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Clear Cell Pleomorphic Dermal Sarcoma: A Case Report and Literature Review

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Abstract

Introduction: Atypical fibroxanthoma (AFX) and pleomorphic dermal sarcoma (PDS) are one spectrum of rare cutaneous neoplasms that typically arise in sun-exposed skin of older population. AFX/PDS is essentially diagnosis of exclusion requiring Immunohistochemical work-up to exclude other types of tumors. **Case Report:** We present a case involving an ulcerated solitary lesion on the scalp of an elderly man. Histological examination revealed that the dermal tumor was composed of large pleomorphic, epithelioid, and spindle cells with clear cytoplasm. These cells were negative for cytokeratins, melanocytes and smooth muscle markers, but positive for CD10. These findings are consistent with a diagnosis of clear cell (CC) PDS. **Conclusion:** PDS is a low-grade malignancy that can recur locally and metastasize, which is distinguished from AFX by its larger size and the presence of aggressive histopathologic features including deeper invasion into the subcutaneous tissue, tumor necrosis, and lymphovascular and/or perineural involvement. Among several histopathologic variants, the CC variant is extremely rare with only two cases of PDS reported in the literature to date.

Keywords

Atypical Fibroxanthoma, Pleomorphic Dermal Sarcoma, Clear Cell Variant

1. Introduction

Atypical fibroxanthomas (AFX) and pleomorphic dermal sarcomas (PDS) are rare dermal-based neoplasm arising on the sun exposed area of older population [1]. Histologically, AFX and PDS typically comprise varying proportions of epithelioid, spindled, and histiocytoid cells showing significant nuclear pleomorphism and numerous mitoses, including atypical ones [1] [2]. AFX/PDS is es-

sentially diagnosis of exclusion requiring Immunohistochemical (IHC) work-up to exclude squamous cell carcinomas, melanomas and sarcomas. AFX and PDS share many similarities in their etiology, molecular structure, histopathology, immunophenotype, and clinical presentation. However, they differ in their malignant potential. While AFX is generally considered a benign tumor, PDS behaves as a low-grade malignancy with the potential for local recurrence and metastasis [2]. Therefore, it is clinically important to distinguish between these tumors based on histopathologic features. PDS can be differentiated from AFX by the larger size (>2 cm), and the presence of adverse histopathologic features such as invasion of the subcutaneous tissue, tumor necrosis, and lymphovascular and/or perineural invasion [2] [3] [4]. Several histologic variants have been identified, such as spindle cell, keloidal, granular cell, clear cell (CC), osteoclast-like giant cell, pigmented hemosiderotic, pseudoangiomatous, and myxoid variants [5]. Among them, the CC variant is particularly rare with only two cases of PDS reported in the literature to date [4]. Here, we present a case of CC-PDS highlighting key histopathologic findings and differential diagnosis with a review of the English literature.

2. Observation

A 74-year-old male patient presented with a non-healing, non-tender, ulcerated solitary lesion on the vertex of his scalp that had persisted for 3 - 4 weeks. The patient reported no prior history of lesions or trauma. He had been treated with antibiotics for a few weeks without improvement. Physical examination revealed a well-demarcated, firm, crusted, and non-tender tan-brown nodule measuring 2.5 cm in diameter, with an ulcerated surface on the scalp (**Figure 1**). A shave biopsy was performed for histopathologic diagnosis. The biopsy specimen showed sheets of tumor cells within the dermis and an ulcerated overlying epidermis. The tumor was composed of large pleomorphic, epithelioid and spindle

