

Case Report

Hydronephrosis Caused by Metastatic Breast Cancer

Hitoshi Sugimoto^a Goshi Oda^a Minato Yokoyama^b Kumiko Hayashi^a
Maho Yoshino^a Ayumi Ogawa^a Tokuko Hosoya^a Tsuyoshi Nakagawa^a
Hiroyuki Uetake^{a, c}

^aDepartment of Specialized Surgery, Tokyo Medical and Dental University Graduate School, Tokyo, Japan; ^bDepartment of Urology, Tokyo Medical and Dental University Graduate School, Tokyo, Japan; ^cDepartment of Clinical Research, National Disaster Medical Center, Tokyo, Japan

Keywords

Hydronephrosis · Breast cancer · Metastasis

Abstract

Breast cancer metastasizes mainly to organs such as bone, lung, and liver, whereas metastases to the peritoneum and urinary tract are rare. Metastasis to the peritoneum or urinary tract may result in renal dysfunction, infection, and painful hydronephrosis. In our hospital, 1,409 breast cancer surgeries were performed between January 2004 and December 2015, and 7 cases of hydronephrosis associated with recurrence were observed. The median age of patients was 69 years (57–79 years). The median time from surgery to diagnosis of hydronephrosis was 47 months (20–70 months). Histology was invasive ductal carcinoma (IDC) in 6 cases and invasive lobular carcinoma (ILC) in 1 case. There were 6 bilateral cases and 1 unilateral case of hydronephrosis. The causes were retroperitoneal metastasis in 5 cases and lymph node metastasis in 2 cases. The hydronephrosis was untreated in 2 cases, and treated with a ureteral stent in 2 cases, nephrostomy in 1 case, and nephrostomy due to ureteral stent failure in 2 cases. The median survival from the onset of hydronephrosis was 12 months (3–57 months). Although the probability of hydronephrosis in breast cancer recurrence was not high, care must be taken to avoid renal dysfunction, infection, or pain, which may require treatment.

© 2021 The Author(s).
Published by S. Karger AG, Basel

Goshi Oda
Department of Specialized Surgery
Tokyo Medical and Dental University Graduate School
1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8519 (Japan)
odasrg2@tmd.ac.jp

Introduction

There were an estimated 2 million cases of breast cancer worldwide in 2017, and the number is increasing every year. There were also an estimated 600,000 female deaths, making it the number one cause of cancer death in women [1]. Despite advances in diagnosis and treatment, the number of deaths has yet to decrease.

Metastasis of breast cancer has been studied in various autopsy and diagnostic imaging studies. Metastasis to the peritoneum or urinary tract may result in renal dysfunction, infection, and painful hydronephrosis. A PubMed search did not identify any papers focusing on hydronephrosis, although there have been case reports of metastasis to rare sites such as the bladder. In the present study, hydronephrosis associated with breast cancer metastasis was investigated.

Materials and Methods

Cases treated at the Tokyo Medical and Dental University, Medical Hospital between January 2004 and December 2015 were reviewed retrospectively. There were 1,409 breast cancer surgeries in that period, of which 122 were metastatic recurrences, with 7 cases of hydronephrosis.

Results

An overview of the cases is shown in Table 1. All were female, and the median age was 69 years (57–79 years). The median time from surgery to diagnosis of hydronephrosis was 47 months (20–70 months). The histological type was IDC in 6 (of 1,252 patients with IDC), ILC in 1 (of 52 patients with ILC), and special type in 0 (of 94 patients with special type). The subtypes were luminal type in 3 cases and triple-negative (TN) in 4 cases.

There were 6 bilateral cases and 1 unilateral case of hydronephrosis. The causes of hydronephrosis were retroperitoneal metastasis in 5 cases and lymph node metastasis in 2 cases. The hydronephrosis was untreated in 2 cases and treated in 2 cases with ureteral stents, 1 case with nephrostomy, and 2 cases with nephrostomy due to ineffective ureteral stents. The indications for the 5 intervening cases were renal dysfunction in 4 cases and back pain in 1 case. Other metastatic sites were bone metastasis in 3 cases, liver metastasis in 3 cases, lymph node metastasis in 3 cases, pleural metastasis in 2 cases, and skin metastasis in 1 case. In 2 untreated patients, chemotherapy eliminated the hydronephrosis. Renal dysfunction and pain improved in the 5 patients with intervention.

