Blastic plasmacytoid dendritic cell neoplasm in a young patient

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Abstract

Blastic plasmacytoid dendritic cell neoplasm is a rare hematologic neoplasm originating from plasmacytoid dendritic cell precursors that has an aggressive disease course with typically poor prognosis. Herein, we report a man in his early twenties who presented with rapid onset of violaceous nodules and purpuric papules and macules that began on his chest before spreading to his arms, back, face, scalp, and legs. He also exhibited systemic symptoms including weight loss and night sweats. He was diagnosed with blastic plasmacytoid dendritic cell neoplasm and began treatment with aggressive multidrug therapy. Thus far his treatment has resulted in complete resolution of his cutaneous manifestations.

Keywords: blastic plasmacytoid dendritic cell neoplasm, cutaneous nodule, hematologic neoplasms

Introduction

Blastic plasmacytoid dendritic cell neoplasm (BPDCN) is a rare, aggressive hematologic neoplasm that originates from plasmacytoid dendritic cell precursors. Incidence is likely underestimated as a significant proportion of patients present without skin lesions, but the data available reports an overall incidence <1% of all hematologic malignancies [1]. Most patients initially present with cutaneous manifestations, typically asymptomatic violaceous and purpuric patches, plaques, or nodules with or without systemic symptoms typical of hematologic malignancy [2]. These lesions mimic ecchymoses, cutaneous T-cell lymphomas, and leukemia cutis and generally present in older adults. A minority of patients will present with systemic involvement without skin lesions [1,2].

We report the clinical course and morphologic presentation of a young patient with BDPCN. This case serves to highlight the rapid presentation, potential complications arising from treatment, and resolution of cutaneous findings in this patient with a rare and aggressive neoplasm.

Case Synopsis

A 21-year-old man with no previous medical history presented with rapid onset violaceous edematous nodules and purpuric papules and macules that began on his chest before spreading to his arms, back, face, scalp, and legs (**Figure 1A**, **B)**. The lesions were accompanied by a 4.5kg unintentional weight loss, subjective fevers, night sweats, muscle aches, and dark urine. Physical examination revealed violaceous mamillated nodules on the right parietal scalp, left forehead, right upper arm, left chest, and right lower leg. Purpuric macules, papules, and patches were present on the chest, abdomen, back, and upper arms, along with a solitary purple papule on the gingival mucosa. No palpable cervical, axillary, or inguinal lymphadenopathy was noted. Laboratory results were significant for mild leukopenia, anemia, neutropenia, and elevated lactate dehydrogenase (LDH). Punch biopsy specimens were obtained from the chest (**Figure 1C**, **D)**.

