SKIN

BRIEF ARTICLE

Lambda Light Chain Plasmacytoma Presenting with Paraneoplastic Leukocytoclastic Vasculitis in the Context of Septic Shock: A Case Report

Alexandra Savage, BS[1], Charlotte McRae, BS[1], Vyshnavi Rallapalle, BS[1], Hector Careres, BS[1], Amit Gaggar, MD[2], Andrew Fortugno, MD[3], Lauren Graham, MD, PhD[3]

[1] Heersink School of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA
[2] Division of Pulmonary, Allergy & Critical Care Medicine, Department of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA
[3] Department of Dermatology, University of Alabama at Birmingham, Birmingham, AL, USA

ABSTRACT

Introduction: Leukocytoclastic vasculitis (LCV) is a small-vessel vasculitis characterized by immune complex deposition presenting with palpable purpura and petechiae. While commonly associated with systemic conditions such as infections and autoimmune diseases, LCV can be triggered less commonly by hematologic malignancies. Plasma cell disorders may lead to LCV through immune dysregulation and abnormal immunoglobulin production.[1] The association between plasma cell dyscrasias and LCV emphasizes the importance of thorough evaluation in patients presenting with vasculitis, specifically those with underlying immunologic conditions.

Case: A 60-year-old man with a history of monoclonal gammopathy of undetermined significance (MGUS) and systemic lupus erythematosus (SLE) with cutaneous features presented with petechiae, weight loss, and sixth months of constitutional symptoms. A punch biopsy confirmed LCV. Imaging revealed mesenteric and paraspinal nodules, and biopsy identified plasmacytoma. Laboratory evaluation showed elevated immunoglobulins (IgG 6000 mg/dL, IgA 2000 mg/dL) and markers of immune dysregulation. The patient's course was complicated by septic shock, necessitating intensive care. Despite this, he stabilized and initiated dermatology-directed treatment for cutaneous lesions. Subsequent autologous hematopoietic stem cell transplantation and chemotherapy led to improvement in both systemic and cutaneous disease.

Conclusion: This case highlights LCV as a paraneoplastic syndrome and a potential harbinger of plasma cell malignancy. Notably, resolution of LCV was achieved following definitive treatment of the underlying malignancy, emphasizing the importance of systemic therapy. Recognition of LCV as a manifestation of hematologic malignancy necessitates thorough evaluation, particularly in patients with pre-existing plasma cell disorders.

INTRODUCTION

Leukocytoclastic vasculitis (LCV) is a small-vessel vasculitis characterized by immune complex deposition presenting with palpable purpura and petechiae. While commonly

associated with systemic conditions such as infections and autoimmune diseases, LCV can be triggered less commonly by hematologic malignancies.[1] Plasma cell disorders may infrequently lead to LCV through immune dysregulation and abnormal immunoglobulin production.[1] The association between plasma cell dyscrasias and LCV emphasizes the importance of thorough evaluation in patients presenting with vasculitis, specifically those with underlying immunologic conditions. We present a case of LCV that led to the diagnosis of lambda light chain plasmacytoma complicated by septic shock in a patient with known monoclonal gammopathy of undetermined significance (MGUS) and systemic lupus erythematosus (SLE). Only six cases have reported LCV in the setting of MGUS, and none have documented LCV as a manifestation of the progression from MGUS to plasmacytoma.[2-4] Our case uniquely demonstrates the resolution of LCV following treatment of the underlying malignancy with autologous hematopoietic stem cell transplantation combined with chemotherapy.

CASE REPORT

Patient Information

A 60-year-old man with a history of SLE with cutaneous features and MGUS presented to the emergency department with a cough, chest pain, shortness of breath and a new-onset, non-blanching petechiae involving the lateral chest wall (**Figure 1**), flanks, upper extremities (**Figure 2**), and lower extremities. The patient noted worsening of the petechiae on his flanks over several days, prompting a dermatology consult during his inpatient stay. At the time of presentation, his SLE was well-managed on belimumab, hydroxychloroquine, and azathioprine. While he had previously experienced photosensitive rashes following belimumab infusions, he described the current eruption as distinctly different in appearance and distribution. The patient reported systemic constitutional symptoms, including seventy pounds of weight loss over the previous six months and night sweats.

