Cervical metastasis in breast cancer: A case report

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Abstract. The present case report describes the case of a 48-year-old woman with a history of invasive lobular carcinoma of the breast who developed cervical metastasis, initially presenting without any gynecological symptoms. Cervical lesions were identified through PET-CT imaging and the diagnosis of metastatic disease was confirmed by cervical biopsy. Abnormal vaginal bleeding is a common initial symptom of cervical metastasis, but some patients may present without any gynecological symptoms, potentially leading to delayed diagnosis of metastatic lesions. Hysteroscopy and cervical exfoliative cytology have low positive rates for diagnosing cervical metastasis and often require cervical biopsy or surgery to confirm the diagnosis. Management strategies for cervical metastasis remain largely individualized; however, surgical intervention may improve prognoses in patients in whom the cervix is the sole site of metastasis. The present case report emphasizes the need for heightened clinical vigilance in the evaluation of patients with a history of breast cancer who present with atypical or subtle findings.

Introduction

The most common metastatic sites of breast cancer include the bones, lungs, liver and brain, whereas metastasis to the reproductive system is less common (1). Within the reproductive system, the cervix is a particularly uncommon site of involvement, due to its relatively limited blood supply, dense fibrous stroma and single lymphatic drainage pathway (2). Given the rarity of this condition, no epidemiological data are currently available regarding the incidence and mortality of breast cancer with cervical metastasis. Existing literature suggests that invasive lobular carcinoma has a higher predilection for cervical spread, despite limited supporting evidence (3,4). The diagnosis of cervical metastasis remains challenging due to non-specific clinical manifestations. While abnormal vaginal bleeding is the most common initial complaint, some patients present without any gynecological symptoms (5). Cervical biopsy is essential for a definitive pathological diagnosis, as conventional cervical cytology frequently results in false-negative findings (6). Treatment strategies are largely individualized, given the absence of high-level evidence from large clinical trials. Notably, prior studies indicate that surgical resection of cervical metastatic lesions may help prolong patient survival (7). In the present case report, a rare case of breast cancer with cervical metastasis presenting without gynecological symptoms is reported to increase awareness of this condition.

Case report

A 48-year-old woman presented to The Second Hospital of Jilin University (Changchun, China) in May 2025 with a hard mass in the central region of the left breast and nipple retraction. Magnetic resonance imaging (MRI) (Fig. 1) revealed an irregular mass in the left breast, involving the nipple and skin, measuring ~68x27x85 mm, with multiple enlarged lymph nodes in the axilla. A core needle biopsy of the breast mass and axillary lymph nodes confirmed the diagnosis of invasive lobular carcinoma of the breast with axillary lymph node metastasis. Immunohistochemical findings were as follows: Estrogen receptor (ER; positive rate: 90%, strongly positive; Fig. 2), progesterone receptor (PR; positive rate: 40%, moderate intensity; Fig. 3), HER-2(2+) (Fig. 4), Ki-67 (positive rate: 30%; Fig. 5) and E-cadherin(-) (Fig. 6). FISH testing showed no HER-2 gene amplification. The patient had no family history of breast or ovarian cancer.

PET-CT imaging revealed lymph node metastasis in the left clavicular region, pectoral muscle area and axillary lymph nodes, as well as multiple bone metastases throughout the body, involving multiple vertebrae of the cervical, thoracic, lumbar and sacral spine, the sternum, the left clavicle, multiple ribs on both sides, the proximal right humerus, both scapulae, the ilium, the pubis and the femur (Figs. 7 and 8). Increased metabolic activity was also noted in the cervix (Fig. 9), warranting pathological examination to differentiate between metastatic disease and primary cervical lesions.

The patient reported regular menstrual cycles with normal flow and no abnormal vaginal bleeding, discharge or lower abdominal pain. Cervical exfoliated cell human papillomavirus (HPV) testing was positive for HPV types 16 and 18, as well as 12 other high-risk HPV DNA types. Subsequent colposcopy and cervical biopsy showed no obvious cervical

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mass but demonstrated diffuse hardening of the cervix, distinct from both normal cervical tissue and primary cervical malignancies. Pathological results confirmed metastatic malignant tumors in the cervix, with immunohistochemistry and morphology consistent with breast cancer metastasis. Immunohistochemical findings were as follows: ER(+; Fig. 10), PR(partial +; Fig. 11), Ki-67 (positive rate, 30%; Fig. 12), cytokeratin (AE1/AE3; +; Fig. 13) and trichorhinophalangeal syndrome 1(+; Fig. 14). Pelvic contrast-enhanced MRI showed a lesion measuring 40x30x36 mm (Fig. 15).

