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CASE REPORT

Dermatofibrosarcoma Protuberans Mimicking Primary Breast Neoplasm

A case report and literature review

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ساركوما ليفية جلدية حدبية تُحاكي اورام الثدي الأولية

تقرير حالة واستعراض الادبيات العلمية لسمات التصوير التشخيصي

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ABSTRACT: Dermatofibrosarcoma protuberans (DFSP) is a rare, slow-growing mesenchymal neoplasm of the dermis and subcutaneous tissues that has a low- to intermediate-grade malignancy. DFSP commonly involves the trunk and extremities, and very rarely the breast skin, mimicking a primary breast neoplasm with few reported cases in the literature. We report a 35-year old female patient who was referred to the Royal Hospital, Muscat, Oman in 2017, with a two-year history of a slow growing left breast lump. Assessment of the breasts with mammography revealed a lobulated lesion in the left-upper-inner quadrant with neither microcalcification nor architectural distortion, mimicking a benign lesion. However, on ultrasound, the lesion had suspicious features with increased vascularity and hence, it was categorised as breast imaging reporting and data system (BIRAD) IV. The patient underwent left breast wide local excision and the histopathological diagnosis was dermatofibrosarcoma protuberans.

Keywords: Breast; Dermatofibrosarcoma Protuberans; Ultrasonography; Oman.

الملخص: الساركوما الليفية الجلدية الحدبية هي ورم نادر وبطيء النمو من اورام اللُّحْمَةُ المتوسطة والتي تصيب الأدمة والأنسجة تحت الجلد، وتعتبر ورماً خبيثاً منخفض إلى متوسط الدرجة. عادة ما تظهر الساركوما الليفية الجلدية الحدبية في الجذع والأطراف، وفي حالات نادرة جدا قد تصيب الجلد الذي يغطي الثدي محاكية أورام الثدي الاولية مع عدد قليل من الحالات المبلغ عنها في الأدبيات. نعرض هنا حالة لامرأة تبلغ من العمر 35 عامًا تم تحويلها إلى المستشفى السلطاني في مسقط، سلطنة عُمان عام 2017، لديها كتلة بطيئة النمو في الثدي الايسر لمدة عامين. وقد كشف تقييم الثدي باستخدام تصوير الثدي الشعاعي عن وجود آفة مُفصَّصة في الربع الإنْسيّ العلوي للثدي الايسر بدون وجود تكلس مجهري أو تشوه في البناء النسيجي محاكية آفة حميدة، في حين أظهر استخدام جهاز الموجات فَوق الصوتية سمات مريبة للآفة مع زيادة في الاوعية الدموية وبالتالي تم تصنيف الورم على انه من الفئة 4 حسب نظام الإبلاغ عن تصوير الثدي والبيانات. خضعت المريضة لاستئصال موضعي واسع للثدي الأيسر وجاء التشخيص المرضي النسيجي على شكل ساركوما ليفية جلدية حدبية.

الكلمات المفتاحية: ثدي؛ الساركوما ليفية جلدية حدبية؛ تصوير بالموجات فوق الصوتية؛ سلطنة عُمان.

Dermatofibrosarcoma protuberans (DFSP) is a rare, slow-growing soft tissue sarcoma that commonly affects young to middle aged adults.[1] It has intermediate- to low-grade malignancy with a high propensity for local infiltration as well as having a high local recurrence rate after excision.[2] DFSP most commonly involves the trunk, followed by the extremities, and the head and neck area.[3] However, DFSP very rarely involves the breast, mimicking primary breast tumour.[1,2,4,5] Awareness of this rare entity and its typical imaging features is crucial to avoid the misdiagnosis of DFSP with a benign breast lesion and to suggest a pre-operative diagnosis. However, reports of imaging features have been scarce in the literature compared to histopathological features, with few reported cases having imaging findings. In the current case, we report the mammographic and ultrasonographic findings of a breast skin DFSP in a 35-year-old female patient and performed a review of the literature.

Case Report

A 35-year-old female patient was referred from a local hospital to the breast surgery outpatient clinic in the Royal Hospital, Muscat, Oman, in 2017, with a two-year history of a slow growing nodular lesion over the left breast [Figure 1]. There was no associated nipple discharge and no family history of breast cancer.

On physical examination, there was a nodular pinkish skin lesion over the upper-inner quadrant

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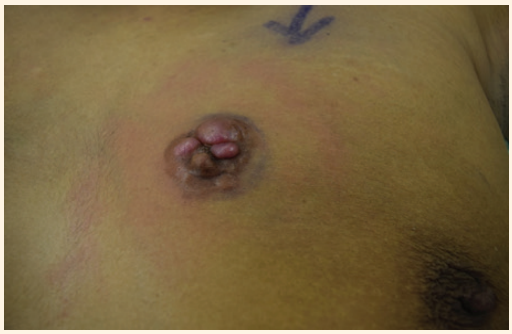

Figure 1: Photograph of the left breast of a 35-year-old female patient showing a nodular pinkish skin lesion over the upper-inner quadrant measuring 3 × 3 cm.