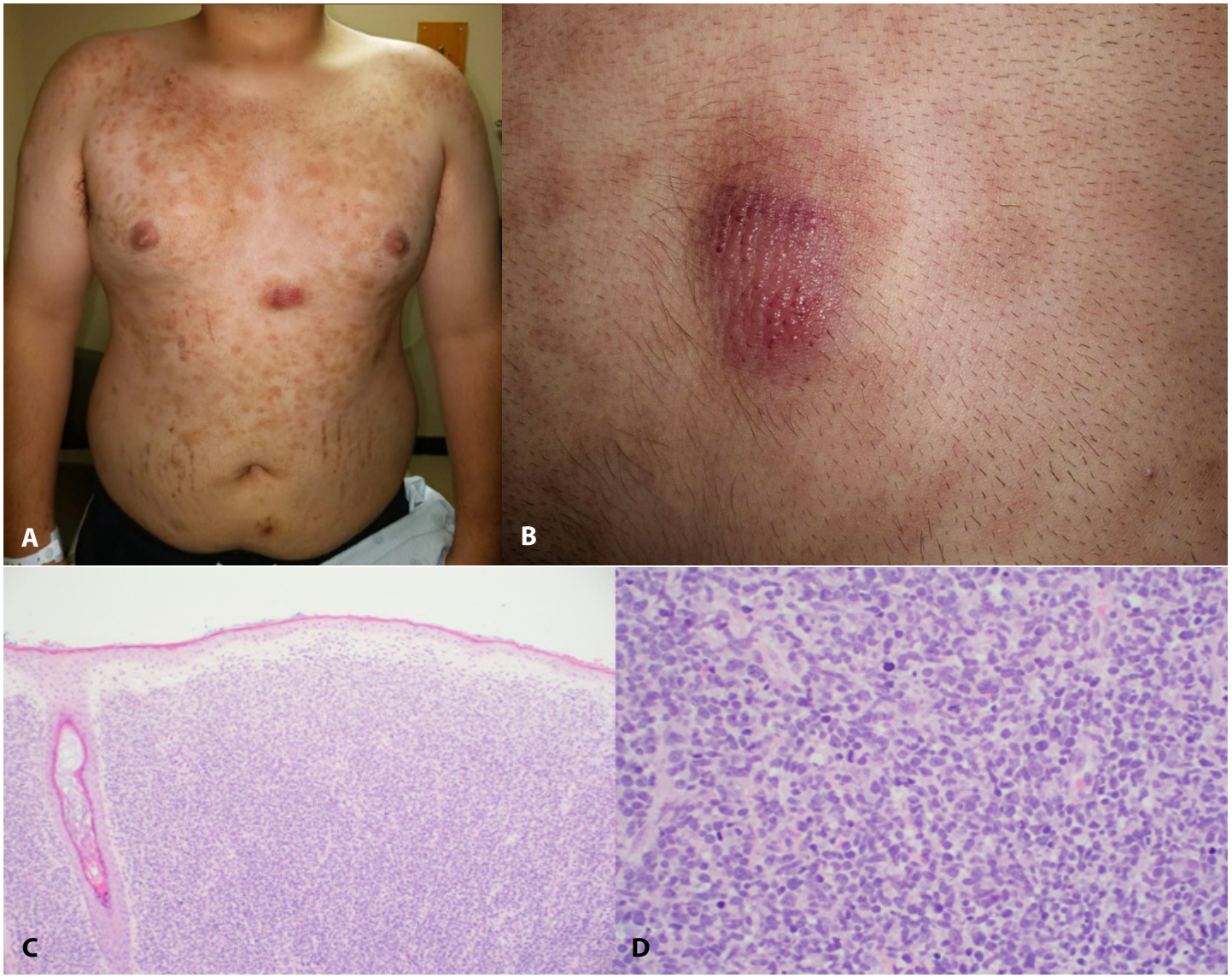

Figure 1. ***A)*** *Clinical image of the chest and abdomen shows violaceous edematous nodules and purpuric papules and macules.* ***B)*** *Close-up of an edematous nodule. C,* ***D)*** *H&E-stained biopsy demonstrating diffuse, monotonous, dermal infiltrates (C, 20×) of medium-sized atypical lymphoid cells. Most cells are atypical with fine chromatin, irregular nuclei with scant cytoplasm, and pinpoint nucleoli (D, 200×).*

Analysis of the skin biopsy specimens revealed dense and diffuse dermal infiltrates of medium-sized atypical lymphoid cells with scant cytoplasm and pinpoint nucleoli. These cells expressed CD123, CD4, and CD56, but not CD3, CD20, CD30, CD8, or myeloperoxidase, consistent with a diagnosis of blastic plasmacytoid dendritic cell neoplasm (BPDCN), not shown. In situ hybridization was negative for Epstein-Barr Virus. Bone marrow biopsy obtained later during the patient's initial admission revealed hypercellularity with extensive replacement by blastic plasmacytoid dendritic cells (70% blasts by manual differential), also corroborative with the diagnosis of BPDCN.