The patient was diagnosed with stage IV breast cancer with regional lymph node metastasis, cervical metastasis and bone metastasis. Given the rarity of cervical metastasis from breast cancer, current treatment strategies are primarily derived from individual case experiences rather than systematic, large-scale studies. A multidisciplinary consultation involving gynecology, radiology and other relevant specialties recommended endocrine rescue therapy with gonadotropin-releasing hormone agonists, aromatase inhibitors and CDK4/6 inhibitors (8,9), in combination with bisphosphonates for bone protection. Treatment response was assessed every two cycles, with pelvic MRI used to evaluate cervical lesions. Regarding gynecological surgery, current consensus suggests that surgical intervention may improve prognosis if the cervix is the sole metastatic site (10). However, given the extensive bone involvement of the patient, cervical surgery was not considered appropriate.

After 2 months of treatment, contrast-enhanced breast and pelvic MRI (performed in August 2025) revealed notable tumor regression. The breast lesion decreased from 68x27x85 mm to 7x6x6 mm (Fig. 16) and the cervical lesion from 40x30x36 mm to 26.3x19.3x21.4 mm (Fig. 17).

Discussion

Previously reported cases of breast cancer metastasis to the cervix were reviewed (Table SI) (1-7,11-53). The ages of the patients ranged from 32 to 84 years, and the mean age was 55 years. Among the 37 cases with available menstrual status, 28 were postmenopausal and 9 were premenopausal. The present literature review suggested that postmenopausal women might have elevated proneness to cervical metastasis, in contradiction to the findings of Cummings *et al* (6), who have reported that premenopausal women have elevated susceptibility to cervical metastasis, possibly due to higher circulating estrogen levels (54). In most cases, cervical metastases are detected after the initial diagnosis of breast cancer, with the interval between the diagnosis of breast cancer and the detection of cervical metastases ranging from 3 months to 15 years, with an average interval of 53 months. In a small number of cases, both breast cancer and cervical metastases were diagnosed concurrently, with some patients initially presenting with gynecological symptoms that prompted investigation and led to the discovery of underlying breast cancer.

Among the 56 reported cases, 32 patients reported gynecological symptoms, with 31 (55.4%) presenting with abnormal vaginal bleeding as the initial symptom and 3 admitted to hospital due to anemia caused by abnormal vaginal bleeding (40,42,51). Less frequent symptoms included abdominal pain, abdominal distension, lower back pain and abnormal vaginal discharge. By contrast, 15 (26.8%) patients were asymptomatic, with cervical metastases detected incidentally during routine physical or comprehensive examinations. In 3 cases (26,28,30), no gynecological symptoms were present, but persistently elevated cancer antigen 15-3 levels prompted further evaluation, which revealed cervical lesions. In the present case report, the patient also exhibited no gynecological symptoms, possibly because metastasis was confirmed to the cervix without endometrial involvement (19). This suggests that some patients with cervical metastasis may have subtle symptoms that are easily overlooked.

Among the 39 patients who underwent hysteroscopy, cervical metastasis was detected in 33 cases (83.6%) and presented primarily as abnormal cervical masses or cervical hardening; however, no obvious abnormalities were observed in 6 cases (15.4%). Cervical cytology was negative in 33.8% of cases, which were subsequently confirmed by cervical biopsy or surgery. All diagnoses of cervical metastases were pathologically confirmed. The majority of cases were identified through cervical needle biopsy, while a smaller number were confirmed postoperatively. Only one patient had a negative cervical biopsy but was later diagnosed during surgery (44). Therefore, a negative cervical cytology does not exclude metastasis, and further pathological biopsy should be performed to avoid missed diagnoses.

In the present case report, vaginal color Doppler ultrasonography revealed no abnormalities, and colposcopy was performed only after PET-CT incidentally identified cervical lesions. Hysteroscopy demonstrated diffuse cervical sclerosis, probably reflecting a tissue response to metastatic disease, characterized by fibrous proliferation and inflammatory cell infiltration (55). Pathological biopsy is the gold standard for diagnosing breast cancer metastasis to the cervix (53).

