

Locally advanced breast cancer in an elderly male with end-stage renal disease: A case report

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Abstract. Male breast cancer (MBC) is uncommon, often diagnosed late and prone to distant metastases. Treating MBC is more challenging than treating female breast cancer. The present study reports a case of end-stage renal disease (ESRD) in a Chinese patient with locally advanced MBC. What distinguishes the present case from previously reported MBCs is the advanced age (90 years), the presence of ESRD with multiple complications and the locally advanced (T4b) ulcerated tumor, a triad rarely documented in the literature. A 90-year-old man presented to the hospital with an itchy, bleeding, ulcerated breast tumor. In addition to ESRD, they had hypertension and urinary retention requiring cystostomy, as well as a 5.0x4.5 cm ulcer on their left breast. A simple left mastectomy was performed as palliative surgery. Postoperative pathology confirmed invasive ductal carcinoma (unspecified type, grade III); immunohistochemistry showed strong estrogen receptor positivity (~95%) and moderate-to-strong progesterone receptor positivity (~10%). After palliative resection, the patient received adjuvant endocrine therapy as scheduled. Due to the systemic condition of the patient and their comorbidities, adjuvant endocrine therapy was chosen over radiation and chemotherapy. The quality of life of the patient improved and recovery was uneventful. In the present case, respecting the preferences of the patient was vital for this very elderly individual with a terminal illness. Striking a balance between tumor control and risk-benefit ratio within a multidisciplinary team framework was essential. A tailored approach based on endocrine and palliative medications should be adopted to improve quality of life and short-term prognosis.

Introduction

Compared with female breast cancer, male breast cancer (MBC) is a rare malignancy, accounting for only 0.6-1% of all breast cancer cases (1). Statistics indicate that in 2021, there were only 38,827 new cases of MBC worldwide, with 13,274 mortalities (2). From 1990 to 2021, the global burden of MBC increased, exhibiting notable regional disparities. Specifically, Eastern Sub-Saharan Africa bore the highest burden, while Oceania had the lowest. Disparities were also observed across socio-demographic index (SDI) levels: High-middle SDI regions showed the highest lifetime risk of incidence and low SDI regions showed the highest mortality risk. Temporal trends differed markedly by region as well (2). Risk factors include advanced age, obesity, testicular disease, intake of medications and exogenous hormones (such as those used in gender transition therapy) and BRCA2 gene mutations; BRCA2 mutation carriers face an 80-fold higher cancer risk than the general population (3). Influenced by societal perceptions and sex factors, patients with MBC typically present for medical care at a later stage. At diagnosis, the disease is often at a more advanced clinical stage and higher histological grade, resulting in worse overall prognosis and markedly reduced 5-year survival rates compared with female patients (4). However, due to the limited sample size of MBC cases and the lack of large-scale clinical trial data, clinical treatment often follows female breast cancer guidelines, leaving the optimal treatment regimen unclear. Based on current epidemiological and histopathological data, >90% of patients with MBC are estrogen receptor (ER)-positive and human epidermal growth factor receptor 2 (HER2)-negative. Their biological characteristics resemble those of postmenopausal hormone receptor-positive breast cancer in women. Modified radical mastectomy is the most common surgical approach, followed by adjuvant systemic therapy with tamoxifen (5).

The present study reports a case of breast cancer in a very elderly male patient from China, who presented with advanced disease involving multiple organ metastases and end-stage renal disease (ESRD). Unlike prior reports that focused on early-stage or younger male patients, the present case uniquely combines three challenging factors: Advanced age (90 years), ESRD [chronic kidney disease (CKD) stage 3b-5] and a locally advanced ulcerated breast mass (T4b) (6,7). This combination has rarely been described and poses distinct

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therapeutic dilemmas. Following pathological confirmation of invasive breast cancer, a palliative mastectomy was performed based on the overall condition of the patient and comorbidities. Adjuvant endocrine therapy was planned for subsequent treatment, thereby providing an individualized diagnostic and therapeutic approach for this special patient population.

