

# Dermatofibrosarcoma protuberans of the vulva: a mesenchymal tumour with a broad differential diagnosis and review of literature

S. GILANI, B. AL-KHAFAJI

Department of Pathology, St. John Hospital & Medical Center, Detroit, MI, USA

## Key words

Dermatofibrosarcoma • Vulva • Local reoccurrence • Treatment

## Summary

Dermatofibrosarcoma protuberans (DFSP) is a malignant cutaneous soft tissue tumour, which rarely presents in the vulva. We report an unusual case of this tumour involving the vulva. A 61-year-old female presented with a mass in the left mons pubis. Subsequent excisional biopsy of the mass was performed. Histologic evaluation of the specimen showed a storiform pattern consisting of fibroblast-like cells arranged in a storiform pattern. On average, there were 2 to 3 mitotic figures per 10 high power field (hpf). The neoplastic cells showed extension into the surrounding fibroadipose tissue. A panel of immunohistochemical stains including CD34, S-100, melan-A, HMB-45, vimentin and smooth muscle actin (SMA) were tested. The neoplastic cells showed diffuse staining with CD34 and vimentin, while

the rest were negative. Based on the morphologic and immunohistochemical staining pattern, a diagnosis of DFSP was rendered. The patient underwent two subsequent resections before she had clear resection margins. The postoperative course was unremarkable. The patient is disease free without recurrence after a follow-up of 12 months. DFSP infrequently involves the vulva and should be considered in the differential diagnosis of other spindle cell lesions presenting in this unusual site. The role of immunohistochemical staining with CD34 is imperative in establishing the diagnosis. The rate of local reoccurrence is high, but it rarely shows metastasis. Treatment of choice is wide local surgical excision with close follow-up to detect reoccurrence.

## Introduction

Mesenchymal tumours of vulva are rare <sup>1</sup>. Dermatofibrosarcoma protuberans (DFSP) is a well differentiated sarcoma of dermal origin. It infrequently arises from vulva. Only a few cases have been reported in the literature <sup>2-5</sup>.

## Case description

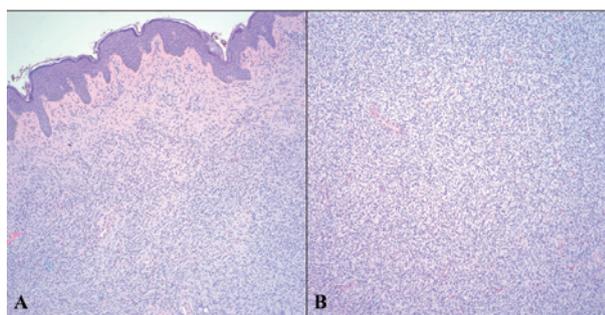
A 61-year-old female presented with a left labial painless mass. She underwent excision of the lesion. Microscopic evaluation of the mass showed a spindle cell proliferation which consisted of fibroblast-like cells in a storiform arrangement (Fig. 1A and 1B). These neoplastic cells have an infiltrative pattern with extension into adjacent fibroadipose tissue (Fig. 2). On average,

the mitotic rate was estimated at two to three per 10 hpf (Fig. 3). Overall, the morphologic pattern was uniform and most of the cells displayed bland cytologic features with no pleomorphism or necrosis (Fig. 4). To evaluate the nature of neoplastic cells, a panel of immunohistochemical stains including CD34, S-100, melan-A, HMB45, SMA and vimentin was tested. The neoplastic cells showed a diffuse staining pattern with CD34 (Fig. 5A) and vimentin (Fig. 5B), while they were negative for S-100 (Fig. 5C), SMA (Fig. 5D), melan-A and HMB45. Based on morphologic features and the immunohistochemical staining pattern, a diagnosis of DFSP was rendered. The neoplastic cells were present at the resection margins. Later, the patient underwent two subsequent resections before she had clear margins of resection. The post-operative course was uneventful. The patient was discharged in a stable condition and is disease free after a follow-up of 12 months.