Initial plans were to start the patient on tagraxofusp, a CD123-directed cytotoxin, but elevations in liver function tests precluded this, so he was started on a lower intensity regimen of Hyper-CVAD chemotherapy (cyclophosphamide, vincristine, adriamycin, and dexamethasone) that is traditionally used for acute leukemia. He completed two cycles with complete resolution of his cutaneous manifestations (**Figure 2**) but developed complications of neutropenic sepsis and Fournier

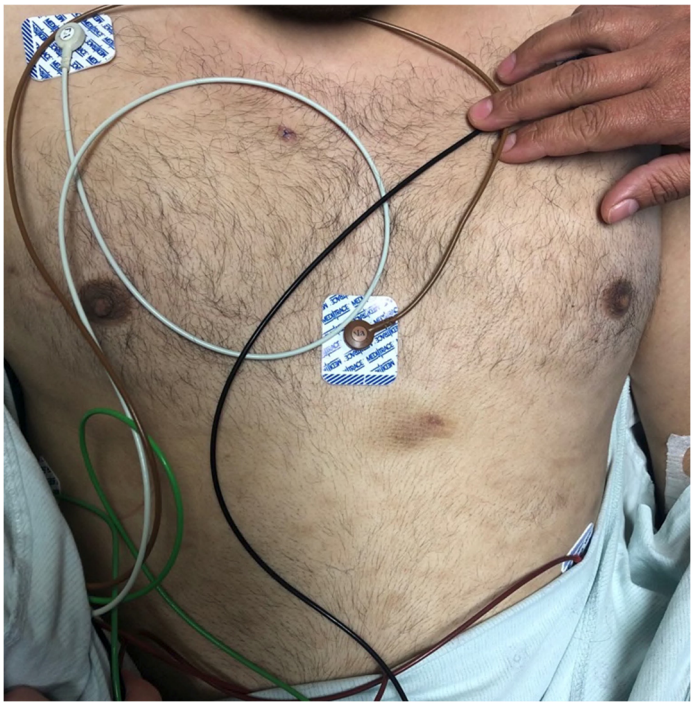

Figure 2. *Clinical image illustrating complete resolution of cutaneous lesions early during the course of therapy.*

gangrene requiring debridement and split thickness skin graft repair. He completed three cycles of azacitidine monotherapy during recovery and scrotal wound management with no evidence of disease on most recent bone marrow biopsy. He then initiated combination azacitidine and venetoclax therapy with plans for eventual bone marrow transplant.

Case Discussion

Blastic plasmacytoid dendritic cell neoplasm diagnosis requires skin biopsy demonstrating blast cells with plasmacytoid morphology and positive expression of CD123, CD4, and CD56 with negative myeloperoxidase (MPO), CD3, and CD79 [3]. Most cases of acute myeloid leukemia will demonstrate expression of MPO and other myeloid antigens whereas cutaneous T cell lymphoma will not demonstrate CD56 or CD123. CD56 is an archetypal natural killer cell marker and represents an immature state. It is typically absent in benign plasmacytoid dendritic cells (PDCs) and characteristically expressed in the BPDCN immunophenotype [4].

CD123 is an interleukin-3 receptor, expressed highly in PDCs as they contribute to inflammatory and immune responses. Plasmacytoid dendritic cells are increased in the skin a variety of inflammatory pathologies, including psoriasis and cutaneous lupus erythematosus. However, these represent mature PDCs and are involved in a number of inflammatory diseases unrelated to the malignant proliferation of their precursors such as those found in BDPCN.

Prognosis is generally poor. Even after complete remission, survival estimates range from 12-16 months in adults and up to 27 months in pediatric patients with purely cutaneous disease [5-7]. A recently developed therapy is tagraxofusp, a CD123-directed cytotoxin associated with higher response rates than traditional acute lymphoblastic lymphoma or acute myeloid leukemia regimens in limited early studies [8]. Venetoclax is an inhibitor of BCL2 and other anti-apoptotic proteins and has been used successfully to achieve response in two patients with relapsed BDPCN [9]. Allogenic hematopoietic stem cell transplant can also be considered and has been used with favorable outcomes but are usually considered after disease recurrence [10].

Conclusion

Blastic plasmacytoid dendritic cell neoplasm is a rare and aggressive malignancy with a generally poor prognosis. Successful treatment involves both early diagnosis and appropriate therapeutic regimens. Although rare, complete cutaneous resolution is possible.

Potential conflicts of interest

The authors declare no conflicts of interests.

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