After hydronephrosis, the breast cancer was treated in 6 cases and untreated in 1 case. Finally, the median survival from hydronephrosis was 12 months (3–57 months).

A case in which the patient's hydronephrosis improved with chemotherapy alone and a case in which a ureteral stent was inserted but was ineffective and a nephrostomy was added are presented.

Presentation of Cases

Case 3 in Table 1 showed improvement in hydronephrosis with chemotherapy alone. The patient underwent neoadjuvant chemotherapy (12 courses of weekly paclitaxel, 4 courses of FEC-100 [5-FU + epirubicin + cyclophosphamide]) and surgery for left breast cancer. The pathology was ypT3N1M0, ER(+), PgR(+), HER2:0. Postoperative radiotherapy and letrozole were started. At 18 months postoperatively, bone metastases appeared, so the treatment was

Table 1. Overview of metastatic breast cancer with hydronephrosis in our hospital

Case	Age	Primary cancer		Metastasis		Hydronephrosis							
		histology	subtype	time from op. to onset, months	sites	medication	time from op. to onset, months	localization	causes	local treatment	Creatinine (mg/dL) before and after local treatment	medication	prognosis after the onset, months
1	79	IDC	TN	20	Pleura Lymph nodes		20	Bilateral	Retroperitoneal metastasis	None		Paclitaxel EC	12
2	60	ILC	TN	70	Pleura		70	Unilateral	Retroperitoneal metastasis	Ureteral stents	before: 0.96 after: 0.84	Paclitaxel Capecitabine S-1 +irinotecan Gemcitabine	14
3	57	IDC	Luminal	17	Bone Skin	Exemestane	27	Bilateral	Retroperitoneal metastasis	None		Capecitabine Eribulin Vinorelbine	57
4	61	IDC	Luminal	60	Lymph nodes Liver		60	Bilateral	Retroperitoneal metastasis	Nephrostomy	before: 7.68 after: 1.26	Docetaxel Anastrozole S-1 +irinotecan Gemcitabine	34
5	71	IDC	TN	17	Lymph nodes Liver Bone	Eribulin Capecitabine Paclitaxel + bevacizumab	34	Bilateral	Lymph node metastasis	Ureteral stents Nephrostomy	before: 7.33 after: 1.11	Gemcitabine Irinotecan	4
6	69	IDC	Luminal	16	Bone	Exemestane Fulvestrant Capecitabine Toremifene	67	Bilateral	Retroperitoneal metastasis	Ureteral stents Nephrostomy	before: 2.73 after: 4.39		3
7	72	IDC	TN	25	Liver	Capecitabine	47	Bilateral	Lymph node metastasis	Ureteral stents	before: 1.25 after: 0.78	Eribulin S-1	8

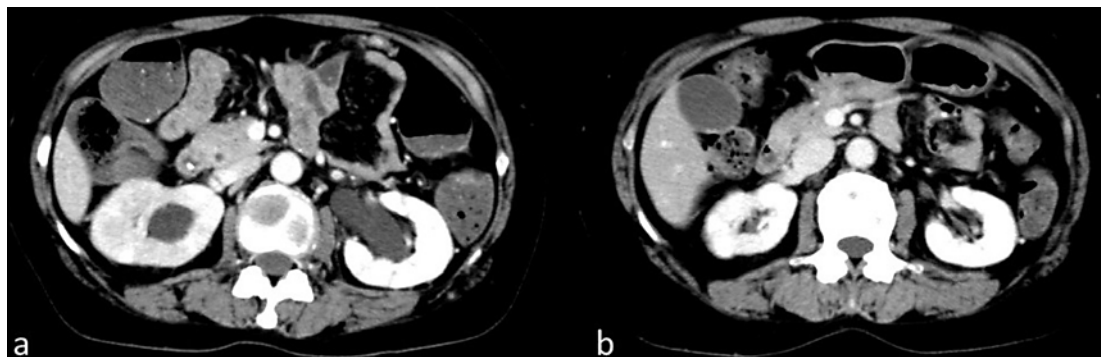


Fig. 1. **a** Appearance of bilateral hydronephrosis. **b** Four months after the start of treatment, bilateral hydronephrosis has improved.

