

UC Davis

Dermatology Online Journal

Title

Atypical vascular lesions extending outside the radiation field: a diagnostic challenge

Permalink

<https://escholarship.org/uc/item/2rt5p3jj>

Journal

Dermatology Online Journal, 27(12)

Authors

Breneman, Alyssa
Hooey, Leah
Spicknall, Kerith E
et al.

Publication Date

2021

DOI

10.5070/D3271256711

Copyright Information

Copyright 2021 by the author(s). This work is made available under the terms of a Creative Commons Attribution-NonCommercial-NoDerivatives License, available at <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Peer reviewed

Atypical vascular lesions extending outside the radiation field: a diagnostic challenge

Alyssa Breneman¹ BA, Leah Hooey² MD, Kerith E Spicknall³ MD, Debra L Breneman³ MD

Affiliations: ¹Vagelos College of Physicians and Surgeons, Columbia University, New York, New York, USA, ²Department of Dermatology, University of Florida, Gainesville, Florida, USA, ³Department of Dermatology, University of Cincinnati, Cincinnati, Ohio, USA

Corresponding Author: Debra L Breneman MD, Department of Dermatology, University of Cincinnati, 231 Albert Sabin Way, Cincinnati, OH 45229, Tel: 513-319-1737, Email: brenemdl@ucmail.uc.edu

Abstract

Atypical vascular lesion (AVL) is an uncommon, benign vascular proliferation seen in previously irradiated skin, most commonly after radiotherapy for breast cancer. Atypical vascular lesion and angiosarcoma may share overlapping clinical and histopathologic features. We report the first case of AVL occurring outside the field of radiation. This patient's clinical course and histopathology was overall consistent with AVL, including two biopsies with focal MYC positivity. However, due to variations in the interpretation of her histopathology, the management plans devised by two centers involved in her care were widely discordant and she was treated with chemotherapy and extensive surgery for angiosarcoma. Great care must be taken to distinguish between these entities, as treatment for angiosarcoma may be associated with significant morbidity.

Keywords: angiosarcoma, atypical, diagnosis, histopathology, radiation-induced, management, vascular

Case Synopsis

In 2006, a 57-year-old woman was treated for invasive ductal carcinoma of the right breast with mastectomy, chemotherapy, and 50Gy to the right chest wall and supraclavicular nodes. In 2011, she presented to the dermatology clinic with a progressive papular eruption involving most of the right chest wall. Examination showed numerous flesh-colored to slightly bluish variably translucent-

appearing 3-5mm papules involving the right anterior chest within the radiation field (**Figure 1A**). Two punch biopsies revealed dilated and anastomosing lymphatic-type vascular channels