Diagnostic Assessment

The dermatology inpatient service was consulted following admission to the Medical Intensive Care Unit (MICU). A punch biopsy of the left forearm confirmed leukocytoclastic vasculitis (**Figure 3**), and the patient underwent further investigation for underlying causes. CT imaging revealed mesenteric and paraspinal nodules and a CT-guided biopsy of these lesions demonstrated lambda light chain-restricted plasmacytoma. Laboratory evaluation was notable for elevated immunoglobulins with IgG at 6000 mg/dL (60-1600 mg/dL) and IgA at 2000 mg/dL (70-400 mg/dL).

The patient's clinical course was complicated by the development of septic shock. The patient was started on vancomycin/piperacillin-tazobactam and underwent a comprehensive immunologic evaluation. Flow cytometry analysis after the initiation of septic shock revealed immune dysregulation with an elevated neutrophil percentage (79.7%), decreased B cells (2.71%) and predominance of CD4 T cells (74.7%), and various inflammatory markers, including CD10, PDL1, and CD63. There was also evidence of ongoing hemolysis indicated by elevated haptoglobin at 234.14 µM (3-30 µM) and decreased hemopexin at 6.13 µM (8.8µM to 28.1 µM). The patient was hemodynamically stabilized and deemed suitable for discharge.

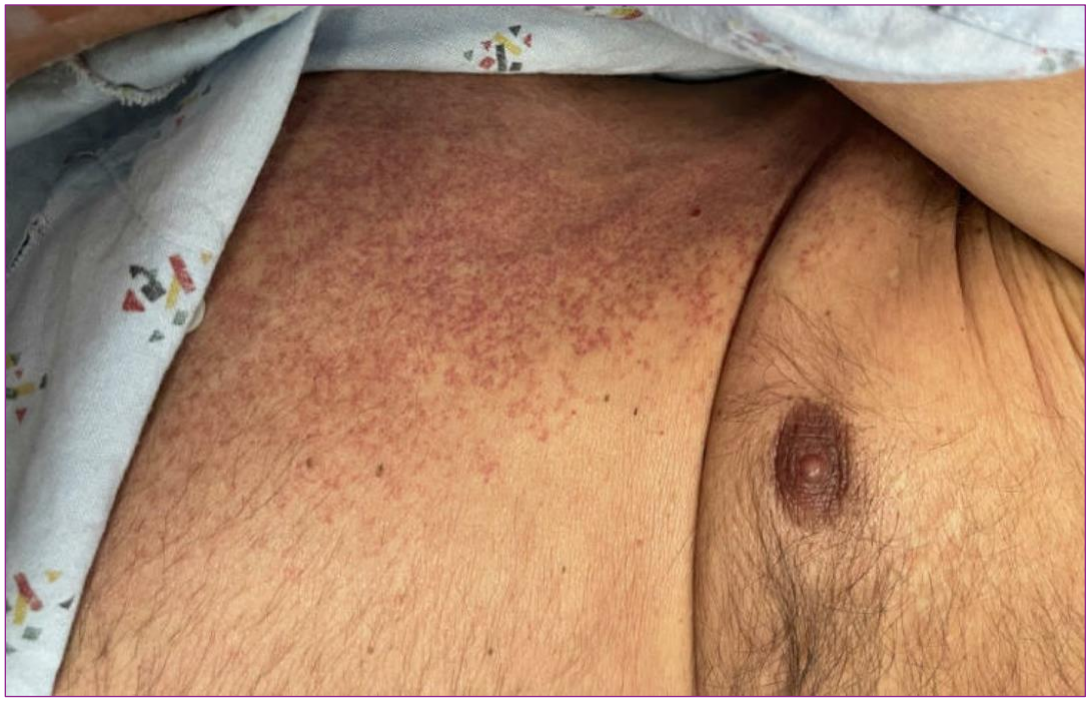

Figure 1. Clinical presentation of leukocytoclastic vasculitis (LCV), characterized by palpable purpura and petechia on the lateral chest wall.