Case report

A 90-year-old male patient was admitted in August 2025 to the Affiliated Hospital of Nanjing University of Chinese Medicine (Nanjing, China) for a left breast mass with local itching for >2 months, ulceration with bloody serous discharge and pain for 1 week. A physical examination revealed destruction of normal left breast structures. A large ulcerative mass, ~5.0x4.5 cm in size, was visible in the central region. The ulcer base contained bloody exudate, with raised, everted and hardened margins presenting a typical ‘crater-like’ appearance. The mass was firm, fixed and prone to bleeding upon palpation. The nipple-areolar complex was absent. The surrounding skin exhibited edema, erythema and hyperpigmentation. Palpation revealed diffuse glandular sclerosis with indistinct borders throughout the breast. Enlarged left axillary lymph nodes were palpable (Fig. 1). The breast ultrasound identified a suspicious, irregular hypoechoic mass (50.8x45.1x26.1 mm) with spiculated margins, containing microcalcifications and posterior acoustic shadowing (breast imaging-reporting and data system 5). Enlarged axillary and supraclavicular lymph nodes suggested potential metastasis (Fig. 2A-F). A chest CT confirmed multiple new pulmonary nodules, with a larger solid nodule located in the apical segment of the right upper lobe consistent with metastatic characteristics (Fig. 3).

The patient had a history of severe ESRD [CKD stage 5; June 2024 serum creatinine, 446.2 $\mu\text{mol/l}$; estimated glomerular filtration rate (eGFR), 9.32 ml/min/1.73 m²], which was managed conservatively. Upon the current admission, renal function was markedly improved compared with previous assessments, with serum creatinine at 166.1 $\mu\text{mol/l}$ and eGFR at 32.5 ml/min/1.73 m² (calculated using the CKD-Epidemiology Collaboration formula), consistent with CKD stage 3b. Complications of renal insufficiency included renal anemia (hemoglobin, 101 g/l) and nephrogenic edema. A suprapubic cystostomy had been performed in September 2024 due to urinary retention. Vital signs and other major organ examinations were generally stable.

A multidisciplinary team (MDT) consultation and a review of relevant treatment guidelines were thoroughly communicated to the patient and their family. Considering their advanced age, stage IV breast cancer and concomitant ESRD, palliative debulking surgery was performed, specifically a simple left mastectomy, aimed at controlling the local tumor and improving quality of life. The patient was discharged on the third postoperative day. During the hospital stay, the surgical wound healed well without complications such as bleeding, infection or skin flap necrosis. Quality of life was assessed using the Eastern Cooperative Oncology Group (ECOG) performance status scale at admission (ECOG 3), at discharge (ECOG 2), at a 1-month follow-up (ECOG 1) and at the last follow-up 6 months after surgery (ECOG 1). The patient reported notable relief from local pain and bleeding, as



Figure 1. Preoperative clinical imaging of the left breast of the patient (August 2025). An ulcerated lesion with a ‘crater-like’ appearance is visible at the site of the left breast mass.

well as improved sleep and appetite. As of the last follow-up (March 2026), the patient remained alive with no evidence of local recurrence or distant progression. They continued to take tamoxifen and medications for the renal disease without major adverse events. At that time, progression-free survival had exceeded 7 months, and overall survival continued to be followed.