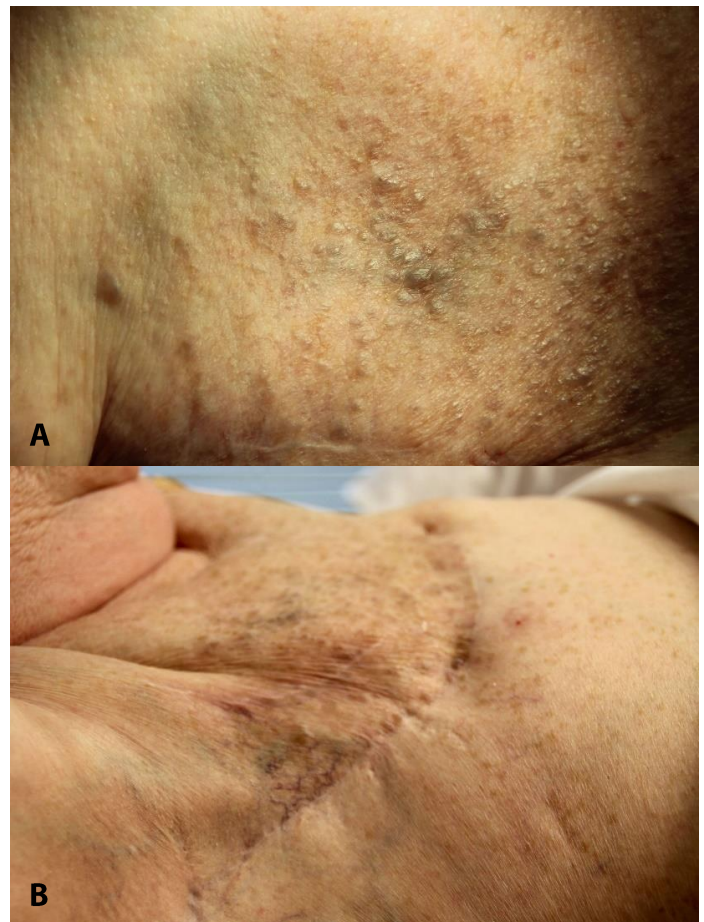


Figure 1. A) Skin-colored to slightly bluish, variably translucent-appearing papules on the right anterior chest within the radiation field. **B)** Numerous skin-colored to bluish translucent-appearing papules within the field of radiation on the right chest, with few lesions extending inferior to the field of radiation.

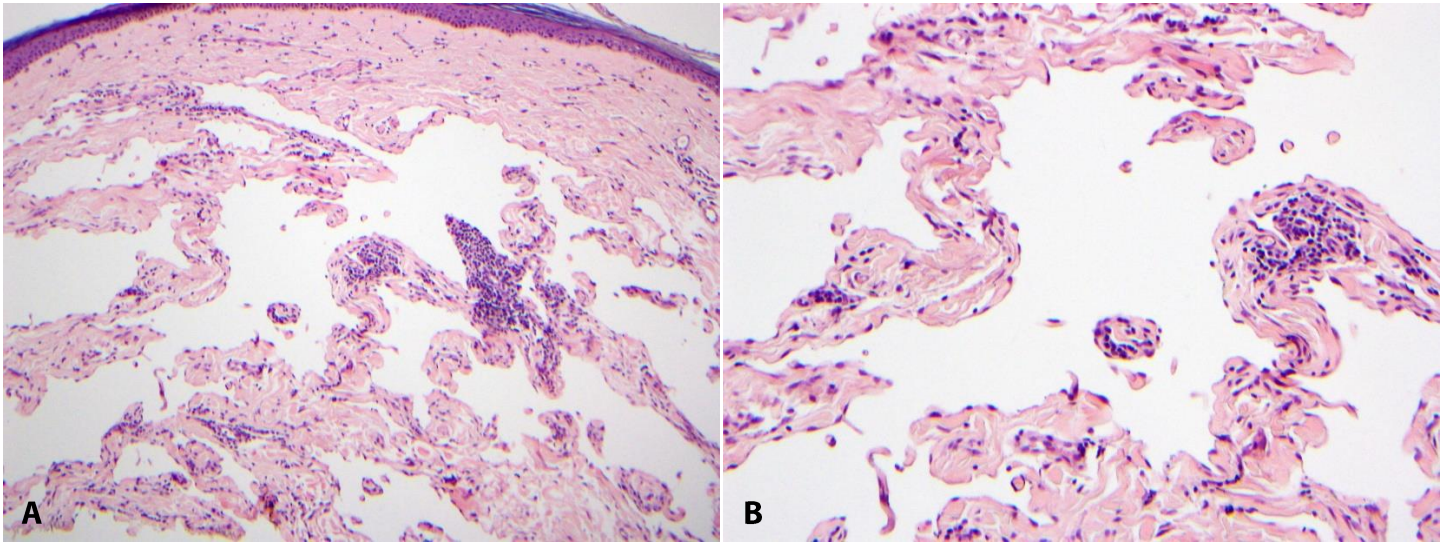


Figure 2. A) Proliferation of dilated lymphatic-type vascular spaces in the superficial dermis. H&E, 20 \times . **B)** Vessels are lined by small, discontinuous endothelial cells without atypia. H&E, 40 \times .

within the mid and deep reticular dermis lined by monomorphic, discontinuous, flattened endothelial cells, diagnostic of atypical vascular lesions (AVL). Because of the extensive area of involvement and generally benign nature of AVL, the patient was observed.