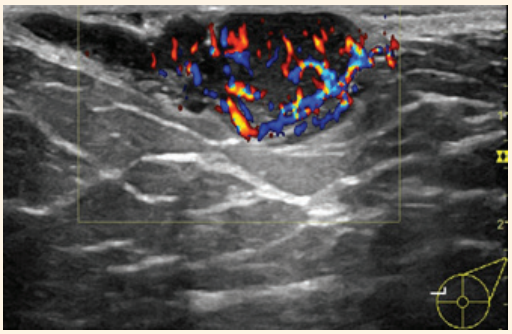

Figure 3: Colour Doppler ultrasound image of the left breast of a 35-year-old female patient showing a well-circumscribed lobulated subcutaneous mass measuring 3 × 1.4 cm with increased vascularity.

of the left breast, which was mobile and non-tender, measuring 3 × 3 cm. There was a mobile single left axillary lymph node. The nipple and areola looked normal.

On mammography, there was a lobulated mass in the upper-inner quadrant of the left breast measuring 3 × 2 cm [Figure 2]. There was neither associated microcalcification nor architectural distortion. Bilateral axillary lymph nodes were seen but demonstrated benign imaging features. Left breast ultrasound was performed during the same sitting and revealed a subcutaneous lobulated mass measuring 3 × 1.4 cm.

On colour Doppler, the lesion showed increased vascularity [Figure 3]. Based on the ultrasound findings, the lesion was categorised as Breast Imaging-Reporting and Data System (BIRAD) IV. Clinical examination and imaging findings were suggestive of DFSP. Therefore, the patient underwent left breast wide local excision with an attempt at a 2 cm gross margin. Histologic examination showed a hypercellular spindle cell lesion, largely located in the dermis, with irregular subcutaneous infiltration; however, there was no infiltration of the breast parenchyma. The cells were monotonous with occasional mitosis and a storiform pattern of arrangement.

Immunohistochemically, the spindle cells were diffusely positive for cluster of differentiation (CD)34 and negative for pan cytokeratin AE1/AE3 [Figures 4 and 5]. These findings were consistent with DFSP. The patient has been under regular close follow-up for three years with breast ultrasonography surveillance every six months and has remained disease-free. Consent for publication of the present clinical details and/or clinical images was obtained from the patient.

Discussion

DFSP is a rare sarcoma of the dermis and subcutaneous tissue that has an estimated incidence of 0.8–5 cases per one million per year and accounts for less than 6% of all sarcomas. It usually affects patients aged between 20–50 years.[6]

DFSP has an intermediate- to low-grade malignancy with a high predilection for local invasion. Although rare, distant metastasis, especially in the lungs and lymph nodes, has been reported.[7,8] DFSP has a high propensity for local recurrence following inadequate surgical excision. Moreover, poorly treated lesions can lead to differentiation into higher-grade sarcoma with a higher recurrence rate.[9] DFSP commonly occurs on the trunk (50–60%), followed by the limbs (25%) and the head and neck area (10–15%). Involvement of the breast by DFSP is extremely rare, with only a few cases reported in the literature.[6,9]

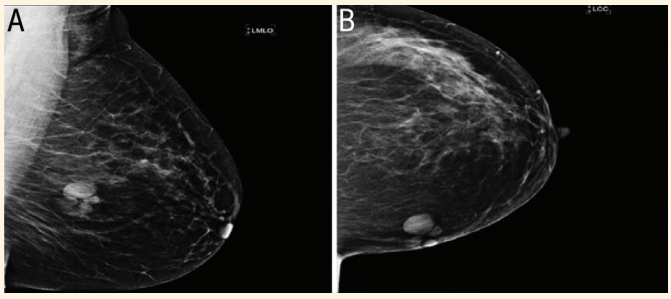

Figure 2: A mammogram of a 35-year-old female patient with dermatofibrosarcoma protuberans of left breast. Mediolateral oblique (**A**) and craniocaudal (**B**) showing a lobulated, smoothly marginated mass in the upper-inner quadrant of the left breast.

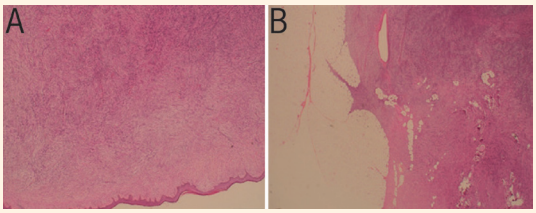

Figure 4: Histopathologic findings of the left breast lesion in a 35-year-old female patient. **A:** Hematoxylin and eosin (H&E) stain at x40 magnification. The tumour was hypercellular and composed of spindle cells arranged in a storiform pattern. **B:** H&E stain at x200 magnification showing that the tumour was infiltrating the subcutaneous tissue.