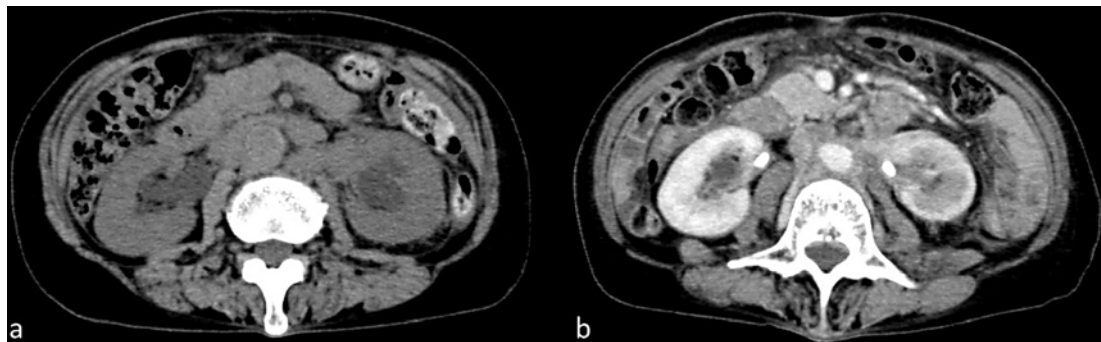


Fig. 2. **a** Appearance of bilateral hydronephrosis. **b** Temporary improvement in hydronephrosis after placement of ureteral stents.

changed to exemestane. When CT was performed because of the appearance of back pain in the 27th month, retroperitoneal thickening, bilateral hydronephrosis (Fig. 1a), and lung metastases were found. The patient's renal function was well preserved, and no local treatment for hydronephrosis was given. The patient was started on capecitabine, and 4 months later the bilateral hydronephrosis improved (Fig. 1b). The patient was treated with capecitabine for 33 months, followed by eribulin and vinorelbine, but the patient died 57 months after surgery.

Case 5 in Table 1 was a case in which a nephrostomy was added due to inadequate response to the insertion of a ureteral stent. The patient underwent neoadjuvant chemotherapy (4 courses of FEC-100 [5-FU + epirubicin + cyclophosphamide] and 4 courses of docetaxel) and surgery for right breast cancer. The pathology was ypT2N1M0, ER(-), PgR(-), HER2:0. The patient underwent postoperative radiation therapy. Seventeen months after surgery, liver metastasis, lymph node metastasis, and bone metastasis were observed.

The patient was treated with eribulin, capecitabine, paclitaxel + bevacizumab, but 34 months after surgery, CT showed hydronephrosis (Fig. 2a), and ureteral stents were placed bilaterally (Fig. 2b). The patient was treated with gemcitabine and irinotecan, but 3 months after stenting, renal failure occurred, and a nephrostomy was performed. The patient's renal function improved, but the primary disease progressed, and the patient died 38 months after surgery.

Table 2. Overview of metastatic breast cancer cases with hydronephrosis in the reference literature

[Ref.]	Age	Primary cancer		Metastasis		Hydronephrosis				prognosis after the onset, months		
		histology	subtype	time from op. to onset, months	sites	medication	time from op. to onset, months	localization	causes		local treatment	medication
[3]	77	Unknown	Luminal	334	Bone	Capecitabine	360	Bilateral	Bladder metastasis	Ureteric stents	Paclitaxel	Unknown
[4]	68	IDC	Luminal HER2	72	Bone	Toremifene	180	Unilateral	Bladder metastasis	Nehrostomy	Eribulin	Unknown
[5]	54	IDC	TN	24	Lymph nodes		24	Unilateral	Lymph node metastasis	Ureteric stents	Paclitaxel	Unknown
[6]	62	IDC	Luminal	27	Lymph nodes	Fulvestrant	45	Bilateral	Bladder metastasis	None	Palbociclib +fulvestrant	Unknown
[7]	58	IDC	Luminal HER2	20	Bone Appendix		20	Bilateral	Lymph node metastasis	Nephrostomy	Fulvestrant Pertuzumab +trastuzumab +docetaxel	Unknown
[8]	59	ILC	Luminal	108	Pleura Bone Lymph nodes		108	Bilateral	Bladder metastasis	Ureteric stents	Unknown	Unknown
[9]	53	ILC	Luminal	60	Lymph nodes Bone	Letrozole Capecitabine Vinorelbine	98	Bilateral	Bladder metastasis	Ureteric stents Nephrostomy	Taxanes	Unknown
[10]	91	ILC	Luminal HER2	55	None		55	Bilateral	Bladder metastasis	Surgery	Tamoxifen	12
[11]	61	ILC	Luminal	120	Lymph nodes Bone	Fulvestrant Capecitabine	156	Unilateral	Retropertitoneal metastasis	Ureteric stents	Eribulin	8
[12]	59	ILC	Luminal	18	Duodenum Lymph nodes		18	Unilateral	Retropertitoneal metastasis	None	Capecitabine +tamoxifen	5