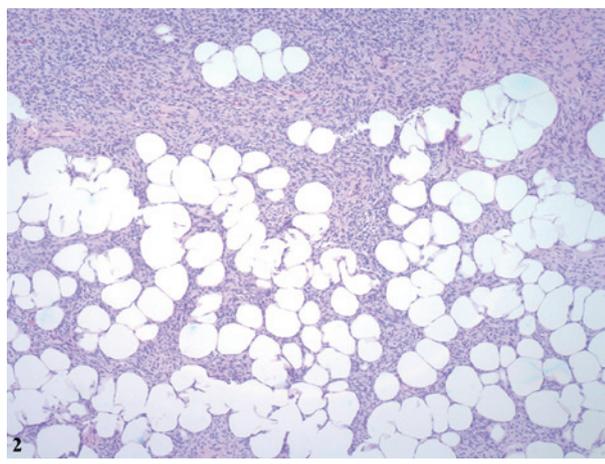
## Correspondence

Syed Gilani, Department of Pathology, St. John Hospital & Medical Center, Detroit, MI, USA - E-mail: magilani@hotmail.com

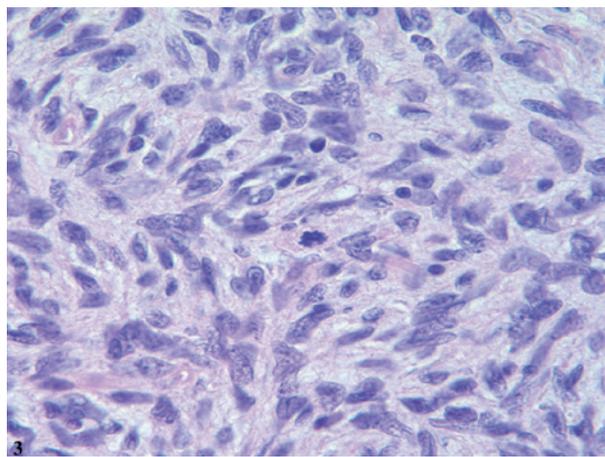
**Fig. 1.** (A & B) Dermal proliferation of spindle cells with a storiform arrangement (H&E, low power).



**Fig. 2.** Neoplastic cells show infiltrative growth pattern to fibroadipose tissue (H&E, low power).



**Fig. 3.** Section shows mitotic figure within tumour cells (H&E, high power).

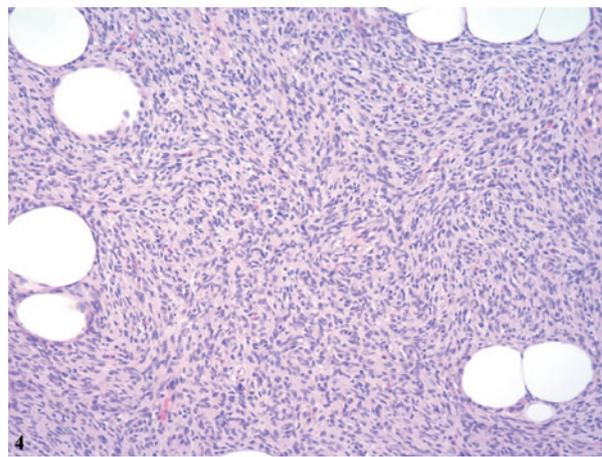


## Discussion

DSFP is a malignant cutaneous soft tissue tumour with frequent local recurrence. It is dermal in origin with low to intermediate potential for malignancy. It usually presents in the extremities and trunk, although it can present in unusual locations including vulva, breast and parotid<sup>2,6,7</sup>. The mean age for presentation is 46 years<sup>3</sup>, while cases of DFSP are reported in the vulva in different age groups. Imaging modalities including magnetic resonance imaging (MRI) are helpful to identify the extent of the disease. It can present as a slowly growing subcutaneous nodular mass. The overlying skin is usually attenuated. Microscopically, the epidermis may show atrophic changes with a cellular dermal spindle cell proliferation in a storiform pattern. The neoplastic cells show infiltrative configuration into adjacent adipose tissue at the base of tumour. Cytologically, neoplastic cells exhibit uniform bland looking fibroblast-like spindle cells with minimal atypia and absence of necrosis. The mitotic rate is variable and up to 5 per 10 hpf. Several morphologic variants of DFSP including myxoid, fibrosarcoma-like, pigmented variant or bednar tumour have been described. Myxoid DFSP has predominantly myxoid background with spindle cell proliferation and intermixed capillary meshwork. Fibrosarcomatous variant can show similar morphologic features to conventional DFSP, but they usually have high mitotic activity and diminished staining pattern with CD34. Pigmented variants show pigmented dendritic cells admixed with neoplastic spindle cells. Immunohistochemical staining is helpful to confirm the diagnosis of DFSP and exclude other close differential diagnoses. The neoplastic cells in DFSP usually demonstrate a diffuse staining pattern with CD34. Intraoperative frozen sections are valuable in evaluating the margins of the lesion. This approach can guide the surgeon for appropriate management and can assist in a tissue preservation approach, specifically in the unusual sites such as the vulva.