Postoperative pathology. On gross examination, the invasive ductal carcinoma measured 5.5x3.8x3 cm, with macroscopic involvement of the skin and nipple-areolar complex accompanied by ulceration. Microscopic examination confirmed a Nottingham histological grade 3 carcinoma (histological score 7: Tubule formation 3, nuclear pleomorphism 3, mitotic count 1), with a high-grade ductal carcinoma *in situ* component. Vascular invasion was identified on hematoxylin and eosin (H&E)-stained sections (+), and perineural invasion was absent (-). Pathological pTNM staging was classified according to the 8th edition AJCC staging system, with a stage of pT4bNx (8). Immunohistochemical staining was performed on formalin-fixed, paraffin-embedded tumor tissue following standard pathological protocols at the Affiliated Hospital of Nanjing University of Chinese Medicine. Immunohistochemical staining and mucicarmine staining were performed to detect the expression of relevant proteins and the distribution of mucus in tumor tissues, respectively. Mucicarmine staining revealed positive mucus staining both inside and outside the tumor cells. Tissue samples were fixed in 4% neutral buffered formalin at room temperature for 24 h. After rinsing thoroughly, the specimens were subjected to gradual dehydration with gradient concentrations of ethanol. The dehydration procedure was performed sequentially in 70, 80, 90, 95% and absolute ethanol successively to completely remove internal moisture from tissues. After full dehydration, the tissues were cleared with xylene and finally embedded in paraffin wax. Serial sections were cut at a thickness of 3 μm . Paraffin sections were baked in an incubator at 65°C for 30 min to enhance tissue adherence to glass slides. Subsequently, the sections were deparaffinized in xylene and rehydrated through a graded ethanol series. To inhibit endogenous peroxidase activity, tissue sections were treated with 3% hydrogen peroxide at room temperature for 20 min. Immunohistochemical staining was performed using a Benchmark ULTRA automated

