Bilateral breast multiple myeloma: a case report

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Hong Kong Med J 2022;28:488–90
https://doi.org/10.12809/hkmj219555

Introduction

Multiple myeloma (MM) is a malignant disorder characterised by excessive proliferation of single clonal plasma cells derived from B cells in the bone marrow with increased formation of monoclonal immunoglobulins.[1] Multiple myeloma may involve extramedullary organs or soft tissues (extramedullary plasmacytoma), commonly in the upper aerodigestive tract with a predilection for the head and neck.[1] Breast plasmacytoma is very rare. We present a case of MM with extensive extramedullary involvement including bilateral breasts, and mainly focus on the imaging features of breast plasmacytoma across multi-modalities.

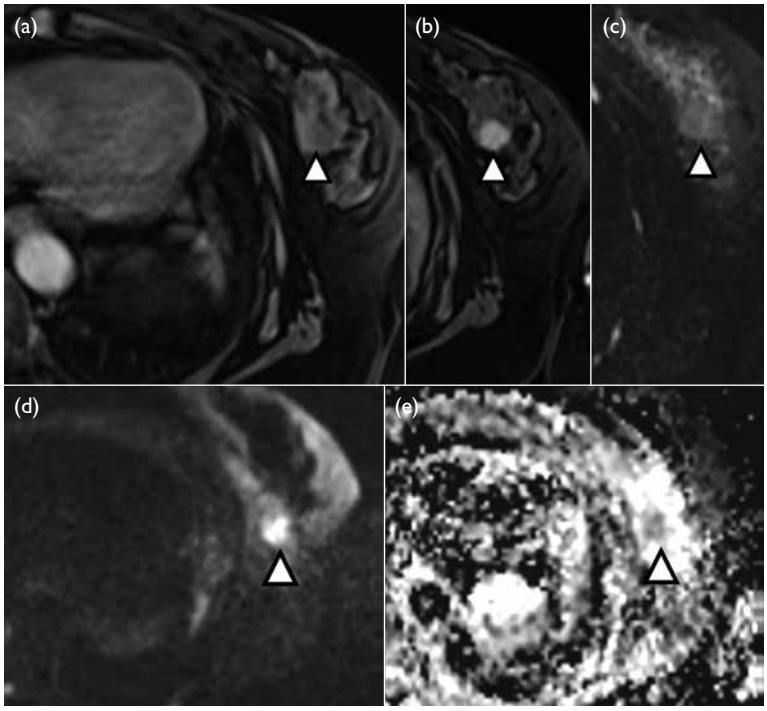

FIG 1. Selected magnetic resonance imaging images: (a) pre-contrast T1-weighted axial image, (b) post-contrast T1-weighted axial image, (c) T2-weighted fat-saturated axial image, (d) diffusion weighted image, and (e) apparent diffusion coefficient. The lesion (arrowheads) in the lower outer quadrant of the left breast demonstrated homogeneous contrast enhancement and restricted diffusion

Case report

A 59-year-old female presented for scheduled ultrasound scan of abdomen for follow-up of a complicated renal cyst in December 2019. She had a previous history of diabetes mellitus, hypertension, hyperlipidaemia and hepatitis B infection. She was diagnosed with MM 10 years previously and had previously failed hematopoietic stem cell transplantation. Ultrasound scan revealed an enlarged hypoechoic nodule in the liver that corresponded to the liver lesion detected on earlier computed tomography (CT) urogram. She also complained of a palpable nodule in the right lower quadrant of the abdomen, present for a few months. Magnetic resonance imaging (MRI) with contrast of liver was arranged to assess the liver lesion and abdominal wall nodule.

The MRI 1 month later showed significant enlargement of the liver lesion with heterogeneous contrast enhancement and restricted diffusion. No definite contrast washout was demonstrated in the portovenous phase. The nodule in the right lower quadrant of the abdominal wall demonstrated contrast enhancement and restricted diffusion as well. Features of both lesions were suggestive of malignancy. The MRI also revealed a 1.3 cm T1 isointense T2 hyperintense contrast enhancing nodule with restricted diffusion in the outer lower quadrant of the left breast (Fig 1).

Ultrasound-guided fine needle aspiration of the right lower quadrant abdominal wall nodule was performed in February 2020. The pathological diagnosis was plasmacytoma.

Dual-tracer positron emission tomography (PET)/CT was performed in early March 2020 at a private institution to assess disease involvement. There were multiple acetate (Ac) and fludeoxyglucose (FDG)-avid soft tissue nodules in bilateral breasts, measuring up to 1.5 × 1.4 cm with FDG maximum standard unit value (SUVmax) 8.4 and Ac SUVmax 5.0 in left breast (Fig 2a) and 1.4 × 1.0 cm with FDG SUVmax 7.0 and Ac SUVmax 6.6 in right breast. There were a few left axillary level I lymph nodes measuring up to 0.9 × 0.8 cm with FDG SUVmax 3.3 and Ac SUVmax 3.9.

