

# Dermatofibrosarcoma protuberans of the breast: A case study

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**Abstract.** Dermatofibrosarcoma protuberans (DFSP) is a superficial mesenchymal neoplasm that originates from the dermal fibroblasts and tends to be locally aggressive. Although infrequent, it is one of the most common cutaneous sarcomas. It mainly affects young and middle-aged patients 20 to 50 years old. Any area of skin may be involved, but the most common sites of presentation are the trunk and extremities. DFSP of the breast is extremely rare. It classically presents as a nodular, exophytic, cutaneous mass, though initially it can manifest as a flat plaque and can show persistent but slow growth for many years. Due to increased risk of local recurrence, the standard of care for localized disease is surgical excision with adequate margins. Wide local excision is the most common technique used, but as an alternative Mohs micrographic surgery has emerged as a procedure that offers lower local recurrence rates. Metastases are rare but have been previously reported. In such patients, treatment with imatinib or radiotherapy can be considered. The current case presents a 52-year-old lady with DFSP of the breast that was successfully managed by the Breast Unit of Athens Medical Center-Psychiko Clinic.

## Introduction

Dermatofibrosarcoma was first described as progressive recurrent dermatofibroma in 1924 by Darier and Ferrand. Subsequently, in 1925 Hoffmann referred to the disease as dermatofibrosarcoma protuberans (DFSP) (1). It is a very rare neoplasm of the breast. Dermatofibrosarcoma of the breast presents with a slow growing pattern, initially in the dermis and then invading the subcutaneous tissue (2). Usually, DFSP

is characterized as low to intermediate grade neoplasm with high recurrence rate but rarely metastasises (3). The majority of DFSP presents as low-grade tumours, but in 5-10% of cases the tumour contains fibrosarcomatous cells that upgrade the neoplasm in intermediate grade with a higher aggressivity (4). Mainly affects young and middle-aged patients 20 to 50 years old and as the lesion progresses, it appears more and more protuberant (1). Surgery is the Gold Standard with particular attention to obtain free margins in order to reduce the recurrence rate (5). Wide local excision (WLE) with minimum 3 cm free margins or Mohs micrographic surgery (MMS) are recommended. We present a rare case of dermatofibrosarcoma protuberans in the right breast of a 52-year-old female patient.

## Case report

A 52-year-old patient presented to our Breast Unit due to a skin lesion of her right breast that had slow but persistent growth during the past 15 years. The physical examination revealed a light-reddish, delineated exophytic, nodular cutaneous mass 3x4 cm in the upper outer quadrant of the right breast. No other finding from the breasts or axillary lymphadenopathy was noted. She had an unremarkable personal and family history.

Mammography revealed a dense, broad-based, well circumscribed, cutaneous lesion. There was no associated intramammary mass or microcalcifications. The lesion was evident on previous mammograms, presenting a small growth rate.

In order to establish a diagnosis, a core-needle biopsy was suggested which the patient denied. Subsequently, she underwent surgical excision under local anesthesia. On gross examination, there was a firm, grey-like mass 3.5 cm in diameter, with irregular borders and extension into the subcutaneous tissue. On microscopic examination, the tumor consisted of monomorphic spindle-like cells arranged in storiform architectural pattern. The nuclei were hyperchromatic, elongated, with little pleomorphism and low mitotic activity (Fig. 1A and 1B). Immunohistochemically as Fig. 1C and 1D show, the tumor cells showed diffuse staining for CD34 and negative staining for CD68, while Ki67 was 15%.

Based on histological and immunohistochemical findings, the mass was eventually diagnosed as dermatofibrosarcoma protuberans. As the lateral and deep margins were focally involved and in order to minimize the chance of local