The differential diagnosis is wide-ranging, encompassing

**Fig. 4.** Neoplastic cells are uniform in architecture and bland in appearance (H&E, high power).



**Tab. I.** Differential diagnosis of dermatofibrosarcoma protuberans (DFSP).

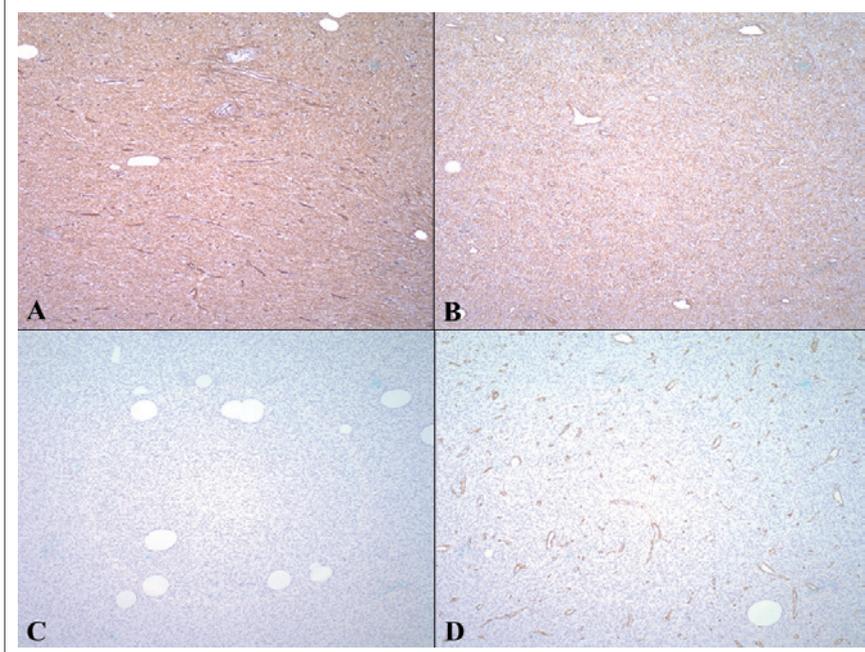
Series no.	Neoplastic entities	Morphologic and immunohistochemical staining features
1	Dermatofibroma	Storiform arrangement of spindle cells, usually do not have infiltrative pattern and stains positive with XIIIa.
2	Schwannoma	Hypocellular and hypercellular areas of neoplastic spindle cells. They usually stain positive with S-100 protein.
3	Neurofibroma	Benign neural tumour with spindle cell proliferation. They usually stain positive with S-100 protein.
4	Spindle cell melanoma	Cellular spindle cell neoplastic cells stain positive with melanoma makers including melan-A and HMB45.
5	Myxoid Liposarcoma	Characterized with stellate or fusiform cells, presence of lipoblast, plexiform capillary network, translocation (12;16) and absence of CD34 staining pattern support myxoid liposarcoma.
6	Undifferentiated pleomorphic sarcoma	Undifferentiated sarcoma with pleomorphic cells, having abundant mitotic figures. Areas of necrosis and giant cell formation can be seen.

dermatofibroma, schwannoma, neurofibroma, leiomyoma, spindle cell variant of melanoma, myxoid liposarcoma and undifferentiated pleomorphic sarcoma (Tab. I). Dermatofibroma (DF) is a benign fibrous histiocytic proliferation of plump spindle cells; usually involving the upper dermis with intervening collagen bands and fascicles. They usually show pseudoepitheliomatous hyperplasia, floret type multinucleated giant cells, dispersed foamy histiocytes and a variable number of mitoses. Histologically, neoplastic spindle cells show analogous morphologic features to those of DFSP, but they lack an infiltrative growth pattern into adjacent adipose tissue and stain positive with factor XIIIa. In contrast, DFSP display an infiltrative growth pattern and stains positive with CD34, while they usually lack giant cells and abundant collagen bands, which helps to differentiate it from DF.