In imaging evaluation, cervical abnormalities were detected in 4 of the 8 patients (50%) who underwent PET-CT, in 8 of the 19 patients (42.1%) who underwent pelvic CT, and in 4 of the 5 patients (80%) who underwent pelvic MRI. Statistically, pelvic MRI showed a relatively higher detection rate for cervical abnormalities and might theoretically be recommended for the evaluation of patients with breast cancer and suspected cervical involvement. However, given the small sample size in each group, the findings might be subject to bias, and no definitive conclusions can be drawn.

Notably, the present patient tested positive for HPV types 16 and 18, and other high-risk HPV types; this finding initially caused uncertainty in the differential diagnosis between primary cervical cancer and metastatic breast cancer. However, through a multidimensional assessment, the diagnosis was ultimately confirmed: The immunohistochemical phenotype of the cervical lesion was consistent with the characteristics of metastatic cancer of breast origin, and the cervical biopsy revealed no histological evidence of cervical intraepithelial neoplasia or primary cancer. These findings, together with the patient's confirmed history of breast cancer and the imaging features of metastatic lesions on pelvic MRI and PET-CT, established a definitive diagnosis of metastatic breast cancer involving the cervix. This case highlights that HPV positivity only indicates an infectious state. Notably, high-risk HPV infection is relatively common in women of

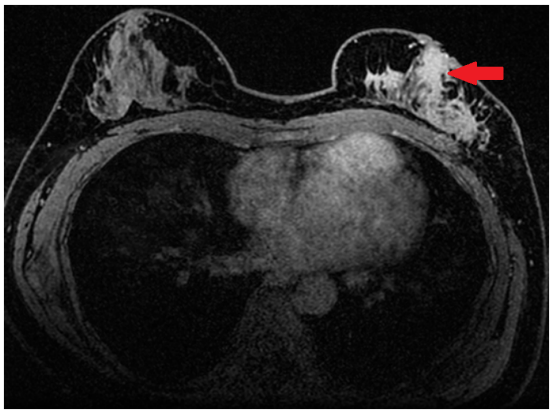

Figure 1. Initial breast magnetic resonance imaging image. The arrow indicates the location of the breast cancer lesion prior to treatment, which manifested as high signal intensity, with indistinct margins and nipple involvement.

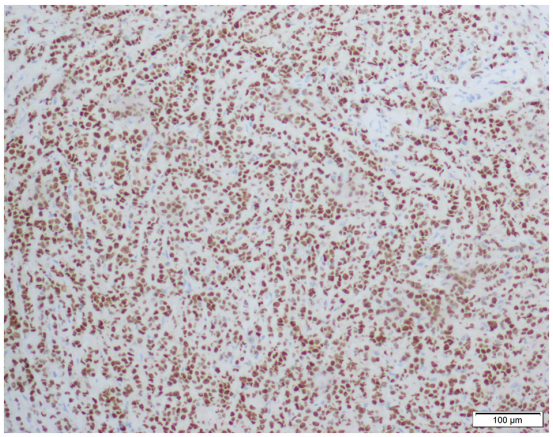

Figure 2. Estrogen receptor expression in the breast cancer cells. Scale bar, 100 μm.

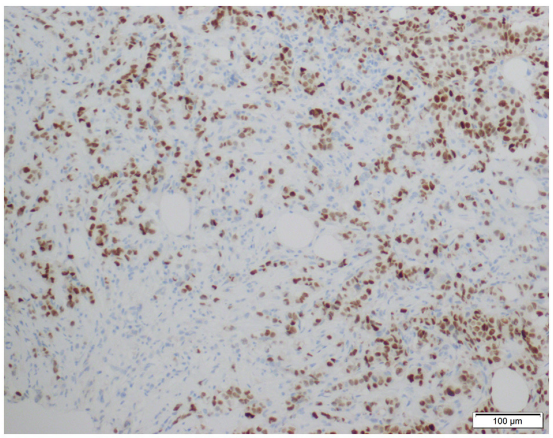

Figure 3. Progesterone receptor expression in the breast cancer cells. Scale bar, 100 μm.

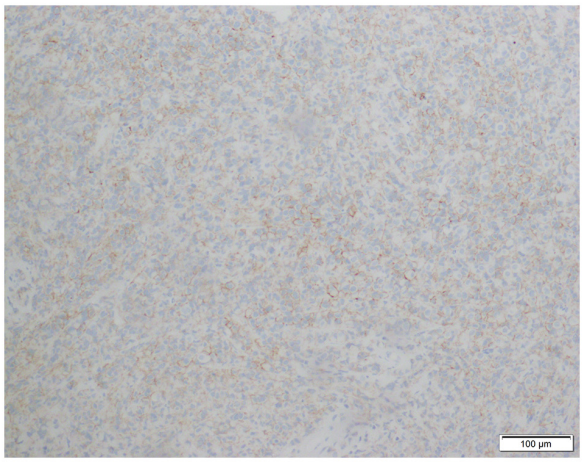

Figure 4. HER-2 expression in the breast cancer cells. Scale bar, 100 μm.