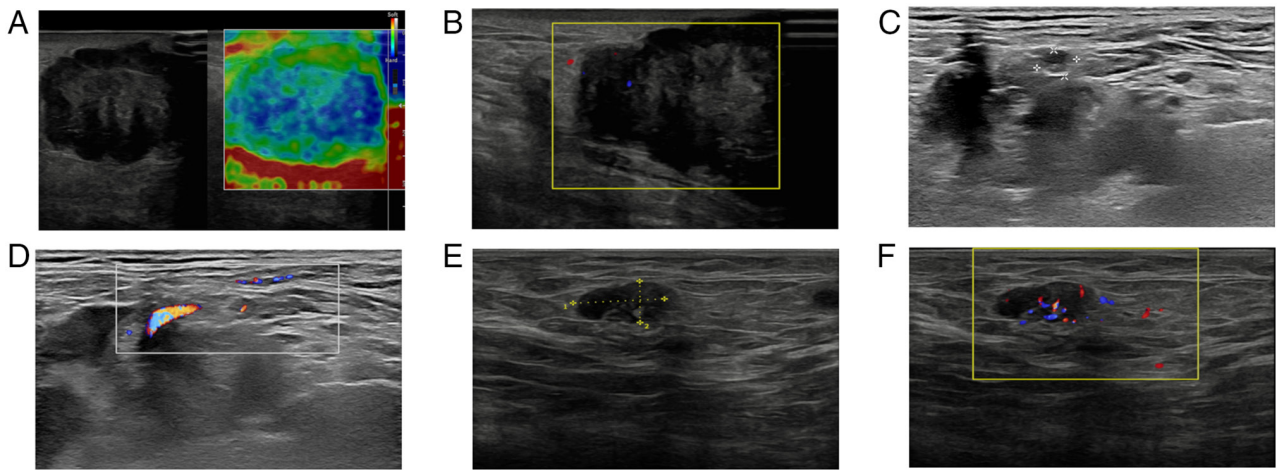


Figure 2. Ultrasound images of the breast and lymph nodes. (A) Ultrasound B-mode imaging of the left breast shows a hypoechoic nodule measuring 50.8x45.1x26.1 mm, with spiked margins, heterogeneous internal echoes, and posterior acoustic shadowing. Concomitant elastography demonstrates predominantly blue color in the central area and green color at the periphery, corresponding to an elasticity score of 3, indicating increased tissue stiffness. (B) CDFI reveals intralesional blood flow signals within the left breast nodule. (C) B-mode ultrasound of the left supraclavicular fossa demonstrates an oval hypoechoic lesion measuring 6x4 mm, with clear borders, regular shape, and slightly heterogeneous cortical echoes. The lymphatic hilum is indistinct. (D) CDFI shows spot-like and strip-like blood flow signals within the left supraclavicular hypoechoic lesion. (E) B-mode ultrasound of the left axilla shows multiple heterogeneous lesions, the largest of which measures 12.4x8.0 mm, with ill-defined margins, irregular shape, heterogeneous internal echoes, focal anechoic areas, and loss of the lymphatic portal structure. (F) CDFI demonstrates abundant blood flow signals within the enlarged left axillary lymph node. CDFI, Color Doppler flow imaging.

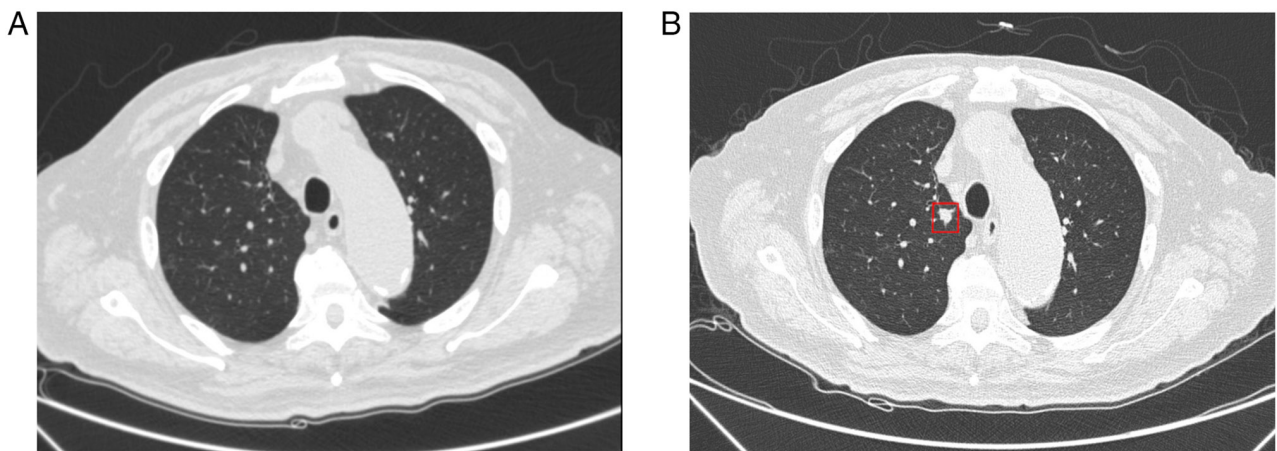


Figure 3. Patient chest CT images. (A) Chest CT scan shows minimal fibrotic foci in both lungs, with a small nodule in the right lower lobe (June 2024). (B) Preoperative chest CT scan (August 2025) demonstrates multiple small nodules in both lungs, including a new solid nodule (~8 mm in diameter) in the apical segment of the right upper lobe, with imaging features suggestive of metastatic disease.

immunohistochemistry stainer (Roche Tissue Diagnostics) according to the manufacturer's instructions with the ultra-View Universal DAB Detection Kit (cat. no. 05269806001; Roche Diagnostics (Shanghai) Co., Ltd.). All experimental procedures, including blocking, primary antibody incubation, secondary antibody/linker incubation, HRP polymer incubation, washing and DAB color development, were automatically completed by the instrument following preset programs. Known positive tissue sections were used as positive controls, and PBS was used instead of the primary antibody as a negative control. All primary antibodies used in the present study were ready-to-use commercial reagents without any further manual dilution. The primary antibodies used were as follows: ER (cat. no. 05278414001; Clone: SPI; Roche Diagnostics (Shanghai) Co., Ltd.); PR (cat. no. 05278392001;