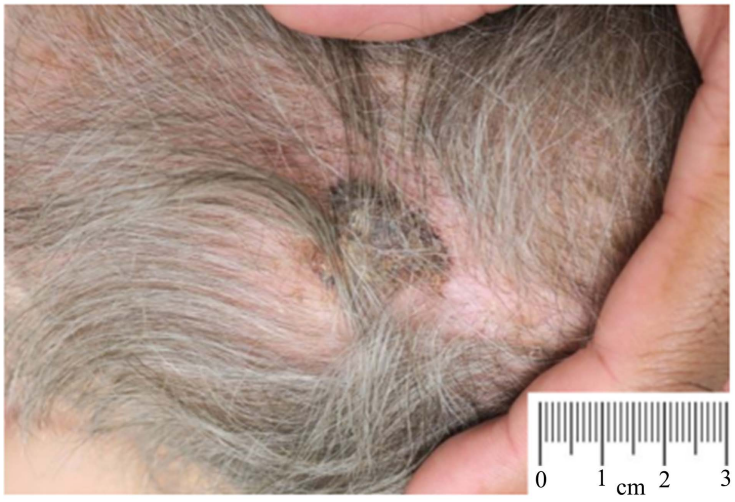
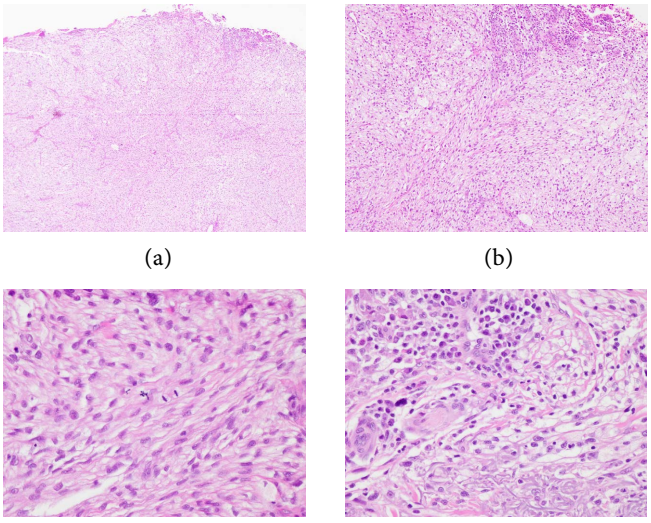


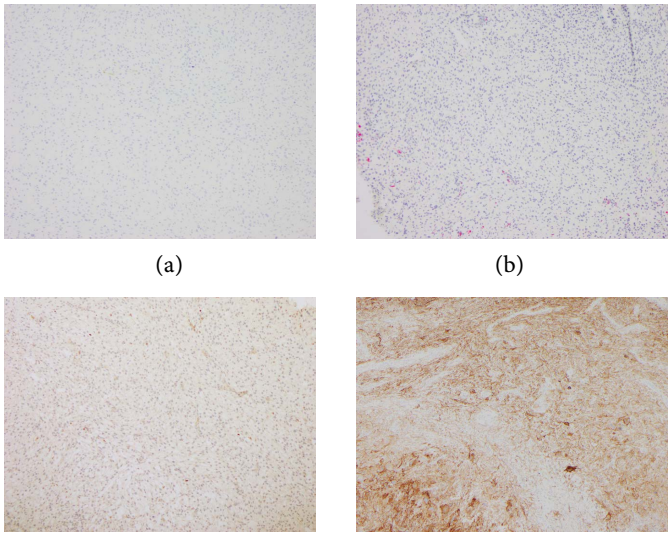
Figure 1. A well-demarcated crusted tan-brown nodule (2.5 cm) with an ulcerated surface on the scalp.

cells with clear cytoplasm. Numerous atypical mitoses and perineural invasion were observed (Figure 2). IHC studies showed that the tumor cells diffusely positive for CD10 and negative for cytokeratin (CK) AE1/AE3, CK 5/6, CK8/18, p63, p40, SOX-10, S100 protein, Melan-A, smooth muscle actin, desmin, CD31, CD34, and ERG (Figure 3). Given the IHC findings, a differential diagnosis of CC-AFX versus CC-PDS was considered, and the large size (>2 cm), deep infiltration and the presence of perineural invasion favored a diagnosis of CC-PDS.