In 2013, examination revealed new, similar-appearing papules on the right chest, some of which extended outside the radiation field to the right upper abdomen and right lateral thorax (**Figure 1B**). Her case was reviewed by a radiation oncologist familiar with her treatment who confirmed that these lesions lay beyond the borders of her previous radiotherapy. Punch biopsies from within and outside the radiation field showed architectural features similar to prior specimens with the exception of the presence of occasional focal enlargement and cytologic atypia of endothelial cells (without mitoses) lining some channels and focal MYC positivity by immunohistochemistry. This prompted submission of additional larger biopsies which, similar to the initial biopsies, revealed well-circumscribed wedge-shaped proliferations of dilated lymphatic-type vessels without cytologic atypia of endothelial cells, mitotic figures, proliferation of Ki-67, or MYC positivity (**Figure 2**). The histopathology was again interpreted as AVL.

The patient was subsequently seen at another institution where a skin biopsy from the right chest

revealed findings similar to previous specimens (**Figure 3**). However, this pathology was initially interpreted as compatible with angiosarcoma (AS), though upon later review the report was revised to indicate that findings were more consistent with AVL. Due to diagnostic uncertainty, an aggressive course of treatment was adopted. The patient received neoadjuvant gemcitabine/docetaxel followed by radical resection of the right chest wall including partial resection of three ribs, partial sternectomy, and resection of the proximal humerus. Pathology from the resection specimen revealed multifocal AVLs in the dermis and no evidence of AS. Her recovery from this extensive surgery was complicated by a chronic, poorly-healing abdominal wall donor site wound, periprosthetic fracture of the right humerus with subsequent infection of the joint, and chronic lymphedema and range of motion restrictions of the right arm.

Following her chemotherapy and surgery, she continued to develop scattered and grouped skin-colored and bluish papules within the original field of radiation. In 2017, she was again seen at the outside institution where biopsy of these recurrent papules was consistent with AVL. However, due to previous suspicion for AS, the patient was treated with three cycles of paclitaxel from which the patient developed peripheral neuropathy. At this point, the patient was lost to follow up at our institution.