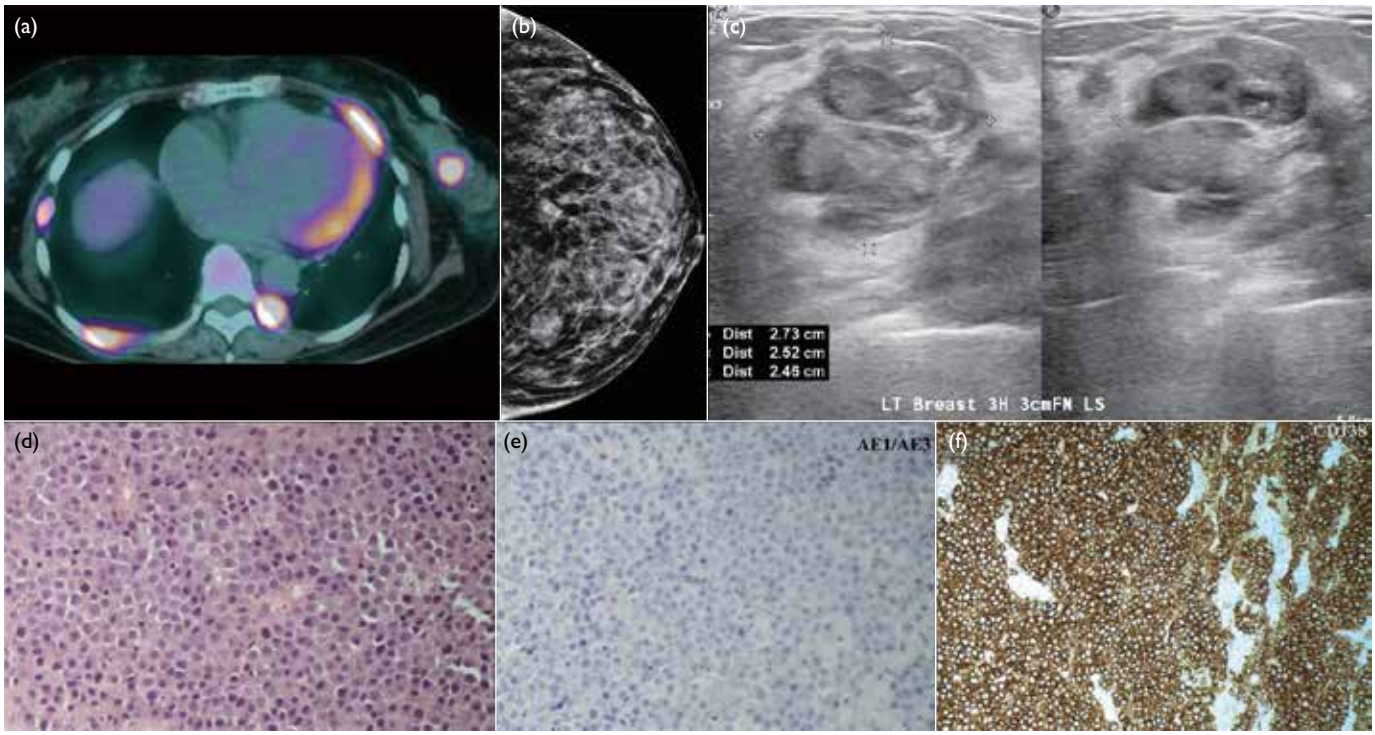

FIG 2. Selected mammography, ultrasound image, fludeoxyglucose (FDG) positron emission tomography/computed tomography fusion image and histopathological slides of left breast lesion. (a) A focal FDG-avid lesion in the left breast at the 3:00 position. (b) Craniocaudal view of left mammography. Several oval ill-defined equal-to-high density lesions were detected in the left breast. No associated microcalcification was identified. (c) The largest mass in the left breast located at the 3:00 position 3 cm from the nipple was evident as an ill-defined heterogeneous mass with hypoechoic and echogenic areas. (d) Light photomicrograph of haematoxylin and eosin stain on 400 x magnification. Tumour cells possess eosinophilic cytoplasm with perinuclear hof and hyperchromatic nuclei with occasional nucleoli. (e & f) Light photomicrograph of immunohistochemistry staining on 400 x magnification. Tumour cells are negative for AE1/AE3 (pancytokeratin) and positive for CD138 (Syndecan-1)

Bilateral mammography and breast ultrasound were arranged in early April 2020 to assess bilateral breast lesions. There were multiple oval and ill-defined equal-to-high density lesions in both breasts. The largest lesion located at the upper outer quadrant of the right breast measured 3.6 × 2.8 cm and was palpable. No associated suspicious microcalcifications were detected. There was no architectural distortion, skin thickening or enlarged lymph nodes on mammography (Fig 2b).