(a) (b) (c) (d)

Figure 2. (a) Diffuse infiltration of tumor cells with ulcerated overlying epidermis (hematoxylin–eosin, ×40); (b) Large pleomorphic, spindle and epithelioid cells with clear foamy and vacuolated cytoplasm arranged in sheets infiltrating into a hyalinized stroma (hematoxylin–eosin, ×100); (c), (d) Atypical, clear cells with frequent mitoses and perineural invasion (hematoxylin–eosin, ×400).



(a) (b) (c) (d)

Figure 3. Tumor cells negative for p40 (a), S100 (b), SOX-10 (c), and positive for CD10 (d), ×100.

3. Discussion

AFX and PDS are undifferentiated rare mesenchymal neoplasms of uncertain histogenesis that do not express epithelial, melanocytic, vascular, or muscle markers. The relationship between PDS and AFX has been a source of confusion since the new term of PDS was introduced in 2011 [1]. However, PDS is not a new distinct disease entity but rather AFX with larger size (>2 cm) and higher risk histopathologic features such as subcutaneous extension, tumor necrosis, vascular and perineural invasion [2] [3]. Given the increased risk of metastasis and local recurrence, it is important to differentiate between AFX and PDS from a clinical standpoint. The presence of perineural invasion favored a diagnosis of PDS in our case. The diagnosis of AFX/PDS is usually made by excluding other tumors that have a more aggressive prognosis, such as sarcomatoid carcinomas, melanomas, and other mesenchymal neoplasms [1] [5]. Diagnosing histologic variants of AFX/PDS cases can be challenging and requires confirmation using IHC studies. CC-AFX/PDS is a rare variant with a wide range of histopathological differential diagnosis. To our knowledge, only two CC-PDS cases have been reported in the English literature [4].

Histologically, CC-AFX/PDS is characterized by the presence of epithelioid, spindled, and histiocytoid cells with a clear and vacuolated cytoplasm, arranged haphazardly in sheets and infiltrated into the hyalinized stroma. In most cases, the lesions are ulcerated and do not exhibit necrosis, vascular or perineural invasion. The inflammatory infiltration is mainly composed of lymphocytes, mast cells, and a few histiocytes [5]. The morphologic differential diagnosis of CC-AFX/PDS includes CC squamous cell carcinoma, CC (balloon cell) melanoma, CC hidradenocarcinoma, metastatic CC carcinomas (especially renal cell carcinoma), pleomorphic liposarcoma, other CC sarcomas, and tumor of perivascular epithelioid cells (PEComa), and a panel of IHC is essential to exclude these other diagnostic considerations. CC squamous cell carcinoma is usually connected to the epidermis and distinguished by the presence of a foci of keratinization, and expression of CK on IHC [6]. The histomorphology of well-circumscribed nodules in CC-AFX/PDS shares architectural similarities with nodular balloon-type malignant melanoma. However, S100 protein and MART-1 positivity, along with molecular studies for BRAF V600E mutation differentiate melanomas from AFX/PDS [5]. CC hidradenocarcinoma is a multilobulated tumor with an eccrine gland origin, which grows into dermis without connection to the epidermis. Squamoid foci, ductal differentiation, and CK expression are some of the characteristics that distinguish it from CC-AFX/PDS [7]. It is also important to differentiate metastatic clear cell carcinoma of renal origin from CC-AFX/PDS. Unlike CC-AFX/PDS, they usually exhibit a delicate, thin, tree-like vasculature, and also express CK [5]. As another differential diagnosis, pleomorphic liposarcoma is characterized by the presence of pleomorphic spindle/epithelioid cells with a variable number of pleomorphic lipoblasts rarely confined to the dermis. The tumor is usually high-grade and has infiltrative mar-

gins. Absence of MDM2 amplification with a complex karyotype and widespread complex copy number of changes help in the diagnosis of pleomorphic liposarcoma [8]. Primary cutaneous PEComa is also a differential diagnosis. It is a rare type of soft tissue tumor that preferentially arises in the limbs of middle-aged women, and histologically is made up of epithelioid and spindle cells with clear or granular cytoplasm arranged in a nest or trabecular growth pattern. IHC expression with melanocytic and smooth muscle markers can differentiate it from CC-AFX/PDS [9].

