Dermatofibrosarcoma protuberans in pediatric patients: A diagnostic and management challenge

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INTRODUCTION

Spindle cell tumors occur in the pediatric population and can prove to be aggressive clinically, as in the case with dermatofibrosarcoma protuberans (DFSP). Soft tissue sarcomas represent less than 1% of malignant tumors overall,[1] and the prevalence of DFSP before 20 years of age is 1.0 per million.[2] This malignancy is characterized by invasive growth, low frequency of metastasis, and a tendency to relapse locally, making it a high-morbidity tumor.[3] DFSP has an insidious onset with slow growth,[4] requiring a high index of clinical suspicion and ultimately a biopsy for diagnosis. The heterogeneous presentation of the tumor often leads to a delay in diagnosis, partly because of a differential diagnosis that includes a number of benign entities such as scars, vascular malformations,[5] dermal dendrocyte hamartoma (CD34$^+$ dermal fibroma), dermatofibroma,[6] and others.

Histologically, DFSP exhibits small, elongated cells arranged in a storiform pattern extending into the subcutaneous fat.[7] The infiltrative pattern of DFSP aids in distinguishing it from benign entities, which can have similar elongated cells in a storiform pattern that lack infiltrative features, but this is often not sufficient for definitive diagnosis. When classification of a spindle cell tumor is not evident through routine histopathology alone, immunohistochemistry studies and fluorescence in situ hybridization (FISH) for the platelet-derived growth factor-β (PDGFB) rearrangement can be useful ancillary tests.

Abbreviations used:

COL1A1:	collagen 1 α1
DF:	dermatofibroma
DFSP:	dermatofibrosarcoma protuberans
FISH:	fluorescence in situ hybridization
JXG:	juvenile xanthogranuloma
PDGFB:	platelet-derived growth factor-β

Traditionally, tumor cells of DFSP stain positively for CD34 and negative for factor XIIIa,[3] whereas benign entities such as dermatofibroma (DF) are typically CD34$^-$ (Table I). However, there are a small number of DFSPs that are CD34$^-$, and conversely some DFs that are CD34$^+$. The genetic translocation t(17:22)(q22:q13) has been identified in DFSP, which results in a collagen 1 α1 (COL1A1)/PDGFB fusion gene.[8] FISH analysis for the PDGFB gene rearrangement has been positive in 89%[12] to 96%[13] of cases felt certain to be DFSP.

We present the cases of 3 pediatric spindle cell tumors, 2 DFSPs, and 1 mimicker exhibiting the importance of clinical judgment and the limitations of current diagnostic tools.

REPORT OF CASES

Case 1

A 10-month old boy was seen for evaluation of a firm, pink plaque on his left dorsal forearm noted at 1 month of age. It had grown proportionally with him and appeared asymptomatic. The patient

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Table I. Differentiating staining characteristics of pediatric spindle tumors[4,8-11]

	CD34	Factor XIIIa	P75	Stromelysin	CD163
DF	Positive up to 40%	Positive up to 100%	Typically negative	Typically positive	Positive 89%
JXG		Positive 93%	—	—	—
DFSP	Positive 80%-100%	Positive 10%-15%	Positive up to 95%	Positive <10%	Positive <17%
Medallionlike dermal dendrocyte hamartoma	Positive 100%	Significant variation	—	—	—

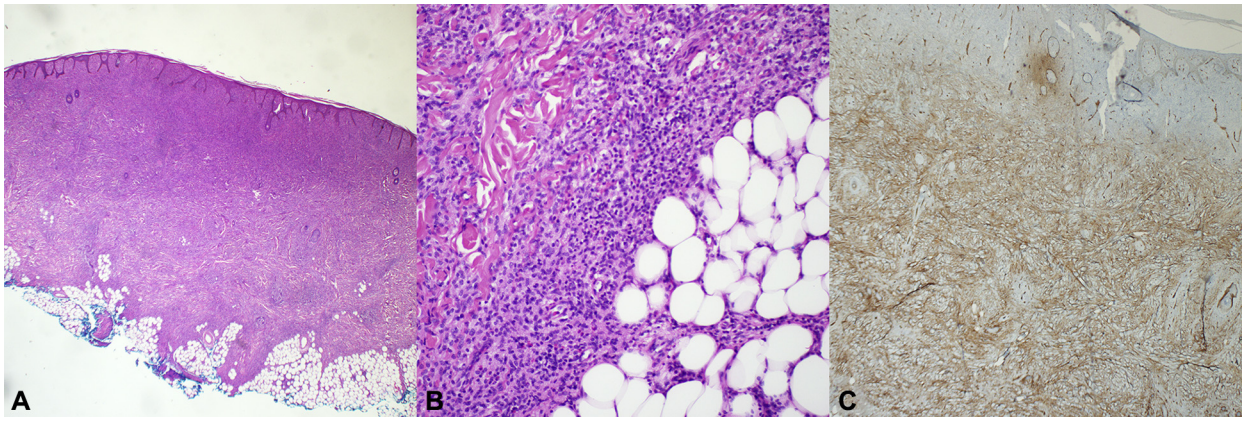

Fig 1. Case 1. Foam cell—poor juvenile xanthogranuloma **A** and **B**, Fibrohistiocytic spindle cell lesion extending from the epidermis to superficial subcutis with storiform pattern. **C**, Diffuse expression of CD34. (**A** and **B**, Hematoxylin-eosin stain; original magnifications: **A**, ×2; **B**, ×40; **C**, ×20.)

underwent an excision. Histopathologic examination found an unencapsulated, fibrohistiocytic spindle cell tumor extending from the epidermis to superficial subcutis with storiform pattern diffusely expressing CD34 and CD10. CD68 and factor XIIIa showed diffuse staining of the spindle cells, and S100 was negative (Fig 1). FISH analysis for PDGFB was negative. The lesion was initially characterized as a DF, but because of CD34 positivity, outside pathology consultation was sought, and it was ultimately reclassified as a foam cell-poor juvenile xanthogranuloma (JXG). He did well postoperatively without recurrence for 11 months.

Case 2

A 9-month-old boy presented for evaluation of lesions on his genitalia noted at 1 month of age. The patient's parents reported that the lesions had grown proportionately with him since they were first noted. On examination, there were smooth papules and plaques seen on the suprapubic and proximal penile shaft, extending inferiorly onto the left aspect of the scrotum (Fig 2). A punch biopsy found a dermal and subcutaneous spindle cell tumor with storiform growth pattern. Tumor cells expressed diffuse CD34. Factor XIIIa, smooth muscle actin, desmin, S100, and SOX10 were negative. FISH analysis for PDGFB rearrangement was also negative. Based on clinical behavior, location, and immunohistochemistry studies, the lesion was presumed to be DFSP, excised with narrow surgical margins and closed primarily. One margin was positive for tumor and was subsequently re-excised with a 2-mm margin. The defect was covered with a full-thickness skin graft. The patient did well postoperatively without recurrence for 21 months.

Case 3

A 7-year-old boy presented for evaluation of a lesion on his left leg that had slowly and steadily grown since it was noticed 3 years ago. On examination there was a 2.5-cm by 15-cm oval atrophic plaque with an overlying nodule on the anterior left leg. Separate biopsies were taken of the atrophic and nodular areas, which showed spindle cell proliferation extending into the dermis consistent with DFSP. Immunohistochemistry was positive for CD34 and vimentin and negative for epithelial membrane