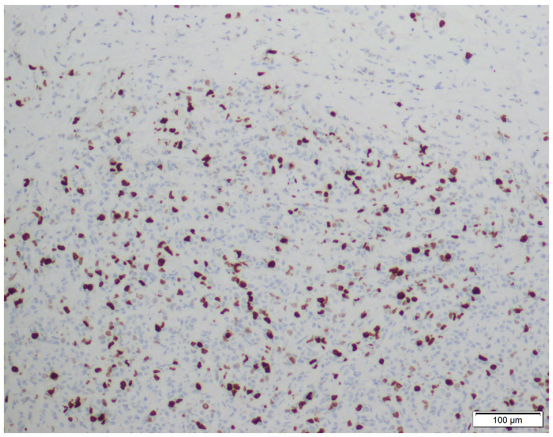

Figure 5. Ki-67 expression in the breast cancer cells. Scale bar, 100 μm.

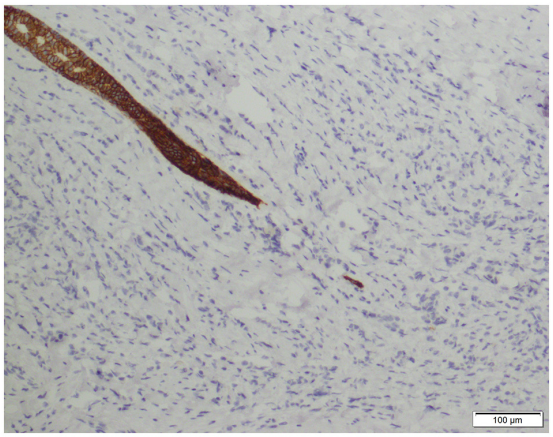

Figure 6. E-cadherin expression in the breast cancer cells.

childbearing age (56). A positive HPV result alone does not equate to cervical pathology, and in the absence of histological evidence supporting HPV-related primary cervical cancer, this finding does not influence the final diagnosis.

Among the 56 reported cases, the histological subtypes of breast cancer were as follows: 18 (34.6%) invasive ductal carcinomas (IDCs), 27 (51.9%) invasive lobular carcinomas (ILCs) and 7 (13.5%) cases of a mixture of both. Among the 7 mixed cases, 2 had cervical lesions of ILC, and the remaining 5 were unspecified. Although the incidence of ILC