Subsequent breast ultrasound on the same section revealed scattered oedematous areas in both breasts. A heterogeneous mass with hypoechoic and echogenic areas was detected in the left breast at a 3:00 position, 3 cm from the nipple (Fig 2c). Posterior enhancement was evident. This mass corresponded to the lesion detected on previous MRI. The size was 2.7 × 2.5 × 2.5 cm. There was interval enlargement compared with previous MRI (which was 1.3 cm). Multiple hypoechoic, echogenic, and heterogeneous masses and nodules were identified in other areas of both breasts. The largest one in the right breast located at a 9:00 position 5 cm from the nipple measured 4.5 × 2.6 × 4.1 cm. There was an irregular hypoechoic enlarged left axillary lymph node with loss of fatty hilum. Ultrasound-guided fine needle aspiration of this node and core biopsies of the dominant masses in each breast were performed in the same section. The pathological diagnoses of the breast masses and left axillary lymph node were consistent with plasmacytoma (Fig 2d-f). Two weeks later (mid-April 2020), the patient was admitted with multilobar pneumonia and severe metabolic acidosis and disseminated intravascular coagulation. Unfortunately, she passed away 4 days later.

Discussion

Breast plasmacytoma is extremely rare. Approximately 50 cases have been reported in the literature since 1925.[2-5] The prevalence is unknown. Surov et al[6] reported a prevalence of 1.5% for breast plasmacytoma among patients with plasmacytoma in their institution. Involvement of the breast was a secondary event of MM in 85% and more than half of the lesions were unilateral.[6]

There are some differences in the ultrasonographic features of breast MM between this case and those reported in the literature. For the

cases described by Ali et al[2] and Park[5], breast MM was revealed as a well-defined oval hypoechoic mass on ultrasound. In our patient, it was an indistinct oval heterogeneous mass with hypoechoic and echogenic areas.

Compared with typical primary breast cancer (invasive ductal carcinoma) that is usually revealed as an irregular spiculated high-density mass on mammogram and an anti-parallel hypoechoic irregular spiculated mass on ultrasound, there are no characteristic imaging features of breast MM. On mammography, it can present as a single or multiple high-density round or oval lesion(s) that is/are circumscribed or ill-defined.[2] It can show as diffuse infiltration. Association with microcalcifications is rarely reported. On ultrasound, the features are well-defined echo-poor, hypoechoic, or hyperechoic solid masses with hypervascularity.[2] Mixed hypo- to hyper-echoic masses with indistinct margins are also possible. Posterior acoustic features are variable. Posterior acoustic enhancement can be evident but absence of acoustic transmission or even posterior acoustic shadowing has been reported in some cases.

There are limited case reports of MRI and PET/CT features of breast MM. On MRI, it shows as a T1-weighted intermediate to hypointense T2-weighted hyperintense lesion with homogeneous or rim enhancement. Restricted diffusion and early rapid contrast enhancement with washout kinetics are the reported features.[5] It appears as a homogeneous soft tissue lesion with high FDG uptake on PET/CT.

No case report has discussed the features of breast MM on dual-tracer PET/CT. It was revealed as an Ac-avid lesion in our patient, indicative of high metabolism of malignant plasma cells. There are provisos in this case report. The MRI protocols did not relate specifically to breast imaging and contrast kinetics was not performed.

Conclusion

There are no specific radiological features of breast MM. In bilateral multiple breast masses, the differential diagnoses are lymphoma, metastasis, synchronous primary breast cancer, secondary involvement of haematological disorder or benign conditions such as fibroadenoma. Biopsy for histopathological diagnosis is advised.

Author contributions

Concept or design: CKM Mo, AYT Lai.
Acquisition of data: SSW Lo, TS Wong.
Analysis or interpretation of data: SSW Lo, TS Wong.
Drafting of the manuscript: CKM Mo, AYT Lai, WWC Wong.
Critical revision of the manuscript for important intellectual content: CKM Mo, AYT Lai, WWC Wong.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

The authors have no conflicts of interest to disclose.

Funding/support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics approval

The patient was treated in accordance with the Declaration of Helsinki. Informed consent for publication was unobtainable from the deceased patient's next-of-kin despite all reasonable efforts.

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