Schwannoma is a nerve sheath tumour. It can involve the

vulva and present as clitoral hypertrophy. Microscopically, neoplastic cells have spindle cell morphology with areas of hypocellularity and hypercellularity, called Antoni A and Antoni B areas, respectively. Antoni A areas show nuclear palisading, whorling appearance and Verocay bodies. The neoplastic cells exhibit positive staining pattern with S-100 protein. While DFSP usually does not show hypocellular and hypercellular growth pattern and is negative for S-100 protein. Neurofibroma is a benign tumour with neural origin. It can occur in association with von Recklinghausen neurofibromatosis<sup>8</sup>. It shows a spindle cell population with distinct cell borders. The cells usually have tapered ends with a background mast cells and intervening collagen fibres. They usually lack mitotic figures. They stain positive with S-100 protein, while in comparison the neoplastic cells in DFSP show positive staining with CD34. Leiomyoma and its cellular variant consist of spindle-shaped smooth muscle proliferation which stain positive with SMA, unlike DFSP which exhibits positive staining with CD34 and negative for SMA. Melanoma can present at any location of body in different morphologic forms. The spindle cell variant of melanoma should always be considered in the differential diagnosis of DFSP. The neoplastic cells in melanoma stain positive with melan-A and HMB45 while they are negative for CD34, which aids in differentiating it from DFSP. Furthermore, myxoid liposarcoma can be confused with the myxoid variant of DFSP. The presence of CD34 staining and absence of lipoblasts supports the diagnosis of DFSP<sup>9</sup>. Undifferentiated pleomorphic sarcoma rarely presents in the vulva, and very few cases have been reported in the literature<sup>10</sup>. The neoplastic cells show marked pleomorphism, cyto-

**Fig. 5.** Spindle shaped neoplastic cells show diffuse staining with (a) CD34 and (b) vimentin (high power). They stain negative with (c) S-100 and (d) SMA (high power).



ma and its cellular variant consist of spindle-shaped smooth muscle proliferation which stain positive with SMA, unlike DFSP which exhibits positive staining with CD34 and negative for SMA. Melanoma can present at any location of body in different morphologic forms. The spindle cell variant of melanoma should always be considered in the differential diagnosis of DFSP. The neoplastic cells in melanoma stain positive with melan-A and HMB45 while they are negative for CD34, which aids in differentiating it from DFSP. Furthermore, myxoid liposarcoma can be confused with the myxoid variant of DFSP. The presence of CD34 staining and absence of lipoblasts supports the diagnosis of DFSP<sup>9</sup>. Undifferentiated pleomorphic sarcoma rarely presents in the vulva, and very few cases have been reported in the literature<sup>10</sup>. The neoplastic cells show marked pleomorphism, cyto-

logic atypia, giant cells, abundant mitotic figures and foci of necrosis, a morphologic pattern, which is typically not observed in DFSP. Ultrastructurally, it shows areas of fibroblast differentiation. Molecular and cytogenetic abnormalities in DFSP can be recognized by fluorescence in-situ hybridization (FISH). DFSP is associated with t (17; 22) translocation and COL1A1-PDGFB fusion<sup>11</sup>. There is intensification of chromosome 17 and 22 or the presence of a supernumerary ring chromosome. These molecular markers aid in confirming diagnosis especially in difficult cases, with overlapping histologic features with other mimickers, and a non-conclusive CD34 staining pattern.

Wide surgical excision and post-excision follow-up is the standard approach in the management of DFSP. Due to the high local recurrence rate (20-49%), the role of Mohs micrographic surgery (MMS) is substantial in the accurate microdissection of margins<sup>12</sup>. It is challeng-

ing to obtain negative margins in deep-seated lesions, so the use of MMS is limited. However, the Tubingen variant of Mohs surgery is useful to achieve negative margins with preservation of uninvolved tissue<sup>13</sup>. Use of imatinib and radiotherapy is supportive predominantly in cases with advanced disease<sup>14,15</sup>. Fibrosarcomatous differentiation in DFSP is associated with an increased risk for recurrence<sup>5,16</sup>. Metastasis is rare with only a few reported cases<sup>17</sup>. Clinical and radiologic follow up is recommended to identify early recurrent diseases.