Discussion

Hydronephrosis in breast cancer is mainly caused by metastases to the retroperitoneum, para-aortic lymph nodes, ureters, and bladder. Abrams et al. [2] reported the frequency of these metastases in 167 cases, with 74 (44.3%) in peritoneal lymph nodes, 41 (24.6%) peritoneal, 13 (7.8%) ureters, and 4 (2.4%) bladder.

A PubMed search for the keywords “breast cancer” and “hydronephrosis” identified 10 cases of postoperative recurrence, as shown in Table 2 [3–12]. The median time from surgery to diagnosis of hydronephrosis was 76.5 months (18–360 months), and the histological type was IDC in 4 cases, ILC in 5 cases, and unknown in 1 case. Compared to the present cases, the histological type was more often lobular carcinoma, and lobular carcinoma is generally known to have a high incidence of specific metastases.

Borst et al. [13] reported that peritoneal and retroperitoneal metastases occurred in 0.6% of ductal carcinoma and 3.1% of lobular carcinoma cases. The subtypes were luminal type in 6 cases, TN in 1 case, and luminal HER2 in 3 cases. There were 6 patients with bilateral and 4 patients with unilateral hydronephrosis. The causes of hydronephrosis were retroperitoneal metastasis in 2 cases, lymph node metastasis in 2 cases, and bladder metastasis in 6 cases. The treatment for hydronephrosis was untreated in 2 cases, ureteral stents in 4 cases, nephrostomy in 2 cases, ureteral stents plus nephrostomy in 1 case, and surgery in 1 case. The time between surgery and diagnosis of hydronephrosis was a median of 47 months in the present cases and 76.5 months in the references. In the present cases and in the references, about half of the cases with hydronephrosis were found at the time of recurrence. However, there were few recurrences of hydronephrosis alone, and most of them were accompanied by bone and lymph node metastases. The median time to metastasis at other sites was reported to be 24 months for bone metastasis, 38 months for lung metastasis, and 11 months for liver metastasis [14]. Since the time to onset of hydronephrosis tends to be longer than that of other metastatic sites, the number of patients who develop hydronephrosis may increase in the future as more patients survive long after recurrence.

Treatment is indicated when hydronephrosis causes or is strongly expected to cause renal dysfunction, infection, or pain. Ureteral stents are often the 1st choice in cases of renal dysfunction. Nephrostomy is indicated in cases where ureteral stent insertion is difficult or where ureteral stent is not effective due to extensive peritoneal metastasis. There are also cases of nephrostomy due to stent ineffectiveness, as in case 5. The cause may be extrinsic ureteral compression, increased bladder pressure, or inadequate peristalsis of the ureter, which can cause ureteral stents to fail [15]. Plastic stents are usually the most commonly used material for ureteral stents, but there have been reports of good ureteral patency with recently developed metallic stents [15].

Hormonal therapy and chemotherapy are used in the treatment of breast cancer after diagnosis of hydronephrosis. However, in cases of prolonged renal dysfunction, it may be better to reduce the dose of drugs or use drugs that are less sensitive to renal dysfunction, such as taxanes.

The prognosis is considered to be near the end stage of the disease, as the disease has spread throughout the body with hematogenous and lymphatic metastases, but there are few reports on prognosis. Further accumulation of data is needed to determine the prognosis of such patients.