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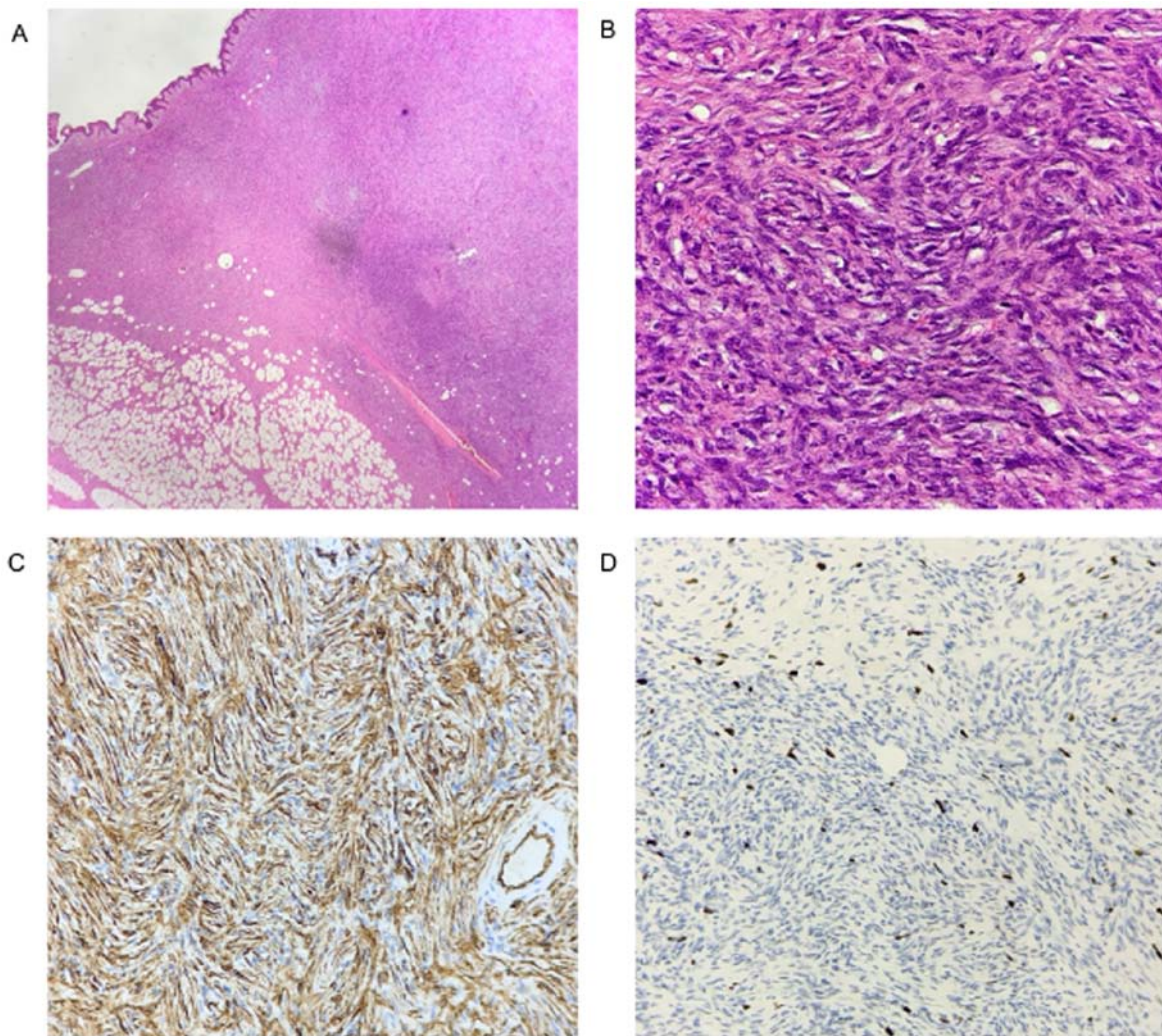


Figure 1. Histological and Immunohistochemical analysis of the resected tumor. (A) Hematoxylin-eosin staining with diffuse infiltration of subcutaneous fat. Magnification, x4. (B) Hematoxylin-eosin staining with storiform or whorled growth pattern, minimal cytological atypia and low mitotic activity. Magnification, x40. (C) Immunohistochemical analysis with CD34 positive (+) staining in spindled tumor cells (Magnification, x20) and (D) Immunohistochemical analysis with Ki67 (Mib-1) positive (+) in ~10% of tumor cells (Magnification, x20).

recurrence, a wide re-excision of 3 cm healthy margins was performed.

## Discussion

Dermatofibrosarcoma protuberans typically presents as a painless, skin-coloured or yellow to brown nodular, exophytic, nodular cutaneous mass (6,7). It tends to be well-circumscribed or has subtle areas of microlobulation, while it can vary in size (0.5->5 cm) (8). The lesion is usually centered in the dermis, but it can invade the subcutaneous tissue (9). It has an indolent clinical course typically for years before the patients seek for medical assistance.