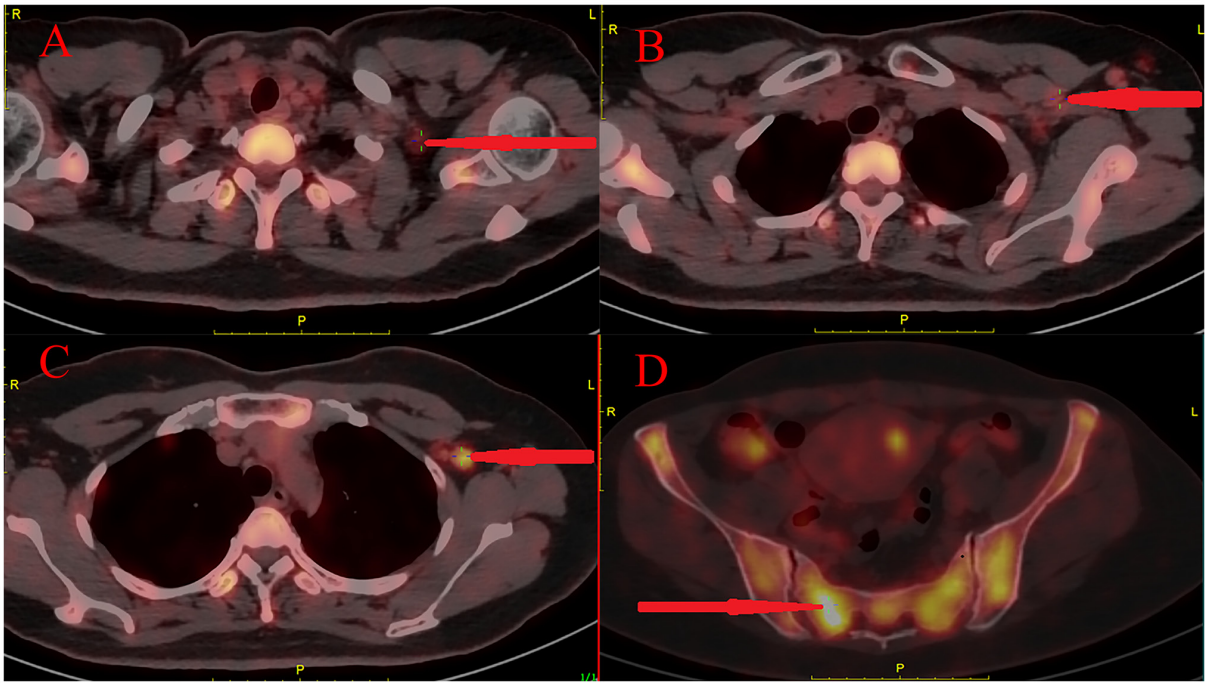

Figure 7. PET-CT images of each metastatic site. (A) Supraclavicular lymph node metastasis of breast cancer, (B) interpectoral lymph node metastasis, (C) axillary lymph node metastasis and (D) bone metastasis.

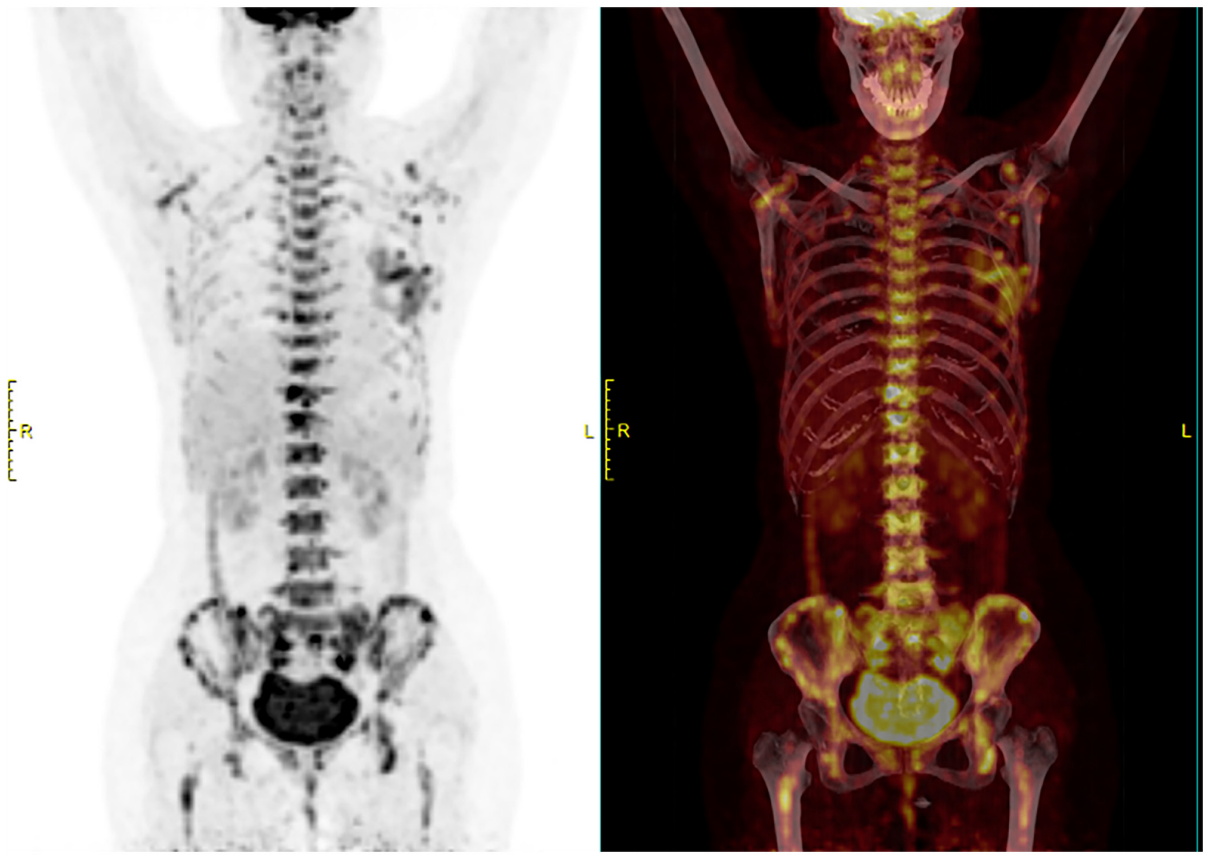

Figure 8. Initial PET-CT image of bone metastasis. The bone metastatic lesion demonstrated notably increased uptake.

