supplemental terms and conditions, which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.