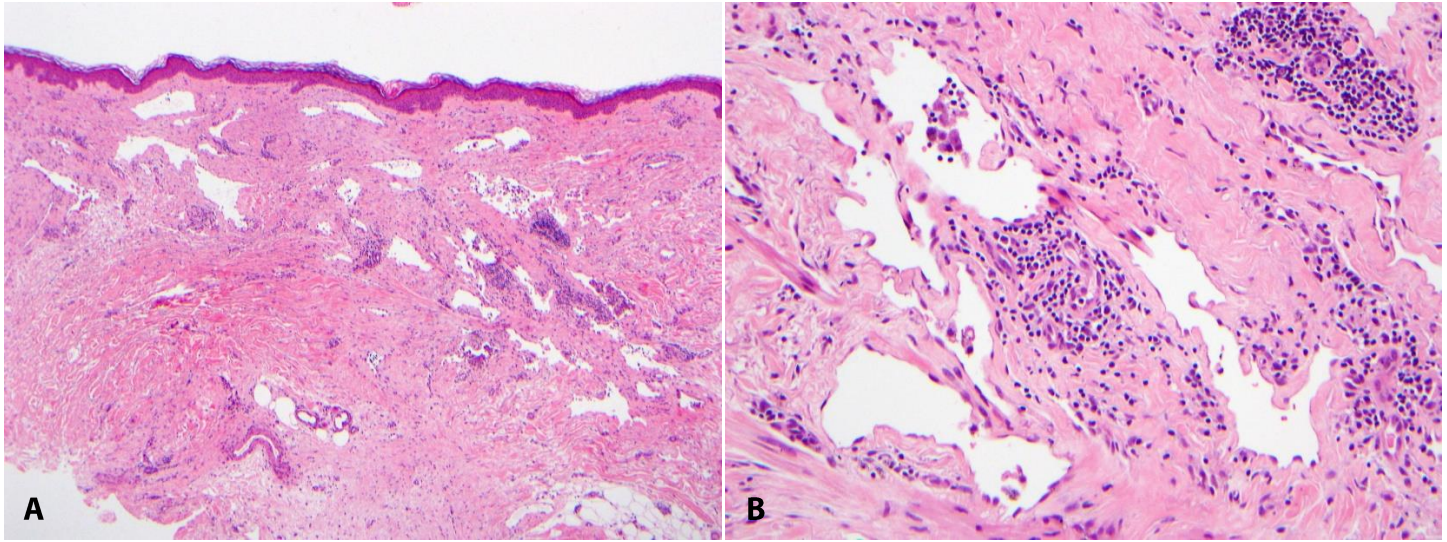


Figure 3. **A)** Wedge-shaped proliferation of lymphatic-type vascular spaces in the reticular dermis. H&E, 4x. **B)** Vessels are lined by discontinuous, sometimes hobnailed endothelial cells. H&E, 40x.

Case Discussion

Atypical vascular lesion is an uncommon complication following radiation, most commonly seen after radiotherapy for breast cancer [1]. The pathogenesis of these lesions is thought to be related to radiation-induced lymphatic obstruction causing dilation of superficial vascular channels [2]. Clinically, AVL typically presents as solitary or multiple, well-defined, flesh-colored, erythematous, or pale blue papules within the field of radiation [3]. Histologically, AVL is generally characterized by a well-circumscribed, wedge-shaped, anastomosing growth pattern of vascular channels in the dermis [3]. Atypical vascular lesion may be divided into two histologic types: a more common lymphatic type (LT) and a less common vascular type (VT), in which histology and immunohistochemistry mimic lymphatic vessels and blood vessels, respectively [4].

Atypical vascular lesion most often occurs 3-6 years following radiotherapy, but it may occur up to 20 years after treatment [5]. The course of AVL is generally thought to be benign, though rare progression to AS has been reported [4,6]. In these cases, the original AVL pathology most commonly revealed at least one overlapping histologic feature of AS [6]. Progression to AS has also been reported rarely in patients whose biopsies initially revealed diagnostic findings of AVL, but over years showed progressive histopathologic changes that were

ultimately interpreted as AS [4]. This progressive course has been reported to be more associated with AVL-VT than AVL-LT [4].

Atypical vascular lesion is adequately treated with local excision if involvement is localized and the lesions are amenable. Approximately 10-20% of patients develop recurrent or additional AVLs following resection [4]. If there is widespread involvement, close surveillance alone may also be acceptable management given the generally benign course of AVL and the morbidity associated with extensive resection.

Radiation-induced AS (RIAS) is another rare, late complication of radiotherapy [3]. Radiation-induced AS may appear as blue or purple skin discoloration, ulcerating tumors, violaceous plaques, or erythematous nodules. Histopathologically, RIAS appears as a poorly-circumscribed proliferation of anastomosing vessels in the dermis and subcutaneous fat with atypical, hyperchromatic endothelial cells and frequent mitotic figures [6].

Radiation-induced AS manifests a median of 6 years after radiotherapy and typically follows a rapidly progressive course, with frequent metastases and a 5-year survival rate of approximately 30% [7,8]. As such, an aggressive treatment course is often adopted involving chemotherapy and/or surgery with wide margins.

Table 1. Clinical and histopathologic features in our patient, commonly seen in atypical vascular lesion, and commonly seen in angiosarcoma.

	Our patient	Typical AVL	Typical AS
Clinical feature			
Morphology	Papules	Papules	Tumors, plaques, nodules
Progression	Indolent, recurrent	Indolent, may recur	Rapid growth, metastases common
Histopathology feature			
Location	Dermis	Dermis	Dermis, may extend to the subcutaneous fat
Well-circumscribed	Yes	Yes	No
Mitosis	Absent	Absent	Frequent
Cytologic atypia	Focal	Not significant	Marked
MYC staining	Focal	Absent	Strong, diffuse

AS, angiosarcoma; AVL, atypical vascular lesions.

Although the clinical course and prognosis of AVL and RIAS are dramatically different, there may be significant histologic overlap, leading to diagnostic uncertainty. Specifically, both entities may appear similarly as a proliferation of anastomosing vascular channels in the dermis with focal dissection of collagen and varying degrees of prominent and hyperchromatic nuclei within endothelial cells [3,7]. In our patient's case, this overlap generated concern from one institution that her AVL had progressed to AS. However, based on her lesional morphology, histopathology and immunohistochemistry, and clinical course we believe her disease is best categorized as AVL (**Table 1**).

