Cellular dermatofibroma: A hyperkeratotic indurated plaque on the thigh

Amira Elbendary[1,2], John R. Griffin[3], Dirk M. Elston[4], Shyam B. Verma[5]

[1]Ackerman Academy of Dermatopathology, New York, [3]Department of Internal Medicine and Pathology and Laboratory Medicine, Texas A&M University Health Science Center, Dallas, Texas, [4]Department of Dermatology and Dermatologic Surgery, Medical University of South Carolina, South Carolina, USA, [2]Department of Dermatology, Kasr al Ainy Faculty of Medicine, Cairo University, Cairo, Egypt, [5]Nirvan Skin Clinic, Vadodara, Gujarat, India

Access this article online

Website: www.idoj.in

DOI: 10.4103/2229-5178.185497

Quick Response Code:

Address for correspondence:
Prof. Dirk M. Elston, 135 Rutledge Avenue, 11th Floor, Charleston - 29425-5780, South Carolina, USA.
E-mail: elstond@musc.edu

A 26-year-old healthy man was evaluated for a slowly growing, asymptomatic lesion on the medial aspect of his thigh of one year duration. The patient denied any history of trauma at the site. Physical examination revealed an indurated, nontender, brown, hyperkeratotic plaque on the medial side of his thigh [Figure 1]. The inguinal lymph nodes were not palpable. Excision biopsy was performed and, microscopically, a dermal-based spindle cell proliferation was present. The spindled cells were arranged in a storiform pattern [Figure 2a and b]. Mitotic figures were rare and none were atypical. Nuclear pleomorphism was mild, and there were no perivascular lymphoid aggregates. Immunohistochemical staining revealed scattered nuclear positivity for CD34 [Figure 2c] and HMB 45. S100 staining was negative. CD99 and Factor XIIIa [Figure 2d] demonstrated uniform nuclear expression in the tumor cells.

Diagnosis: Cellular Dermatofibroma

DISCUSSION

Dermatofibroma (DF) is a benign fibrohistiocytic tumor that is usually asymptomatic. It typically presents as a single skin-colored, red or red-brown, round or oval papule less than 1 cm in diameter presenting on the extremities of young to middle-aged patients.[1]

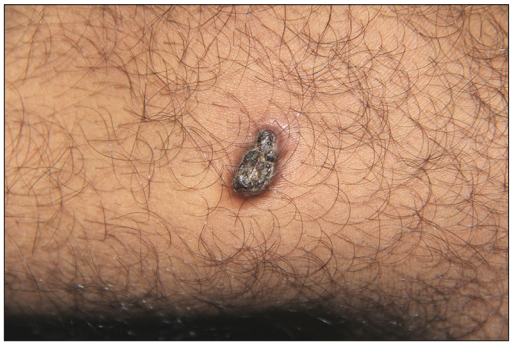

Figure 1: Hyperkeratotic, hyperpigmented indurated plaque on the thigh

Dermatofibroma is characterized by a long list of variants; in 1994 LeBoit and Barr described 25 subtypes,[2] and Yus *et al*. added three additional subtypes in year 2000, namely, the lichenoid, erosive, and ulcerated types.[3] Several clinical variants of DF exist [Table 1].

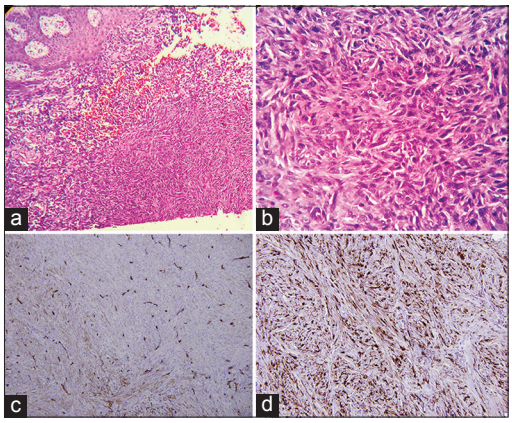

Figure 2: Dermal spindle cell proliferartion in a storiform pattern (H and E): (a) Original magnification ×40; (b) Original magnification ×200); (c) Staining of spindle cells only at the periphery of the tumor (Immunostain CD34; original magnification ×200); (d) Strong expression in tumor spindle cells (Factor XIII a; original magnification ×200)

Cite this article as: Elbendary A, Griffin JR, Elston DM, Verma SB. Cellular dermatofibroma: A hyperkeratotic indurated plaque on the thigh. Indian Dermatol Online J 2016;7:308-10.