Clone: 1E2; Roche Diagnostics (Shanghai) Co., Ltd.); AR (cat. no. ZA-0554; Clone: EP120; Beijing Zhongshan Golden Bridge Biotechnology Co., Ltd.); HER2 (cat. no. 05999570001; Clone: 4B5; Roche Diagnostics (Shanghai) Co., Ltd.); Ki-67 (cat. no. 05278384001; Clone: 46295; Roche Diagnostics (Shanghai) Co., Ltd.); Cytokeratin 5/6 (CK5/6; cat. no. 06478441001; Clone: D5/16 B4; Roche Diagnostics (Shanghai) Co., Ltd.); E-cadherin (cat. no. 04015630983872; Clone: 36; Roche Diagnostics (Shanghai) Co., Ltd.); p120 (cat. no. 05867088001; Clone: 98; Roche Diagnostics (Shanghai) Co., Ltd.); EGFR (cat. no. ZA-00505; Clone: EP22; Beijing Zhongshan Golden Bridge Biotechnology Co., Ltd.); SOX10 (cat. no. ZM-0366; Clone: MRQ-58; Beijing Zhongshan Golden Bridge Biotechnology Co., Ltd.); p40 (cat. no. 07394420001; Clone: BC28; Roche Diagnostics

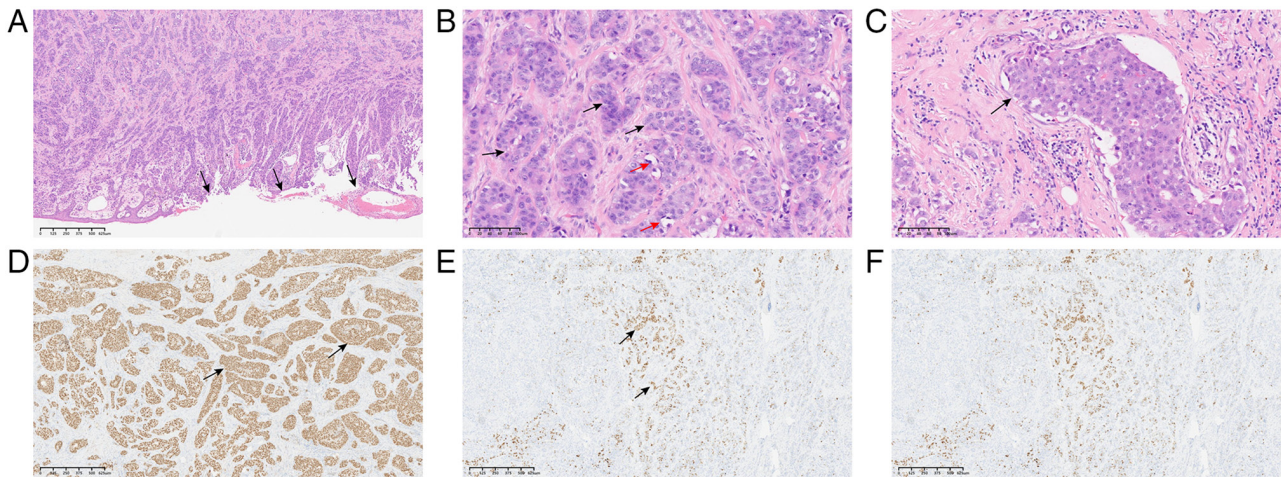


Figure 4. Postoperative pathological images of invasive breast carcinoma in the patient (August 2025). (A) H&E staining shows invasive breast carcinoma invading the epidermis with ulceration. Arrows indicate the edge of epidermal ulceration (original magnification, x40; scale bar, 625 μ m). (B) H&E staining reveals that tumor cells are arranged in nests or tubular structures with glandular lumina, separated by collagen fibers. Tumor cells are large and pleomorphic with slightly eosinophilic or vacuolated cytoplasm, marked nuclear atypia, prominent nucleoli and readily visible mitotic figures. Black arrows indicate tumor nests/tubular structures separated by collagen fibers, and red arrows point to pleomorphic tumor cells with prominent nucleoli and mitotic figures (original magnification, x200; scale bar, 100 μ m). (C) H&E staining demonstrates intravascular tumor thrombi; arrows indicate tumor cell clusters (vascular tumor emboli) within the vascular lumen (original magnification, x200; scale bar, 100 μ m). Immunohistochemical results, (D) Tumor cells show strong nuclear positivity for estrogen receptor (ER). Arrows indicate nuclear positivity in tumor cells (original magnification, x40; scale bar, 625 μ m). (E) Tumor cells exhibit moderate-to-strong nuclear positivity for progesterone receptor (PR). Arrows indicate nuclear positivity in tumor cells (original magnification, x40; scale bar, 625 μ m). (F) Tumor cells show low expression of human epidermal growth factor receptor 2 (HER2), with weak and incomplete membranous staining in a portion of tumor cells and no circumferential membranous staining (IHC 1+; original magnification, x200; scale bar, 100 μ m).