Morphologically, our patient's papular eruption was much more consistent with AVL than the typical plaques, nodules, and tumors of AS. Histologically, her biopsy specimens consistently demonstrated well-circumscribed lymphatic-type vascular proliferations without mitotic figures or significant cytologic atypia that were limited to the dermis, as opposed to the poorly-circumscribed vascular proliferations with mitotic figures, marked cytologic atypia, and extension into the subcutaneous fat that typically characterize AS [7]. The MYC staining seen on two (of many) biopsy specimens from our patient was initially concerning for AS. However, focal MYC staining, such as that seen in our patient, has been reported in cases with histology and disease courses otherwise consistent with AVL and is therefore not

diagnostic of RIAS [9,10]. Furthermore, RIAS most often exhibits strong, diffuse MYC staining as opposed to focal staining [9]. Additionally, we felt progression to AS was less likely in our patient's case as her histology appeared as AVL-LT as opposed to AVL-VT.

Perhaps most importantly, our patient's clinical course did not reflect that of AS. Over four years of follow up after her AS diagnosis, she progressively developed numerous papules. However, no single lesion displayed growth or evolution beyond this papular morphology, which reflected an indolent process as opposed to the rapid growth and frequent metastases generally exhibited by AS [8].

Conclusion

This case exemplifies the difficulties in distinguishing AVL and RIAS which demand very different management strategies. This is, to our knowledge, the first report of AVL extending outside the field of radiation and demonstrates that this distribution does not necessarily indicate a malignant process. Care must be taken to differentiate AVL and RIAS, as RIAS treatment may have high morbidity.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Fineberg S, Rosen PP. Cutaneous angiosarcoma and atypical vascular lesions of the skin and breast after radiation therapy for breast carcinoma. *Am J Clin Pathol*. 1994;102:757-63. [PMID: 7801888].
2. Ronen S, Ivan D, Torres-Cabala CA, et al. Post-radiation vascular lesions of the breast. *J Cutan Pathol*. 2019;46:52-58. [PMID: 30251277].
3. Brenn T, Fletcher CD. Radiation-associated cutaneous atypical vascular lesions and angiosarcoma: clinicopathologic analysis of 42 cases. *Am J Surg Pathol*. 2005;29:983-96. [PMID: 16006792].
4. Mandrell J, Minitier U, Vaitla R. Multiple primary atypical vascular lesions occurring in the same breast. *Cutis*. 2017;100:E13-E16. [PMID: 28961301].
5. Patton KT, Deyrup AT, Weiss SW. Atypical vascular lesions after surgery and radiation of the breast: a clinicopathologic study of 32 cases analyzing histologic heterogeneity and association with angiosarcoma. *Am J Surg Pathol*. 2008;32:943-50. [PMID: 18551753].
6. Fraga-Guedes C, Gobbi H, Mastropasqua MG, et al. Clinicopathological and immunohistochemical study of 30 cases of post-radiation atypical vascular lesion of the breast. *Breast Cancer Res Treat*. 2014;146:347-54. [PMID: 24943869].
7. Mattoch IW, Robbins JB, Kempson RL, Kohler S. Post-radiotherapy vascular proliferations in mammary skin: a clinicopathologic study of 11 cases. *J Am Acad Dermatol* 2007;57:126-33. [PMID: 17572278].
8. Alves I, Marques JC. Radiation-induced angiosarcoma of the breast: a retrospective analysis of 15 years' experience at an oncology center. *Radiol Bras*. 2018;51:281-286. [PMID: 30369653].
9. Udager AM, Ishikawa MK, Lucas DR, McHugh JB, Patel RM. MYC immunohistochemistry in angiosarcoma and atypical vascular lesions: practical considerations based on a single institutional experience. *Pathology*. 2016;48:697-704. [PMID: 27780597].
10. Corradini AG, Asioli S, Morandi L, et al. Post-radiotherapy vascular lesions of the breast: immunohistochemical and molecular features of 74 cases with long-term follow-up and literature review. *Histopathology*. 2020;77:293-302. [PMID: 32043616].