Mammographically, DFSP presents as a dense mass. Preoperative ultrasound examination or MRI offer limited information about the degree of subcutaneous infiltration and can be helpful only in selected cases (6,10). Diagnosis is made histologically, either with a core-needle or an excisional biopsy (7,10).

DFSP may appear histopathological similar to benign fibrous histiocytoma but arises as a subcutaneous mass,

infiltrating and spreading along the surrounding tissue and fascia with radial extensions of tumor in large distances (2). This growth pattern might be confusing since both advanced breast cancer and squamous skin cancer follow the same pattern. However, it rarely disseminates systematically and metastasizes (3).

The etiology is not completely known. A history of previous trauma has been suggested as predisposing factor in approximately 10-20% of the cases. The reported cases included lesions in surgical scars, burns, tattoo skin regions and even bacillus Calmette-Guerin vaccination scar (11). But, the vast majority of cases arise from the rearrangement of chromosomes 17 and 22, creating a supernumerary ring chromosome composed of hybrid material derived from t (17;22). This translocation leads to a continuous activation of platelet derived growth factor receptor  $\beta$ -protein tyrosine kinase due to a fusion of PDGFB gene with collagen Type Ia1 gene (COL1A1) (12). Interestingly, this PDGFB continuous loop is thought to be the main reason for the sensitivity that this tumor has to imatinib, which is a tyrosine kinase inhibitor. What this rearrangement fails to predict is the metastatic potential of the tumor. There is



increasing evidence that positive immunoreactivity with CD34 and D2-40 antibody might be the most accurate predictor for the latter (13). Moreover, increased age, high mitotic index and increased cellularity are predictors of poor clinical outcome (2). In our case, the patient had no previous scar or trauma in the right breast and immunochemistry showed a positive staining with CD34 and a low mitotic index.

As far as treatment is concerned, surgical excision is the standard of care, since DFSPs are resistant to chemotherapy and radiotherapy (5). The exact margin of resection is still unknown, but due to histologically tumour-free margins varying significantly from clinically-free ones, an excision with no less than 2-3 cm with skin, subcutaneous tissue and fascia included is wide accepted. Mohs Micrographic Surgery allows the extent of excision to be customized to the microscopic extent of tumour and results in better tridimensional margin control. In a series of 29 patients, this technique resulted in 93.4% cure rate after the first surgery and low recurrence rates at least short-term (14). MMS offers lower but comparable local recurrence rates compared to WLE (5,15). As a result, MMS is currently advised as the method of choice for the treatment of DFSP (7,15). Setbacks of this procedure include longer operative time, more complex defect closure techniques and limited surgical expertise (7,15,16). However, MMS has yet to be widely diffused and many centers-including ours-use as a primary mode of treatment standard surgical techniques (WLE) and histopathological procedures (7,17). Elective lymph node resection has no additional benefit in prognosis of the disease (18). Adjuvant external irradiation is used in cases with adverse prognostic factors such as high mitotic index and positive margins.

DFSP tends to be locally aggressive (19). Systemic dissemination is rare (1-4%) and usually occurs after multiple local recurrences (20,21). Metastases are hematogenous, with the lungs being the most common site (21). Extensive initial staging workup is not done routinely and is essential only for patients with suspected systemic disease (21). As there have been recurrences reported after 5 years from the initial diagnosis, a long-term follow-up is warranted. Diagnosis of DFSP in breast is challenging because it is rare and imitates a wide range of benign and malignant breast lesions and requires an increased readiness for differentiating and managing it properly. We present this case to recommend that obstetricians and gynecologists should be aware of it and refer to a breast unit. Though a few treatments have been suggested, wide local excision or Mohs micrographic surgery remain the standard of care. To minimize recurrences, a personalized follow-up plan should be applied due to the lack of an existing evidence-based guideline.

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## Authors' contribution

DD and IB were major contributors in writing the manuscript. AP was a major contributor in manuscript writing and figure editing. NK performed the histological examination. DB and KS performed the literature review. FD and IM contributed to manuscript editing. All authors read and approved the final version of the manuscript.

## Ethics approval and consent to participate

Not applicable.

## Patient consent for publication

The patient gave a written informed consent allowing the publication of histological findings and case presentation as long as anonymity is preserved.

## Competing interests

The authors declare that they have no competing interests.

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