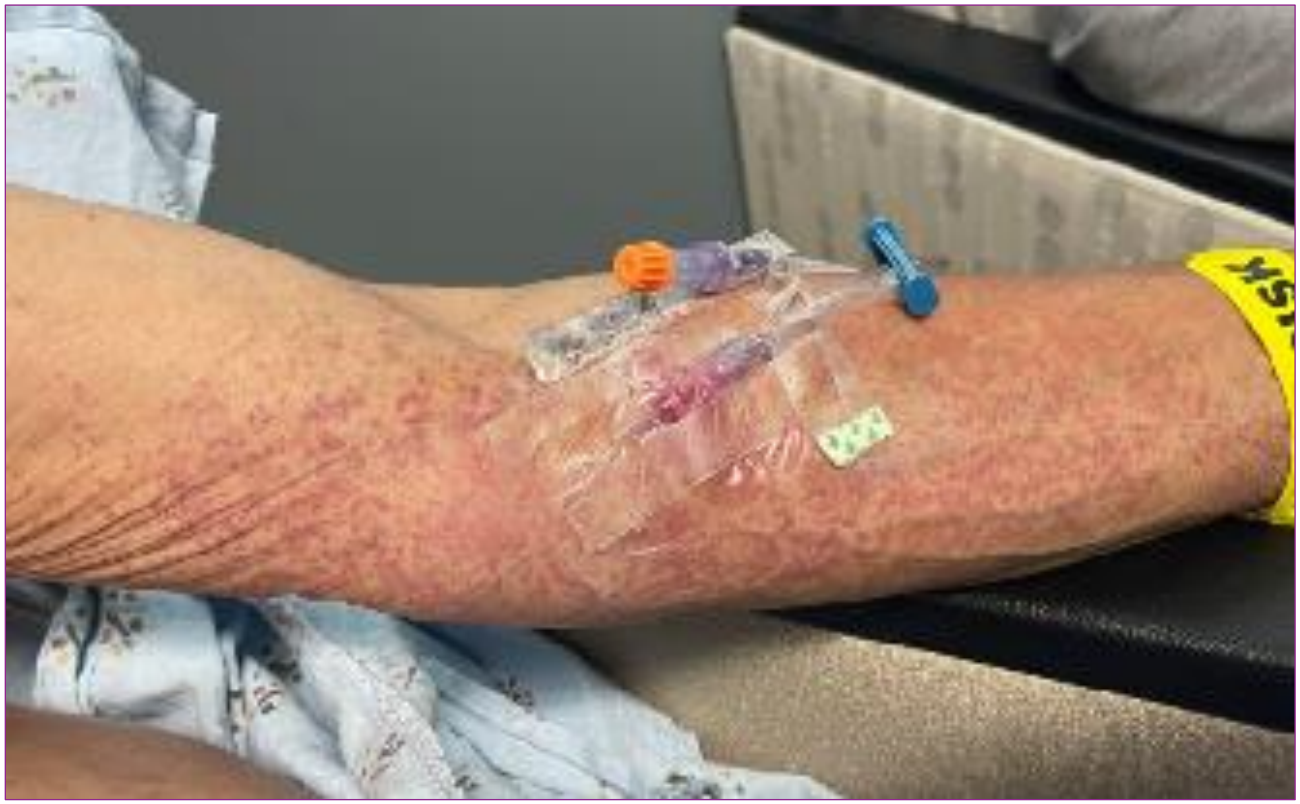

Figure 2. A punch biopsy was taken from the left upper extremity.