Table 1: Some DF variants with clinical differential diagnosis

DF variant	Clinical differential diagnosis
Large plaque DF	Dermatofibrosarcoma protuberans
Aneurysmal DF	Angioma, melanoma, nodular Kaposi sarcoma
Atrophic DF	Morpheaform basal cell carcinoma, scar
Hemosiderrhotic DF	Melanoma
Polypoid DF[4]	DFSP, amelanotic melanoma
Ulcerated and erosive DF[4]	Keratoacanthoma, squamous cell carcinoma, basal cell carcinoma

DF: Dermatofibroma, DFSP: Dermatofibrosarcoma protuberans. Table adapted from Zegler *et al*.[1]

Histopathologically, classic DF is characterized by a proliferation of spindle cells arranged in a storiform pattern in the mid to deep dermis and an overlying acanthotic epidermis, sometimes with follicular induction. Hemosiderin-laden macrophages (ringed siderophages) may be scattered and a proliferation of small vessels, some with a hyalinized vessel wall are typical. Cells at the periphery tend to surround small, rounded bundles of collagen. The tumor may extend deeply to the superficial fat, whereas the cellular DF variant shows hypercellularity and the spindled cells are usually arranged in a fascicular pattern infiltrating to the subcutaneous tissue as well as mitotic figures and mild cellular pleomorphism.[4] Atypical mitoses should not be seen.

Table 2: Differential diagnosis of cellular DF

Cases simulating cellular DF microscopically	Clinical features	Microscopic features	Helpful differentiating criteria	Immunohistochemical criteria
Cellular DF[5]	Usually as a single skin colored, red or red-brown, round or oval papule less than 1 cm in diameter with characteristic dimpling sign	Proliferation of spindle cell, hypercellular with prominent fascicular growth pattern infiltrating to the subcutaneous tissue Mitotic figures and mild cellular pleomorphism	Absent atypical mitoses Focal areas of classic DF at the periphery as acanthotic epidermis with follicular induction, hemosiderin laden macrophages and rounded bundles of collagen	The spindled cells stain for factor XIIIa CD34 stains the surrounding stroma as well as some tumor cells at the periphery Diffuse expression of CD99
DFSP[7,8]	Large multilobular plaque or tumor, in early stage, may resemble large plaque DF	Spindled cells with elongated nuclei that deeply infiltrate the deep reticular dermis and extend into the subcutaneous fat preserving single adipocytes creating a reticular pattern or, so-called fat trapping Sparse mitotic figures are noted in cases of plaque lesions In tumor nodules, increased cellularity is noted and spindled cells are arranged more irregularly creating a storiform appearance	Absence of focal areas of classic DF at the periphery Diffuse storiform architecture Fat trapping with a pattern of honeycomb or multilayer infiltration of the subcutaneous tissue	Moderate to strong staining of spindle cells with CD34 Negative staining of spindle cells with factor XIIIa Negative staining with CD99
Desmoplastic melanoma[9]	Indurated papule or nodule frequently lacking pigmentation	Dermal spindle cells arranged singly or in thin fascicles infiltrating the subcutaneous tissue, with dense desmoplastic stroma and variable atypia of spindle cells Areas with solar elastosis may be noted	Presence of lymphoid aggregates may be a clue to the diagnosis	The melanocytic markers S100 and SOX10 appear to be the most sensitive for detecting this tumor and should be negative in cellular DF
Cutaneous spindle cell squamous cell carcinoma[10]	Exophytic or ulcerated lesion usually on sun exposed skin, may develop in burn scars or following radiodermatitis	Poorly differentiated tumor with scanty or absent signs of keratinization, elongated oval cells and hyperchromatic nuclei with occasional pleomorphic giant cells, infiltrating deeply to the subcutaneous fat	Presence of focal keratinization Derivation from an epidermal focus of atypical keratinocytes	Reacts positively to p63 and wide-spectrum cytokeratins
Cutaneous leiomyosarcoma[11]	Firm plaque, nodule or exophytic tumor Large and ulcerated lesions could occur Extremities are usual sites	Dermal spindle cell proliferation with interweaved fascicular growth pattern. Nuclei demonstrate blunt ended cigar shape surrounded by eosinophilic cytoplasm. Mitotic rate is high. Focal necrosis could be noted	Pleomorphism and high degree of nuclear atypia High mitotic rate Presence of cells with blunt ended cigar shape nuclei surrounded by eosinophilic cytoplasm	Positive expression of spindled cells for desmin, smooth muscle actin, and vimentin

DF: Dermatofibroma, DFSP: Dermatofibrosarcoma protuberans

Cellular DF, sometimes referred to as an "indeterminate fibrohistiocytic lesion" due to the presence of overlap in histologic and immunopathologic characteristics between cellular DF and DFSP,[5] is particularly important to differentiate from DFSP [Table 2]. DFSP is an uncommon soft tissue sarcoma that is locally aggressive but has a high recurrence rate after wide local excision and a low rate of metastasis.

