Low utility of radiologic imaging in evaluating cutaneous small-vessel vasculitis: A multi-institutional retrospective study

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Small-vessel vasculitis (SVV) frequently presents in the skin. Although many cases are idiopathic and limited to the skin, cutaneous findings may be a manifestation of systemic disease or signal vasculitis involving internal organs.[1] Identifying complications is essential; yet, no evidence-based evaluation protocol exists. A range of imaging methods are used to investigate the presence of systemic vasculitis,[2] but utility has not been established. This study investigates the utility of imaging in the initial evaluation of patients presenting with SVV of the skin.

Patients with skin biopsy specimens demonstrating SVV between 2000 and 2014 at Massachusetts General Hospital, Brigham and Women's Hospital, and the Hospital of the University of Pennsylvania were identified. Radiology studies ordered within 1 week of the initial vasculitis diagnosis were recorded, along with the ultimate diagnoses rendered. Of 449 patients meeting inclusion criteria, 258 (57.4%) underwent 379 imaging studies, including chest x-ray, computed tomography (CT), magnetic resonance imaging (MRI), and angiography (Fig 1).

Of these 379 imaging studies, only 13 (3.4%) identified findings concerning for systemic vasculitis (Table I). Chest x-ray (1 of 223 [0.4%]) and MRI (1 of 27 [3.7%]) had the lowest yield, followed by angiography (1 of 13 [7.7%]) and CT (10 of 116 [8.6%]). Of the 13 patients with radiographic findings suggestive of vasculitis, 12 (92.3%) were ultimately diagnosed with systemic vasculitis. However, 21.7% (53 of 245) of patients with "no evidence of systemic vasculitis" identified on imaging were ultimately diagnosed with systemic vasculitis. The sensitivity and specificity of imaging for identifying systemic vasculitis were therefore 18.5% and 99.0%, respectively, with a positive predictive value of 92.3% and a negative predictive value of 78.4%.

These findings suggest routine radiographic studies for identification of systemic vasculitis in the initial evaluation of small vessel vasculitis of the skin are of limited utility. Although 57.4% of patients underwent imaging, the sensitivity for detecting systemic vasculitis was low (18.5%). Most patients determined to have systemic disease were identified through laboratory testing and physical findings rather than through imaging.

Radiologic studies are costly and expose patients to radiation.[3] Given the low diagnostic yield (3.4%) and potential for incidental findings in one-third of patients, downstream costs may be tremendous.[4] Moreover, those undergoing imaging may have been judged more likely to have systemic vasculitis than

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those who did not, and the diagnostic yield of radiography in the entire population, including those not imaged, might be lower still. Of the studies with positive results, the most common systemic finding was gastrointestinal involvement in cases of IgA vasculitis, identified by CT, and all of these patients had symptoms of abdominal pain.

These results must be considered in the context of the retrospective study design, which cannot fully account for clinical judgment and patient factors at the time of testing. However, the utility of routine radiography for identifying systemic manifestations of vasculitis in those presenting with an initial episode of SVV in the skin is low. Imaging should be reserved for patients with evidence of systemic involvement based on clinical presentation and laboratory investigations. Evidence to support routine imaging for evaluation of small vessel vasculitis of the skin is insufficient.

CAPSULE SUMMARY

- Small-vessel vasculitis is a heterogenous disease that may be limited to the skin or a manifestation of systemic disease. Radiologic studies are often recommended in textbooks, although no data exist to define their utility.
- This article demonstrates low utility of radiology for identifying systemic manifestation of vasculitis with potentials for false positives and negatives. Evidence to support routine imaging for evaluation of small vessel vasculitis is insufficient and should be considered for each patient individually.

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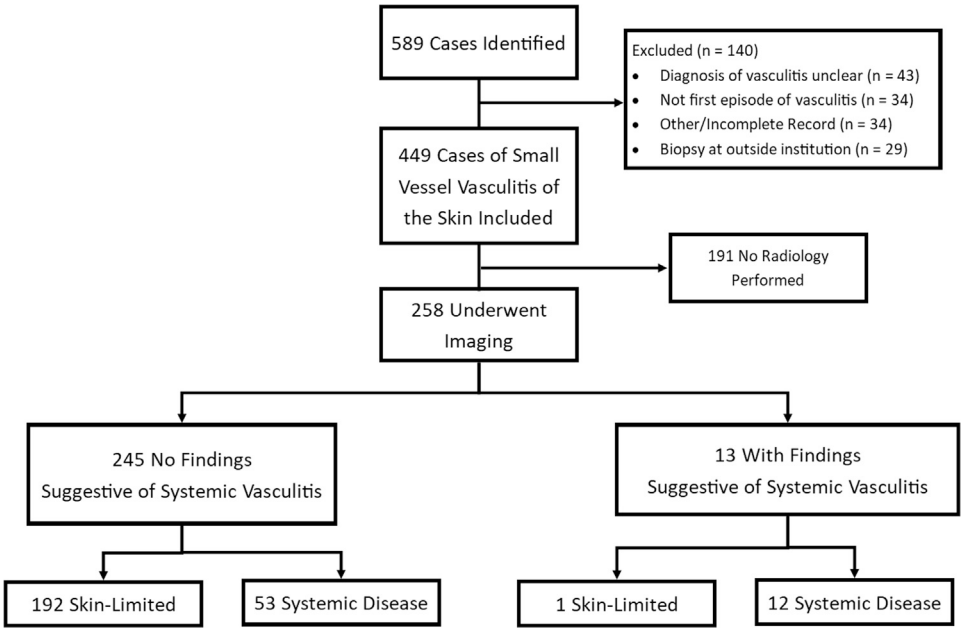

Fig 1. Cases identified of small-vessel vasculitis with imaging performed

Table I. Imaging studies performed in patients presenting with small-vessel vasculitis of the skin

Variable	Imaging consistent with systemic vasculitis (n = 13)	Imaging with no findings of systemic vasculitis (n = 245)	Total (N = 258)
Age, mean ± SD, y	48.7 ± 15.9	50.4 ± 17.0	50.3 ± 17.2
Sex			
Male, No. (%)	6 (46.0)	161 (65.6)	166 (64.6)
Female, No. (%)	7 (54.0)	84 (34.4)	91 (35.3)
Imaging studies performed, No. (%)			
Chest x-ray	1 (7.7)	222 (60.6)	223
Computed tomography	10 (76.9)	106 (28.9)	116
Magnetic resonance imaging	1 (7.7)	26 (10.6)	27
Angiography	1 (7.7)	12 (4.9)	13
Total	13 (100)	366 (100)	379 (100)
Final diagnosis, No. (%)			
Skin-limited disease	1 (7.7)	192 (78.3)	193 (74.8)
Systemic disease	12 (92.3)	53 (21.7)	65 (25.2)
IgA vasculitis	7 (53.4)	24 (9.8)	31 (12.0)
Connective tissue disease	0 (0)	10 (4.1)	10 (3.9)
Medium vessel, No. (%)			
Vasculitis (EGP, PAN, GPA)	3 (23.1)	4 (1.7)	7 (2.7)
Other	2 (15.4)	15 (6.1)	17 (6.6)
Testing performance, % (95% CI)			
Sensitivity	18.5 (10.9-29.6)		
Specificity	99.0 (97.1-99.9)		
Positive-predictive value	92.3 (66.7-98.6)		
Negative-predictive value	78.4 (72.8-83.1)		

CI, Confidence interval; *EGP*, eosinophilic granulomatosis with polyangiitis; *GPA*, granulomatosis with polyangiitis; *No.*, number; *PAN*, polyarteritis nodosa.