4. Conclusion

In conclusion, CC-AFX/PDS is a rare variant of AFX/PDS that predominantly affects the head/face of elderly males. Due to histomorphologic similarities, a panel of IHC stains is required to exclude other malignancies. From a clinical standpoint, it is important to differentiate between AFX and PDS due to their different risk of metastasis and local recurrence.

Declaration

Data collection and management performed in accordance with the Declaration of Helsinki.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] McCalmont T.H. (2011) AFX: What We Now Know. *Journal of Cutaneous Pathology*, **38**, 853-856. https://doi.org/10.1111/j.1600-0560.2011.01802.x

[2] Helbig, D., Ziemer, M., Dippel, E., Erdmann, M., *et al.* (2022) S1-Guideline Atypical Fibroxanthoma (AFX) and Pleomorphic Dermal Sarcoma (PDS). *Journal of the German Society of Dermatology*: *JDDG*, **20**, 235-243. https://doi.org/10.1111/ddg.14700

[3] Carletti, M., Nguyen, D.A., Malouf, P., Ingersoll, Z., *et al.* (2022) Pleomorphic Dermal Sarcoma: A Clinical and Histopathologic Emulator of Atypical Fibroxanthoma, but Different Biologic Behavior. *HCA Healthcare Journal of Medicine*, **3**, 299-304. https://doi.org/10.36518/2689-0216.1334

[4] Coelho-Lima, J., Bruty, J., Watkins, J., Liu, H., *et al.* (2022) Clear Cell Variant of Atypical Fibroxanthoma and Pleomorphic Dermal Sarcoma: Molecular Characterization and Review of the Literature. *Journal of Cutaneous Pathology*, **49**, 1031-1034. https://doi.org/10.1111/cup.14307

[5] Tardío, J.C., Pinedo, F., Aramburu, J.A., Martínez-González, M.Á., *et al.* (2016) Clear Cell Atypical Fibroxanthoma: Clinicopathological Study of 6 Cases and Review of the Literature with Special Emphasis on the Differential Diagnosis. *The American Journal of Dermatopathology*, **38**, 586-592. https://doi.org/10.1097/DAD.0000000000000465

[6] Kuo, T. (1980) Clear Cell Carcinoma of the Skin. A Variant of the Squamous Cell

Carcinoma that Simulates Sebaceous Carcinoma. *The American Journal of Surgical Pathology*, **4**, 573-583. https://doi.org/10.1097/00000478-198012000-00008

[7] Kazakov, D.V., Ivan, D., Kutzner, H., Spagnolo, D.V., *et al.* (2009) Cutaneous Hidradenocarcinoma: A Clinicopathological, Immunohistochemical, and Molecular Biologic Study of 14 Cases, Including Her2/neu Gene Expression/Amplification, TP53 Gene Mutation Analysis, and t(11;19) Translocation. *The American Journal of Dermatopathology*, **31**, 236-247. https://doi.org/10.1097/DAD.0b013e3181984f10

[8] Guillou, L. and Aurias, A. (2010) Soft Tissue Sarcomas with Complex Genomic Profiles. *Virchows Archiv*: *An International Journal of Pathology*, **456**, 201-217. https://doi.org/10.1007/s00428-009-0853-4

[9] Mentzel, T., Reisshauer, S., Rütten, A., Hantschke, M., *et al.* (2005) Cutaneous Clear Cell Myomelanocytic Tumour: A New Member of the Growing Family of Perivascular Epithelioid Cell Tumours (PEComas). Clinicopathological and Immunohistochemical Analysis of Seven Cases. *Histopathology*, **46**, 498-504. https://doi.org/10.1111/j.1365-2559.2005.02105.x