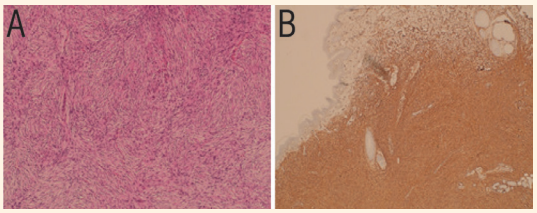

Figure 5: Histopathologic findings of the left breast lesion in a 35-year-old female patient. **A:** Hematoxylin and eosin stain at x400 magnification demonstrating storiform arrangement of short spindle cells and mitotic figures. **B:** The tumor cells show positive immune histochemical reactivity for CD34.

Clinically, DFSP usually appears as an irregular reddish-brown to bluish superficial nodule and the diagnosis might be suggested from the appearance.[6,8,10] However, DFSP can present as a subcutaneous nodule known as subcutaneous DFSP and when it involves the breast it can be confused with a primary breast lesion.[11] The current patient had a superficial nodular pinkish nodule.

Histologically, DFSP is composed of monomorphous spindle-shaped cells arranged in a storiform pattern with scattered mitosis and mild nuclear pleomorphism on a background of fibrous stroma and infiltration of surrounding subcutaneous fat. Immunohistochemically, the tumour is diffusely and strongly CD34 positive and negative for cytokeratins, smooth muscle actin (SMA), desmin and S100.[2,12] Dermatofibroma is one of the main differential diagnoses for DFSP. Unlike DFSP, tumoural cells in dermatofibroma do not show a prominent storiform pattern, increased mitotic activity nor positive immune histochemical reactivity for CD34. Dermatofibroma is a tumour of the dermis, whereas DFSP frequently infiltrates the subcutaneous adipose tissue.[13] Bednar tumour is the pigmented variant of DFSP and has similar morphologic properties as DFSP. However, Bednar tumour has melanin containing dendritic cells.[13] Another differential diagnosis is malignant fibrous histiocytoma (MFH). Marked nuclear pleomorphism, increased mitotic activity and necrosis are detected in MFH and tumour cells are negative for CD34.[14] The current case was differentiated from leiomyoma and leiomyosarcoma by immunohistochemical positivity for CD34 and negativity for SMA, along with its morphological characteristics.

On mammography, breast DFSP appears as a skin-based or intra-mammary located well-circumscribed oval-shaped lesion with no microcalcification nor speculation. These mammography findings are not specific and hence, breast DFSP can mimic a benign breast lesion such as fibroadenoma, sebaceous cyst or an abscess.[1,4,5,9,15] In the current case, the mammography findings were consistent with findings reported in the literature with a skin-based well-defined lesion with no microcalcification nor architectural distortion, mimicking a sebaceous cyst.

Ultrasonographically, breast DFSP appears as a skin-based or subcutaneous, well-circumscribed hypoechoic lesion with mild lobulation and increased vascularity on colour Doppler. Increased vascularity can be used to differentiate DFSP from benign breast lesions that usually appear as well-circumscribed lesions such as sebaceous cysts and liver abscesses. Another useful ultrasonographic finding that can help to distinguish DFSP is the presence of a peripheral hyperechoic rim in the subcutaneous tissue that represents a mixture of tumour cells and fibrous tissue infiltrating the subcutaneous fat.[1,2,4,5,9,11]

On magnetic resonance imaging (MRI), DSFP has no specific features and appears as a well-defined nodule or mass that is T1 isointense to the muscle and shows homogenous or heterogenous enhancement on post-contrast examination. However, owing to its high spatial resolution and high tissue characterisation, MRI is very helpful in delineation of tumour extent and evaluating the anatomical relation of the tumour to adjacent structures.[2,3,9]

Due to its infiltrative behaviour, DFSP tends to extend beyond the clinical margin. This explains the high local recurrence rate of 20–50% following local excision and justifies the current recommendation of a wide local excision with a 2–3 cm resection margin.[2,6,10] Radiation therapy can be used in inoperable and metastatic cases. It is estimated that about 80–90% of DFSP tumours have a fusion gene that results in continuous activation of the platelet-derived growth factor-β (PDGF-β) signalling pathway. Therefore, molecular targeted therapy inhibiting PDGF-β is an effective option for inoperable and metastatic DFSP. Multikinase inhibitor imatinib is the first agent to be approved for systemic treatment of DFSP and has

shown objective response rates of approximately 50% in clinical trials.[16] Imatinib treatment has been also used for metastatic DFSP.[17] Long-term follow-up requires strict monitoring every 6–12 months with ultrasound and tissue biopsy in cases of suspected recurrence. The 10-year survival rate is >99%.[18]

Conclusion

Breast skin DFSP is a rare entity that can mimic a primary breast tumour. Awareness of this rare lesion and its typical imaging features will help to avoid the misdiagnosis of DFSP with a benign breast lesion and suggest a pre-operative diagnosis.

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