The immunohistochemical staining pattern may aid in making the distinction. The spindled cells of cellular DF stain for factor XIIIa, whereas CD34 stains the surrounding stroma as well as some tumor cells at the periphery, whereas in DFSP there is moderate to strong CD34 staining of tumor cells diffusely.[6] In some cases, typically in superficial biopsies, CD34 and factor XIIIa may show overlap leading to difficulty in differentiating these tumors. False-positive CD34 staining often relates to the pH of the buffer solution, which can result in significant background staining. Careful interpretation of CD34 is important to prevent overinterpretation of background staining particularly at the periphery of the lesion.

Recently, CD99 was shown to be diffusely expressed in DF thus providing another potential option for distinguishing the two tumors.[7] Advanced techniques for distinguishing the tumors include fluorescent *in situ* hybridization (FISH) probe analysis for the t(17;22) translocation found in DFSP or array-based comparative genomic hybridization (CGH) assessment for DNA copy number changes.[8]

Other important differential diagnoses are desmoplastic melanoma, leiomyosarcoma, and cutaneous spindle cell squamous cell carcinoma [Table 2].

The recurrence rate of cellular DF is reported to be as high as 26% compared with classic DF, which has a low risk of recurrence (2%–3%) even if incompletely excised. Controversy regarding the optimal management of cellular DF exists. Rare reports of metastases and malignant transformation exist leading some authors to recommend complete excision or Mohs micrographic surgery as the treatment of cellular DF, especially in cases with an aggressive growth pattern.[1,12] Observation is considered acceptable by other authors, especially if immunostaining supports the diagnosis of a benign lesion.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Zelger B, Zelger BG, Burgdorf WH. Dermatofibroma-a critical evaluation. Int J Surg Pathol 2004;12:333-44.
2. LeBoit PE, Barr RJ. Smooth-muscle proliferation in dermatofibromas. Am J Dermatopathol 1994;16:155-60.
3. Sánchez Yus E, Soria L, de Eusebio E, Requena L. Lichenoid, erosive and ulcerated dermatofibromas. Three additional clinico-pathologic variants. J Cutan Pathol 2000;27:112-7.
4. Calonje E, Brenn T, Lazar A, Mckee P. Calonje E, Brenn T, Lazar A, Mckee P. McKee's pathology of the skin with clinical correlations. 4th ed. Edinburgh: Elsevier Saunders; 2012. Fibrohistiocytic tumors; pp. 1643–62.
5. Horenstein MG, Prieto VG, Nuckols JD, Burchette JL, Shea CR. Indeterminate fibrohistiocytic lesions of the skin: Is there a spectrum between dermatofibroma and dermatofibrosarcoma protuberans? Am J Surg Pathol 2000;24:996-1003.
6. Sanmartín O, Llombart B, López-Guerrero JA, Serra C, Requena C, Guillén C. Dermatofibrosarcoma protuberans. Actas Dermosifiliogr 2007;98:77-87.
7. Kazlouskaya V, Malhotra S, Kabigting FD, Lal K, Elston DM. CD99 Expression in dermatofibrosarcoma protuberans and dermatofibroma. Am J Dermatopathol 2014;36:392-6.
8. Charli-Joseph Y, Saggini A, Doyle LA, Fletcher CD, Weier J, Mirza S, *et al*. DNA copy number change in tumors within the spectrum of cellular, atypical, and metastasizing fibrous histiocytoma. J Am Acad Dermatol 2014;71:256-63.
9. Busam KJ. Desmoplastic melanoma. Clin Lab Med 2011;31:321-30.
10. Petter G, Haustein UF. Histologic subtyping and malignancy assessment of cutaneous squamous cell carcinoma. Dermatol Surg 2000;26:521-30.
11. Kaddu S, Beham A, Cerroni L, Humer-Fuchs U, Salmhofer W, Kerl H, *et al*. Cutaneous leiomyosarcoma. Am J Surg Pathol 1997;21:979-87.
12. Doyle LA, Fletcher CD. Metastasizing "benign" cutaneous fibrous histiocytoma: A clinicopathologic analysis of 16 cases. Am J Surg Pathol 2013;37:484-95.