Conclusions

Hydronephrosis associated with breast cancer metastasis was investigated. At our institution, the rate of hydronephrosis in breast cancer recurrence was not high, about 0.5%. Hydronephrosis does not require treatment in the absence of renal dysfunction. If renal dysfunction appears or is likely to appear, procedures such as stents or nephrostomy could be used to continue treatment of the breast cancer.

Statement of Ethics

All procedures were conducted in accordance with the ethical standards of the Helsinki Declaration of 1975. Patient anonymity and all confidential information have been preserved.

The study was approved by the Ethics Committee of Tokyo Medical and Dental University Hospital (Tokyo, Japan). All patients gave informed consent for the publication of this case report.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions

Study conception and design: Hitoshi Sugimoto, Goshi Oda, Tsuyoshi Nakagawa, and Hiroyuki Uetake. Collected data: Hitoshi Sugimoto, Kumiko Hayashi, Maho Yoshino, Ayumi Ogawa and Tokuko Hosoya. Drafting of the manuscript: Hitoshi Sugimoto. Modification of the manuscript: Goshi Oda and Minato Yokoyama. All authors read and approved the final version of the manuscript.

References

- 1 Fitzmaurice C, Abate D, Abbasi N, Abbastabar H, Abd-Allah F, Abdel-Rahman O, et al., Global Burden of Disease Cancer Collaboration.. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 1990 to 2017: A Systematic Analysis for the Global Burden of Disease Study. *JAMA Oncol*. 2019;5(12):1749–68.
- 2 Abrams HL, Spiro R, Goldstein N. Metastasis in carcinoma: analysis of 1000 autopsied cases. *Cancer*. 1950;3:74–85.
- 3 Jordan LA, Green L. Late breast cancer metastasis to the urinary bladder presenting with bilateral hydronephrosis. *Radiol Case Rep*. 2018;13(6):1238–41.
- 4 Yoneyama K, Nakagawa M, Hara A. Bladder metastasis from primary breast cancer: a case report. *Surg Case Rep*. 2018;4(1):73.
- 5 Chahin M, Chhatrala H, Krishnan N, Brow D, Zuberi L. Triple-negative lobular breast cancer causing hydronephrosis. *J Investig Med High Impact Case Rep*. 2020;8:1–3.
- 6 De Rose AF, Balzarini F, Mantica G, Toncini C, Terrone C. Late urinary bladder metastasis from breast cancer. *Arch Ital Urol Androl*. 2019;91(1):60–2.

- 7 Mori R, Futamura M, Morimitsu K, Yoshida K. Appendicitis caused by the metastasis of HER2-positive breast cancer. [Surg Case Rep](#). 2016;2(1):104.
- 8 Ibraheemi A. Case report of metastatic invasive breast lobular carcinoma to the urinary bladder. [Int J Hematol Oncol Stem Cell Res](#). 2016;10(1):51.
- 9 Cormio L, Sanguedolce F, Di Fino G, Massenio P, Liuzzi G, Ruocco N, et al. Asymptomatic bladder metastasis from breast cancer. [Case Rep Urol](#). 2014;2014:672591.
- 10 Nieder C, Pawinski A. A case of recurrent breast cancer with solitary metastasis to the urinary bladder. [Case Rep Oncol Med](#). 2014;2014:931546.
- 11 Jibiki N, Shimizu Y, Hashimoto K, Hamano T, Nishino T. Case of retroperitoneal metastasis of breast cancer with effective insertion of plural stents. [Jpn J Cancer Chemother](#). 2018;45(13):2220–2.
- 12 Nihon-yanagi Y, Park Y, Ooshiro M, Aoki H, Suzuki Y, Hiruta N, et al. A case of recurrent invasive lobular carcinoma of the breast found as metastasis to the duodenum. [Breast Cancer](#). 2009;16(1):83–7.
- 13 Borst MJ, Ingold JA. Metastatic patterns of invasive lobular versus invasive ductal carcinoma of the breast. [Surgery](#). 1993;114(4):637–2.
- 14 Patanaphan V, Salazar OM, Risco R. Breast cancer: metastatic patterns and their prognosis. [South Med J](#). 1988; 81(9):1109–12.
- 15 Kouba E, Wallen EM, Pruthi RS. Management of ureteral obstruction due to advanced malignancy: optimizing therapeutic and palliative outcomes. [J Urol](#). 2008;180(2):444–50.