DFSP is a malignant soft tissue mesenchymal tumour of dermal origin. It is less frequently encountered in the vulva. The differential diagnosis consists of a wide spectrum of diseases ranging from benign neoplasms to undifferentiated sarcomas. The characteristic morphologic pattern and immunohistochemical staining with CD34 is extremely helpful in confirming a diagnosis of DFSP.

## References

- Ulutin HC, Zellars RC, Frassica D. *Soft tissue sarcoma of the vulva: A clinical study*. Int J Gynecol Cancer 2003;13:528-31.
- Zizi-Sermpetzoglou A, Savvaidou V, Fournogerakis S, et al. *Dermatofibrosarcoma protuberans of the mons pubis*. Eur J Gynaecol Oncol 2012;33:537-9.
- Edelweiss M, Malpica A. *Dermatofibrosarcoma protuberans of the vulva: a clinicopathologic and immunohistochemical study of 13 cases*. Am J Surg Pathol 2010;34:393-400.
- Moodley M, Moodley J. *Dermatofibrosarcoma protuberans of the vulva: a case report and review of the literature*. Gynecol Oncol 2000;78:74-5.
- Ghorbani RP, Malpica A, Ayala AG. *Dermatofibrosarcoma protuberans of the vulva: clinicopathologic and immunohistochemical analysis of four cases, one with fibrosarcomatous change, and review of the literature*. Int J Gynecol Pathol 1999;18:366-73.
- Yeniay L, Unalp O, Sezak M. *Dermatofibrosarcoma protuberans of the breast*. Breast J 2012;18:493-4.
- Siddharaju N, Singh N, Murugan P, et al. *Cytologic diagnostic pitfall of dermatofibrosarcoma protuberans masquerading as primary parotid tumor: a case report*. Diagn Cytopathol 2009;37:277-80.
- Gómez-Bravo Topete E, Martínez Martínez M, et al. *Recklinghausen disease with tumor involving the vulva. Presentation of a case*. Ginecol Obstet Mex 1993;61:156-9.
- Hong YJ, Choi YW, Myung KB, et al. *A case of myxoid dermatofibrosarcoma protuberans*. Ann Dermatol 2011;23(3):379-81.
- Vural B, Ozkan S, Yildiz K, et al. *Malignant fibrous histiocytoma of the vulva: a case report*. Arch Gynecol Obstet 2005;273:122-5.
- Vanni R, Faa G, Dettori T, et al. *A case of dermatofibrosarcoma protuberans of the vulva with a COL1A1/PDGFB fusion identical to a case of giant cell fibroblastoma*. Virchows Arch 2000;437:95-100.
- Foroozan M, Sei JF, Amini M, et al. *Efficacy of Mohs micrographic surgery for the treatment of dermatofibrosarcoma protuberans: systematic review*. Arch Dermatol 2012;148:1055-63.
- Leigheb M, Zavattaro E, Bellinzona F, et al. *Micrographic surgery (Tubingen torte technique) for the treatment of an invasive dermatofibrosarcoma protuberans with muscular involvement*. G Ital Dermatol Venereol 2010;145:309-11.
- Williams N, Morris CG, Kirwan JM. *Radiotherapy for Dermatofibrosarcoma Protuberans*. Am J Clin Oncol 2013; Feb 5.
- Llombart B, Serra-Guillén C, Monteagudo C, et al. *Dermatofibrosarcoma protuberans: a comprehensive review and update on diagnosis and management*. Semin Diagn Pathol 2013;30:13-28.
- Palmerini E, Gambarotti M, Staals EL, et al. *Fibrosarcomatous changes and expression of CD34+ and apolipoprotein-D in dermatofibrosarcoma protuberans*. Clin Sarcoma Res 2012;2:4.
- Soergel TM, Doering DL, O'connor D. *Metastatic dermatofibrosarcoma protuberans of the vulva*. Gynecol Oncol 1998;71:320-4.