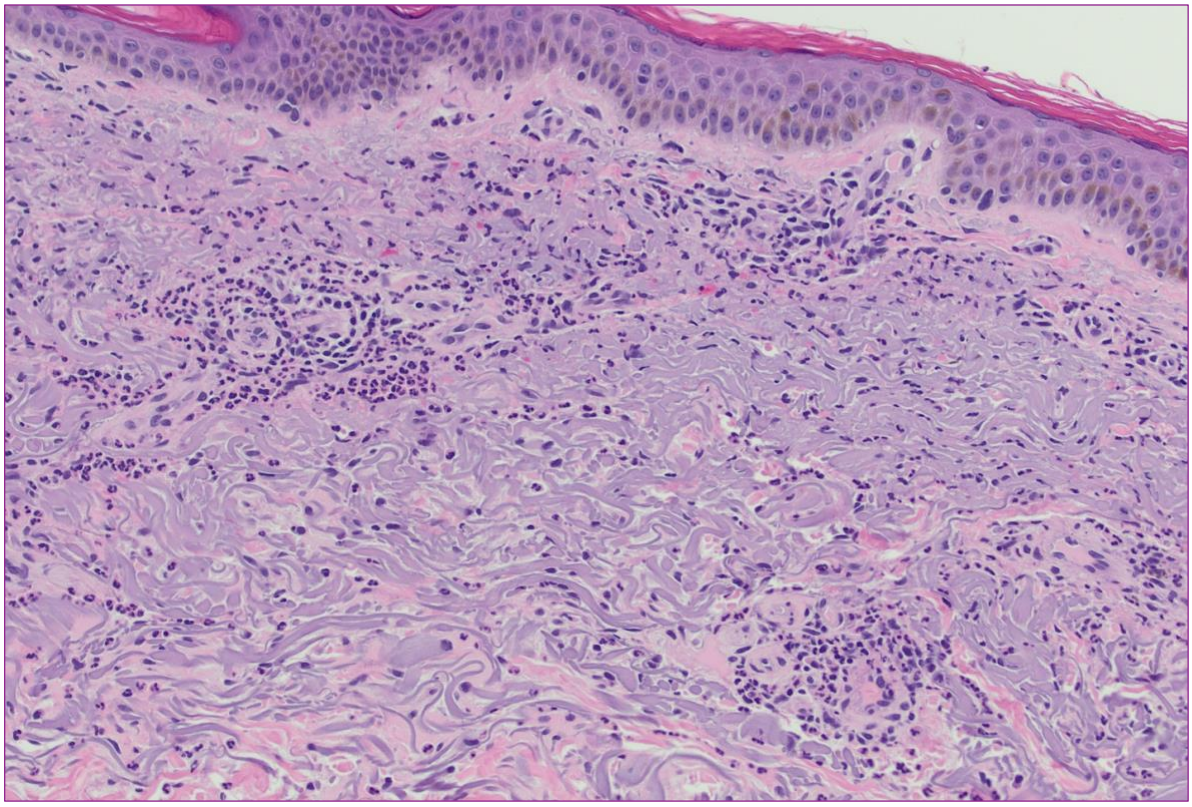

Figure 3. Histologic sections at x200 magnification demonstrate a perivascular mostly neutrophilic infiltrate with karyorrhectic debris and fibrinoid necrosis of the affected small vessels. These histologic findings are consistent with the diagnosis of leukocytoclastic vasculitis.

Follow-up and Outcomes

At a dermatology follow-up in the clinic two weeks later, examination revealed the petechiae had coalesced into larger violaceous patches on the bilateral lower extremities. The patient reported improved skin findings with no new lesions or blisters, and management with triamcinolone acetonide ointment was initiated as needed for pruritus. He underwent autologous hematopoietic stem cell transplantation and chemotherapy, which led to eventual improvement in both his cutaneous manifestations and malignancy.

DISCUSSION

While some paraneoplastic cutaneous manifestations are commonly associated with hematologic malignancies, leukocytoclastic vasculitis as a cutaneous paraneoplastic manifestation of plasmacytoma arising in the setting of pre-existing MGUS is far less documented.[7] In fact, only six cases to date have reported LCV in the setting of MGUS, and none have documented the progression to plasmacytoma. [2,3,4] In our case, the development of LCV served as a clinical indicator, prompting further investigation that revealed progression from MGUS to plasmacytoma.

Plasmacytomas, localized tumors of monoclonal plasma cells, can lead to alterations in immunoglobulin production and immune system function.[5] The relationship between plasmacytoma and LCV involves mechanisms where abnormal plasma cell proliferation and subsequent monoclonal

protein production contribute to endothelial injury and vascular inflammation.[1] In our patient's case, the concurrent presence of plasma cell dyscrasia, immune dysregulation, and septic shock created a domino effect contributing to a complex inflammatory environment. The biomarker profile in our patient's case provides specific insights into the underlying disease processes. The elevated neutrophil count with increased activation markers and alterations in T and B cell populations signal systemic immune system disruption. Hemolysis markers, including elevated haptoglobin and altered hemopexin, suggest ongoing tissue damage and inflammation.[6] This combination of findings indicates multiple pathways of endothelial injury that likely contributed to the development of LCV in the setting of plasmacytoma.