is markedly lower than that of IDC (57), the present analysis revealed a comparable ratio of ILC to IDC, suggesting that ILC had a greater propensity to metastasize to the cervix. This observation is consistent with previous reports (3,4), where the rates of metastasis to reproductive organs for ILC and IDC were 4.5 and 0.8%, respectively (58). The tendency

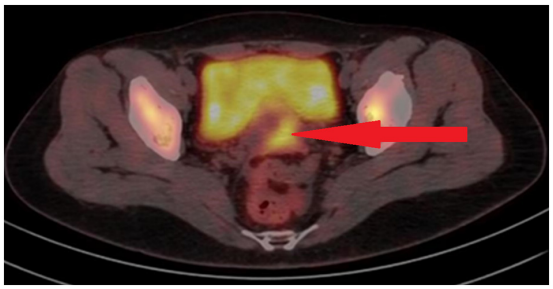

Figure 9. Initial PET-CT image of the cervical region. The cervical metastatic lesion demonstrated notably increased uptake.

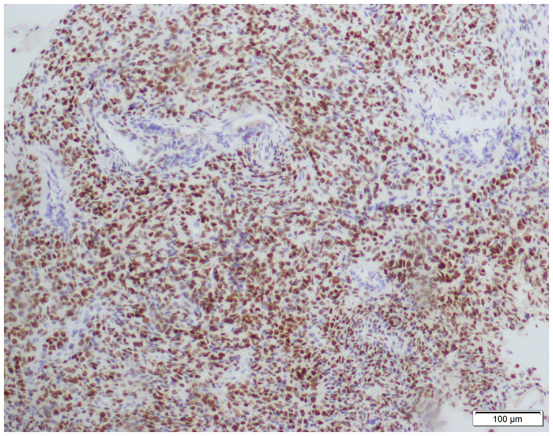

Figure 10. Estrogen receptor expression in the cervical metastatic lesion. Scale bar, 100 μm.

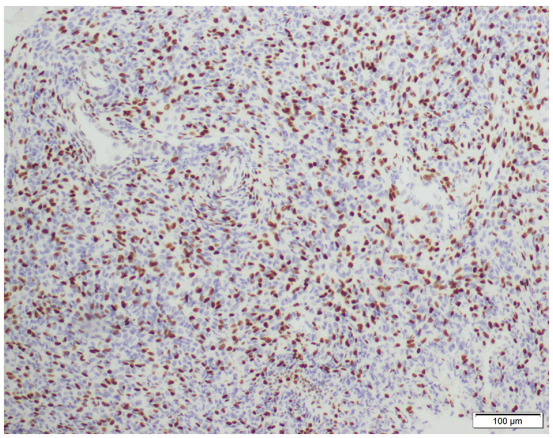

Figure 11. Progesterone receptor expression in the cervical metastatic lesion. Scale bar, 100 μm.

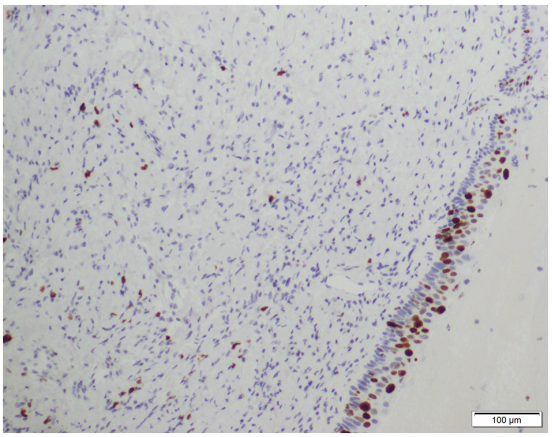

Figure 12. Ki-67 expression in the cervical metastatic lesion. Scale bar, 100 μm.