(Shanghai) Co., Ltd.); TRPS1 (cat. no. ZA-0681; Clone: B22; Beijing Zhongshan Golden Bridge Biotechnology Co., Ltd.); D2-40 (cat. no. X0931; Clone: D2-40; Agilent Technologies Co., Ltd.); p63 (cat. no. 05867061001; Clone: 4A4; Roche Diagnostics (Shanghai) Co., Ltd.). The secondary antibodies and matching linker reagents were supporting components contained in the ultraView Universal DAB Detection Kit [cat. no. 05269806001; Roche Diagnostics (Shanghai) Co., Ltd.]. These reagents were pre-configured ready-to-use products specifically adapted to the Benchmark ULTRA automatic staining platform, and all incubation and reaction procedures were finished automatically by the instrument in accordance with built-in standard protocols. Stained sections were observed and images were captured using a Leica DM-2000 light microscope. The immunohistochemistry results showed ER (~95%, strongly positive), PR (~10%, moderately to strongly positive), AR (negative), HER2 (1+), Ki-67 (~70% positive), cytokeratin 5/6 (CK5/6; -), E-cadherin (+++), p120 (cell membrane, +++), EGFR (-), SOX10 (-), p40 (-), trichorhinophalangeal syndrome 1 (+++), D2-40 (highlighting vascular channels and p63 (-) (Figs. 4 and S1).

Immunohistochemistry results demonstrated strong hormone receptor positivity (ER, 95%; PR, 10%), indicating that the patient was suitable for adjuvant endocrine therapy. After a comprehensive assessment of the risks and benefits associated with their advanced age, poor general condition and ESRD, tamoxifen was selected as the first-line agent. The patient is currently taking daily tamoxifen and renal protective medication. During treatment, renal function has been closely monitored and remained stable, with no evidence of deterioration related to tamoxifen administration. Close monitoring for drug-related adverse reactions will be continued, with particular emphasis on changes in renal function. This

individualized treatment plan aims to maximize therapeutic benefit while minimizing the risk of further renal impairment.

Discussion

The present report describes the management of an extremely rare case of metastatic breast cancer in a very elderly (90-year-old) male patient, whose condition was notably complicated by concomitant ESRD. The present case highlights the immense challenges in developing individualized treatment strategies when very advanced age, multiple comorbidities (particularly ESRD) and advanced cancer coexist. Most published MBC cases involve patients without severe renal impairment or with early-stage disease. The present patient's triad of very advanced age (90 years), ESRD requiring cystostomy and T4b ulcerated tumor represents a rare clinical scenario that demands individualized palliative management. The core dilemma lies in balancing limited oncological benefit against substantial risks of treatment-related toxicity.