Umemura et al. describe 14 cases of LCV associated with multiple myeloma and MGUS, all treated with a range of therapies, including systemic steroids, immunosuppressant agents, intravenous immunoglobulin, plasma exchange, and colchicine.[4] However, no cases reported resolution of LCV with autologous hematopoietic stem cell transplantation in combination with chemotherapy.[2,3,4] The patient's eventual improvement following autologous stem cell transplantation and chemotherapy demonstrates that treating the underlying plasma cell disorder can resolve the associated cutaneous paraneoplastic manifestations.

This case showcases several important aspects regarding the relationship between plasma cell disorders and vasculitis. First, LCV may serve as an initial presenting sign of underlying hematologic malignancy. Second, concurrent systemic conditions can influence the disease trajectory, complicate diagnosis and potentially affect treatment outcomes. Third, definitive treatment of the underlying malignancy may be necessary for the resolution of cutaneous manifestations.

CONCLUSION

This case demonstrates LCV as a presenting manifestation of lambda light chain plasmacytoma in a patient with underlying MGUS and SLE. The concurrent development of septic shock with significant immune dysregulation adds complexity to our understanding of the pathophysiologic relationship between our patient's plasma cell disorder and vasculitis. This case provides evidence that definitive treatment of the underlying plasma cell disorder may lead to amelioration of cutaneous manifestations. Recognition of LCV as a potential harbinger of plasma cell malignancy requires thorough evaluation in patients presenting with vasculitis, especially those with pre-existing plasma cell disorders.

Conflict of Interest Disclosures: None

Funding: None

Corresponding Author:
Alexandra Savage, MS
Volker Hall
2000 6th Ave S.
Birmingham, AL 35205
Email: alsavage@uab.edu

References:

1. Bayer-Garner IB, Smoller BR. Leukocytoclastic (small vessel) vasculitis in multiple myeloma. Clin Exp Dermatol. 2003 Sep;28(5):521-4. doi: 10.1046/j.1365-2230.2003.01324.x. PMID: 12950344.
2. Rousset L, Cordoliani F, Battistella M et al. Vasculitis and IgA monoclonal gammopathy of cutaneous

significance. J Eur Acad Dermatol Venereol 2018; 32: e175–e176.
3. Umemura, H., Yamasaki, O., & Iwatsuki, K. (2018). Leukocytoclastic vasculitis associated with immunoglobulin A lambda monoclonal gammopathy of undetermined significance: A case report and review of previously reported cases. The Journal of dermatology, 45(8), 1009–1012. https://doi-org.uab.idm.oclc.org/10.1111/1346-8138.14466
4. Zhao, H., Huang, W. H., Huang, J. Y., Lu, S. Y., Yang, Y. H., & Ma, Z. G. (2019). Henoch-Schönlein purpura nephritis associated with monoclonal gammopathy of renal significance: a case report. Brazilian journal of medical and biological research = Revista brasileira de pesquisas medicas e biologicas, 52(7), e8222. https://doi-org.uab.idm.oclc.org/10.1590/1414-431X20198222
5. Caers, J., Paiva, B., Zamagni, E. et al. Diagnosis, treatment, and response assessment in solitary plasmacytoma: updated recommendations from a European Expert Panel. J Hematol Oncol 11, 10 (2018). https://doi.org/10.1186/s13045-017-0549
6. Janz, D. R., Bastarache, J. A., Sills, G., Wickersham, N., May, A. K., Bernard, G. R., et al. (2013). Association between haptoglobin, hemopexin and mortality in adults with sepsis. *Crit. Care* 17, R272. doi: 10.1186/cc13108
7. Bouiller K, Audia S, Devilliers H, et al. Etiologies and prognostic factors of leukocytoclastic vasculitis with skin involvement: A retrospective study in 112 patients. *Medicine (Baltimore).* 2016;95(28):e4238. doi:10.1097/MD.0000000000004238