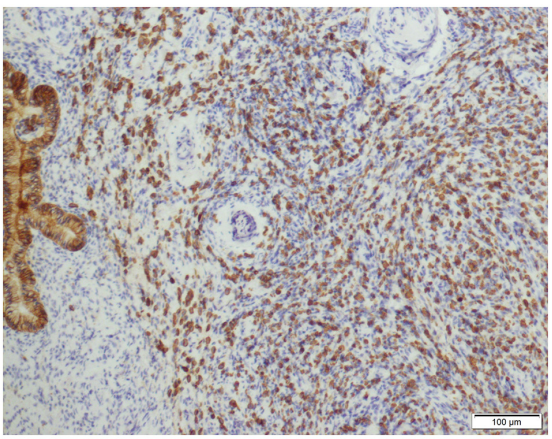

Figure 13. Cytokeratin (AE1/AE3) expression in the cervical metastatic lesion. Scale bar, 100 μm.

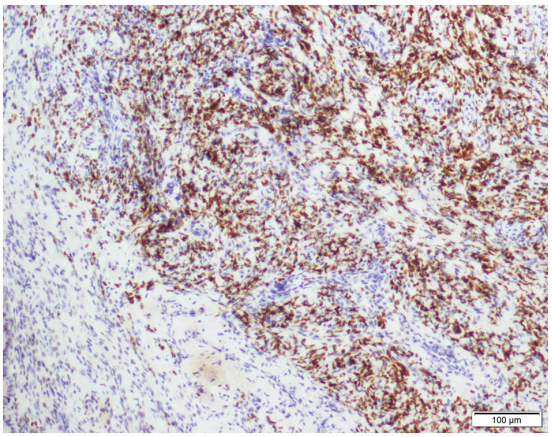

Figure 14. Trichorhinophalangeal syndrome 1 expression in the cervical metastatic lesion. Scale bar, 100 μm.

of ILC to metastasize to the cervix is closely associated with its hormone receptor (HR)-positive phenotype and the diffuse invasive characteristics resulting from E-cadherin loss (59,60).

Among the 40 patients with available immunohistochemical subtype data, 38 (95%) had HR(+) breast cancer. In one case, the patient had bilateral breast cancer, with one tumor being HR(+) and the other HR(-) and HER-2(+) (6). Notably, the cervical lesion was HR(+). These findings suggested that HR(+) breast cancer may be more likely to metastasize to the cervix, which is consistent with the present case. However, this association may also reflect the overall higher prevalence of HR(+) breast cancer. Beyond immunohistochemical phenotypes, multiple factors can influence distant metastasis, such as lymph node status (61). In the present literature analysis lymph node information

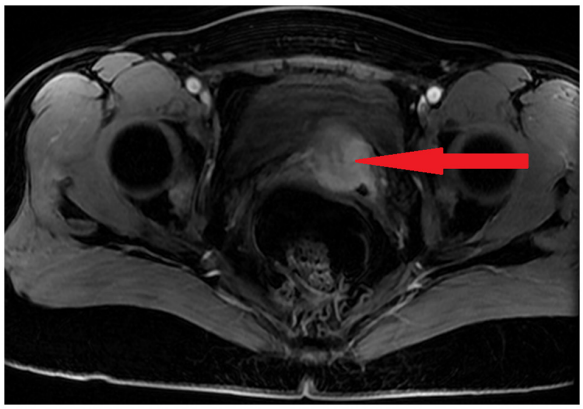

Figure 15. Initial pelvic MRI. The arrow indicates the location of the cervical metastatic lesion prior to treatment, which manifests as high signal intensity.

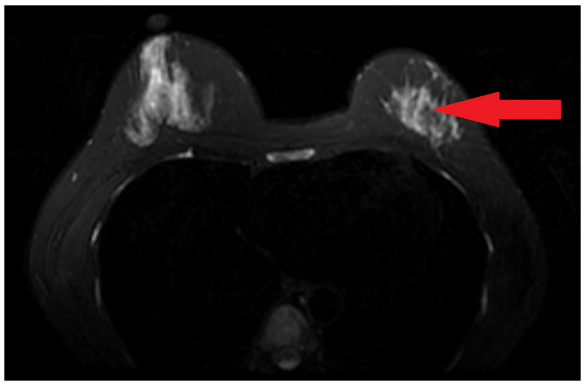

Figure 16. Follow-up breast MRI. The arrow indicates the location of the breast cancer lesion after treatment, which shows a marked reduction in size.