Breast cancer is a rare disease in men, accounting for ~1% of all breast cancer cases. Its occurrence is associated with increased age, familial inheritance, obesity, testicular disease and elevated serum estrogen levels due to radiation exposure (9). Previous studies have confirmed that high-risk BRCA1/2 gene mutations not only increase men's risk of developing breast cancer but are also linked to an elevated risk of prostate cancer (10-12). A real-world study examining the characteristics of MBC in China (13) conducted a retrospective analysis of 1,119 Chinese patients with MBC. The average age at diagnosis was 60.9 years, with most patients clinically staged at stage II and hormone receptor-positive subtypes predominating. Therapeutically, the vast majority underwent mastectomy followed by adjuvant chemotherapy,

with hormone receptor-positive cases additionally receiving endocrine therapy. Due to insufficient breast cancer health education and screening coverage, Chinese patients are more likely than their American counterparts to present with locally advanced disease (14).

Currently, due to the lack of clinical research data specifically targeting MBC, its diagnosis and treatment strategies generally follow guidelines for female breast cancer, primarily including surgery, chemotherapy, radiotherapy and adjuvant endocrine and targeted therapies (15). However, existing literature lacks systematic reports on treatment strategies for very elderly male patients with advanced breast cancer, particularly regarding individualized treatment options in cases involving multiple comorbidities (such as ESRD) and metastatic disease. This gap underscores the urgency and importance of individualized treatment decisions based on chronological age, functional status, comorbidity burden and patient preferences. For this special population, treatment goals should prioritize quality of life improvement and local symptom control, while more real-world studies and consensus guidelines are needed to inform clinical practice.

The present case presents an extremely rare instance of breast cancer in a very elderly male patient concurrent with ESRD. The presence of ESRD notably limits treatment options and increases treatment risks. When kidney disease progresses to its final stage, it is termed ESRD, representing kidney failure where renal function is completely lost, necessitating renal replacement therapy such as hemodialysis or kidney transplantation (16). ESRD impacts all aspects of cancer treatment. Studies indicate dialysis patients face a 42% higher risk of developing breast cancer compared with the general population (17,18). This increased risk may be attributed to chronic inflammation, immune dysfunction, prolonged uremic toxin exposure or impaired DNA repair mechanisms in patients with end-stage renal disease (19). Furthermore, the persistent oxidative stress and chronic inflammatory state associated with ESRD may exacerbate mitotic activity and tumor cell proliferation, contributing to increased breast cancer aggressiveness (20). ESRD alters drug pharmacokinetics, compromises renal clearance, elevates blood drug concentrations and increases toxicity risks (18). Patients with ESRD exhibit compromised immunity, heightened infection susceptibility and greater vulnerability to adverse reactions such as bone marrow suppression and neurotoxicity. Drugs such as platinum-based agents, capecitabine, methotrexate and cyclophosphamide, which are renally excreted, require discontinuation or notable dose adjustments in these patients. This severely limits treatment options, reduces tolerance to antitumor therapy, and consequently impacts overall survival and quality of life (21-23).

The present patient underwent palliative surgery followed by endocrine therapy. Due to the advanced age of the patient and potential for systemic metastasis, the goal was to reduce tumor burden through palliative surgery while balancing survival outcomes with quality-of-life benefits. Immunohistochemistry demonstrated strong hormone receptor positivity, leading to subsequent oral endocrine therapy. Tamoxifen is primarily metabolized by the liver, posing minimal renal risk to the patient; however, careful monitoring of hepatic and renal function remains essential.