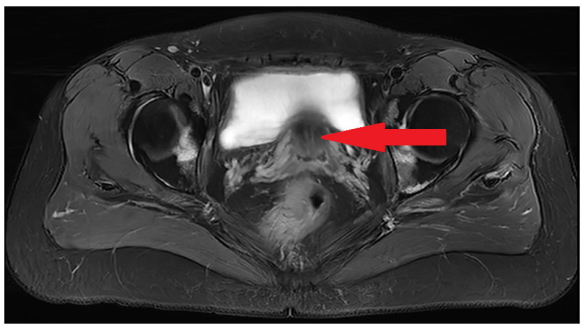

Figure 17. Follow-up pelvic MRI. The arrow indicates the location of the cervical metastatic lesion after treatment, which shows a marked reduction in size.

was not documented in 17 cases (30.3%). Furthermore, the limited sample size hindered the balancing of other potential confounding factors related to distant metastasis. Moreover, HR(+) breast cancer inherently has an elevated incidence rate (62), thus potentially introducing bias to the present results. Nevertheless, the high proportion of 95% strongly suggests a potential association between the two variables.

There is a lack of large-scale data to guide the treatment of cervical metastasis in breast cancer. There is a lack of large-scale data to guide the treatment of cervical metastasis in breast cancer. Among the cases presented in Table SI, 12 (22.2%) had isolated cervical metastasis, and 5 of these 12 patients did not undergo surgical resection. Another 14 (25.9%) patients had metastasis involving other parts of the reproductive system, including the endometrium and ovaries, and 2 did not undergo surgical resection. Among the 19 patients who were deceased at the time of reporting, 7 underwent hysterectomy with bilateral adnexectomy and had an average survival time of 20.1 months compared with 7.8 months in those who did not undergo surgery. These case reports have suggested that isolated cervical metastasis may be treated surgically to improve prognosis. However, in the studies analyzed in the present case report, patients with systemic metastasis who underwent cervical surgery had a longer mean survival time (15.3 months) than those who did not (5.6 months). Therefore, regardless of whether a patient has systemic metastasis, surgical treatment should be performed whenever possible to prolong survival, if the patient can tolerate gynecological surgery.

Regarding the use of radiotherapy in metastatic breast cancer involving the cervix, current research data are limited: In previously reported cases (2,6,11,15,16,52), the number of patients who underwent local radiotherapy to the cervix was small and large-scale cohort studies are lacking; consequently, the benefits of radiotherapy for cervical lesions cannot be definitively established through statistical analysis. However, Zhang *et al* (6) demonstrated that, in one patient with cervical metastases from breast cancer who received only local radiotherapy to the cervix in combination with systemic breast cancer treatment, the cervical tumor notably reduced after six treatment cycles. Therefore, local radiotherapy to the cervix may have some clinical value in controlling metastatic lesions in the cervix, thus offering a potential local treatment option for patients who cannot tolerate surgery.

In the present case report, a rare case of cervical metastasis from breast cancer was documented. Cervical metastasis from breast cancer is rare in clinical practice. It should be noted that the existing quantitative data on its incidence come from literature published in 1962 (63), which is >6 decades old. There is a lack of recent large-scale cohort studies to provide updated and more reliable epidemiological evidence for this rare occurrence. In the present report, previously published cases were reviewed and revealed that abnormal vaginal bleeding was the most common initial symptom, although 26.8% of cases had no gynecological symptoms. According to the previously published literature in Table SI, Color Doppler ultrasonography appeared to have limited sensitivity for cervical metastasis, thus prompting the question of which diagnostic tools are most appropriate for screening. In female patients with a history of breast cancer, cervical metastasis should be considered when gynecological symptoms are present and when abnormalities are detected on ultrasonography and MRI. Even in the absence of symptoms, routine gynecological examinations are recommended, with pelvic MRI serving as a more effective screening method. Pathological confirmation by cervical biopsy is essential when metastasis is suspected.

The present case underscores the importance of gynecological surveillance for patients with breast cancer and highlights the potential to improve quality of life and prognosis through earlier detection and intervention.

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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

XL proposed the main conceptual ideas, and wrote and edited the manuscript. KS and HZ obtained medical images, collected data, and assisted with the preparation of tables and figures. TD and LS performed biopsy procedures, managed the patient during diagnosis and treatment, and provided guidance and supervision throughout the writing process. BL made treatment decisions and provided financial support for this project. All authors have read and approved the final manuscript. XL and BL confirm the authenticity of all the raw data.

Ethics approval and consent to participate

Not applicable.

Patient consent for publication

Written consent for publication was obtained from the patient.

Competing interests

The authors declare that they have no competing interests.

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