Metastatic breast cancer is incurable, necessitating palliative treatment strategies focused on systemic therapy guided by breast cancer subtype. Palliative care is a patient-centered approach emphasizing optimal symptom management and providing psychosocial and spiritual support based on the needs of the patient, values, beliefs and culture. Palliative care can improve quality of life and symptoms while reducing mortality rates (24,25). Palliative surgery controls local breakdown, bleeding and infection symptoms, aiming to reduce tumor burden and improve quality of life. Multiple retrospective studies indicate that palliative surgery in patients with metastatic breast cancer may also yield certain survival benefits (26-28). In the present case, due to the age of the patient, ESRD and metastatic status, the decision to perform palliative surgical resection while forgoing radiotherapy and chemotherapy, and to continue subsequent endocrine therapy, represented an inevitable outcome of risk-benefit balancing. This also highlights the central role of MDT collaboration in decision-making for such complex cases.

The present study has limitations. First, as a single case report, it cannot yield generalizable conclusions. Second, the follow-up period was relatively short, precluding assessment of long-term oncological outcomes. Finally, the treatment decision in the present case was highly individualized. Due to the advanced age of the patient and multiple comorbidities, the personalized approach combining palliative surgery with endocrine therapy may not apply to all patients with advanced metastatic breast cancer.

While the individual components of the present case (MBC, advanced age and ESRD) are not rare, their combination in a single patient, especially the triad of 90 years, ESRD with CKD stage 3b-5 and a T4b ulcerated tumor, has been scarcely documented. Moreover, the successful use of palliative mastectomy followed by tamoxifen alone, without radiotherapy or chemotherapy, in a patient who could not tolerate standard systemic therapy due to renal failure, provides a real-world example of risk-benefit decision-making. The present report does not claim a novel molecular discovery but offers practical guidance for clinicians facing similar therapeutic dilemmas in frail, multi-morbid elderly patients.

Reports on metastatic breast cancer in very elderly males remain scarce in both domestic and international literature. The present case underscores several key principles in geriatric oncology treatment and care. First, comprehensive and systematic assessments must be conducted based on disease management guidelines, considering the functional status of the patient and the burden of comorbidities. This enables the development of individualized treatment plans aimed at improving quality of life without compromising survival outcomes. Second, for patients with advanced tumors and severe comorbidities, palliative care becomes essential for symptom control, tumor burden reduction, quality of life enhancement and humanistic care. In this context, palliative surgery serves as an effective tool for managing local tumor symptoms and may extend survival to some extent. Third, managing complex cases such as elderly patients with cancer requires MDT collaboration. Integrating expertise from breast surgery, oncology, anesthesiology, nephrology and palliative care enables the provision of optimal treatment plans and clinical care. In summary, while the long-term outcome of

the present case remains to be observed, it presents a valuable example for developing individualized treatment plans for elderly patients with cancer with severe comorbidities. Enhancing male awareness of breast cancer can facilitate early detection and treatment, reduce stigma, encourage proactive management and ultimately improve patient prognosis.

In conclusion, the present case demonstrates the successful management of a very elderly male patient with metastatic breast cancer complicated by ESRD. Through multidisciplinary evaluation, individualized palliative local surgery and planned endocrine therapy were implemented. The present case illustrates that even for patients with extremely complex conditions, meaningful clinical interventions remain achievable through patient-centered, quality-of-life-oriented individualized strategies.

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Availability of data and materials

The data generated in the present study may be requested from the corresponding author.

Authors' contributions

MFC and CY conceived the overall concept and designed the framework of this study. MFC and MF collected the clinical case data and drafted the manuscript. XYL and HHW sorted and analyzed the ultrasound and CT imaging data derived from medical records, interpreted the radiological findings, and participated in the writing and discussion of imaging characteristics in the manuscript. KH participated in revising the manuscript for important intellectual content, critically reviewed the pathological and imaging data, and took part in the analysis and interpretation of the research results. MFC and CY confirm the authenticity of all the raw data. All authors meet the ICMJE criteria for authorship, and have read and approved the final version of the manuscript.

Ethics approval and consent to participate

Not applicable.

Patient consent for publication

Written informed consent was obtained from the patient for the publication of the present case report.

Competing interests

The authors declare that they have no competing interests.

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