Diffuse Dermal Angiomatosis: A Clue to the Diagnosis of Atherosclerotic Vascular Disease

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Key Words
Atherosclerosis · Diffuse dermal angiomatosis · Reactive angiomatosis

Abstract
Diffuse dermal angiomatosis (DDA) is a benign, acquired, reactive vascular proliferation. DDA is clinically characterized by painful purpuric plaque with central ulceration. The histopathologic hallmark is diffuse proliferation of endothelial cells that are arranged interstitially between collagen bundles of the reticular dermis. DDA has been reported in association with peripheral atherosclerotic disease, arteriovenous fistula and heavy smoking. We report the case of a 49-year-old Asian male with DDA who presented with a painful stellate-shaped purpuric patch on the right thigh. Histopathologic examination showed proliferation of CD34-positive spindle cells in the dermis. Our patient underwent vascular bypass surgery along with tight control of cardiovascular risk factors, which yielded successful results.

Introduction
Diffuse dermal angiomatosis (DDA) is a benign, acquired, reactive vascular proliferation; it is a variant of reactive angioendotheliomatosis. DDA is characterized by painful, violaceous, purpuric and occasionally ulcerated plaques mainly on the lower extremities of patients with peripheral vascular atherosclerotic disease.
Case Report

A 49-year-old Asian male presented with a painful lesion on the right thigh. It had gradually become larger and markedly painful. During the previous 6 months, he had also had intermittent claudication of both legs, the right being worse. His medical history was significant for coronary artery disease, diabetes mellitus, dyslipidemia, hypertension and heavy smoking. Medications included aspirin (325 mg/day), isosorbide dinitrate, glipizide, simvastatin, carvedilol and hydralazine. No other pertinent symptoms were found in systems review. He had no history of previous surgery or trauma on either leg.

Physical examination revealed a solitary, well-defined, stellate-shaped purpuric patch, 10 × 12 cm, on the right thigh, with a superficial central ulceration covered by a hemorrhagic crust (fig. 1). Femoral, popliteal, posterior tibial and dorsalis pedis pulses were absent on both sides. No gangrene or clinical signs of chronic venous insufficiency were observed. There was no lymphadenopathy. A biopsy specimen was obtained from the edge of the lesion. Histopathology showed interstitial proliferation of spindle cells in association with extravasated red blood cells and sparse perivascular inflammatory cell infiltration in the dermis without intravascular proliferation (fig. 2). These spindle cells were positive for CD31 and CD34 (fig. 3) and negative for HHV-8. Computed tomography angiography showed total occlusion of the right infrarenal aorta extending to the aortic bifurcation, both common iliac arteries and the internal and external iliac arteries (fig. 4). Coagulogram was within normal limits.

The diagnosis was DDA. Our patient underwent right axillo-femoral and left femoro-femoral bypass surgery, along with tight control of cardiovascular risk factors, which yielded successful results. The painful lesion rapidly disappeared within 1 week after the operation, leaving postinflammatory hyperpigmentation and a central reticulate scar.

Discussion

DDA is a benign vascular disorder of the skin, classified in the group of cutaneous reactive angiomatosis [1]. It has been described in association with atherosclerotic peripheral vascular disease [2]. It is hypothesized that ischemia or inflammation generates a local hypoxic stimulus, which results in increased vascular endothelial growth factor, endothelial proliferation and neovascularization. In addition, vascular occlusion caused by atherosclerotic plaques may be a source of emboli to distal cutaneous vessels, where they could induce neoangiogenesis [3].

The clinical presentations of DDA consist of erythematous to violaceous, livedoid patches, often with central ulceration [1]. The lesions may be solitary or multiple and are typically found on the lower extremities in patients with severe atherosclerotic disease. DDA has been reported on the forearm secondary to iatrogenic arteriovenous fistulas in chronic hemodialysis patients and in women with nonhealing, ulcerating lesions on the breast [3, 4]. In addition, this cutaneous reactive pattern has also been reported in association with a variety of diseases that cause vasculopathy, including calciphylaxis [5, 6], monoclonal gammopathy [7, 8] and cutis marmorata telangiectatica congenita [9]. The differential diagnosis of DDA includes vasculopathy, medium to large vessel vasculitis, acroangiodermatitis and benign or malignant vascular tumor.

Histologically, DDA is characterized by diffuse proliferation of endothelial cells interstitially arranged between collagen bundles within the dermis [1]. Frequently, the proliferating cells may show a spindled morphology, vacuolated cytoplasm and formation of small vascu-
lar channels, suggesting neoangiogenesis. Scattered extravasated red blood cells and hemosiderin deposition may be apparent. Atypical mitotic figures are always absent.

Immunohistochemistry shows positivity of endothelial cells for *Ulex europaeus* agglutinin-1, factor VIII-associated antigen, CD31 and CD34 [3, 5]. The histologic differential diagnosis includes Kaposi sarcoma, well-differentiated angiosarcoma and acroangiodermatitis. However, cytologic atypia, diffuse slit-like lumen formation and the promontory sign along with the inflammatory component are lacking. Acroangiodermatitis, by contrast, exhibits slight endothelial proliferation and formation of new thick-walled vessels in a lobular arrangement in the dermis.

We performed a PubMed search using the term ‘diffuse dermal angiomatosis’ and found 29 cases in the English language literature, of which 11 were associated with peripheral artery disease (table 1). The characteristic clinical features of the reported patients were reticulated, erythematous to purpuric plaque with central necrotic area. The medial thigh was most frequently reported. In addition, all reported patients had multiple atherosclerotic comorbidities such as hypertension, dyslipidemia, diabetes mellitus, chronic kidney disease and heavy smoking. Most of them had undergone revascularization procedures, and all lesions rapidly healed shortly after the procedures [2, 10–17]. However, one reported patient who received conservative medical therapy, which included oral prednisolone and colchicine, died from severe sepsis.

The management of DDA generally requires improving underlying tissue hypoxia and ischemia. Revascularization, such as vascular surgery for correcting and bypassing the vascular occlusion, is the most efficient method, particularly in cases caused by vaso-occlusive disease, and generally results in complete or near-complete lesion resolution [11]. The treatment also includes strict control of cardiovascular risk factors. Systemic steroids and isotretinoin have been successfully used as well, based on their inhibitory effect on neoangiogenesis [4].

**Summary**

DDA is not an uncommon benign vascular condition. It should be considered in a patient who presents with painful, nonhealing purpuric plaque with central ulceration on the upper thigh. Prompt recognition is important as surgical intervention is often curative, thereby limiting the associated morbidity.

**Statement of Ethics**

We state that our patient gave informed consent. The research complies with all ethical guidelines for human studies.

**Disclosure Statement**

The authors declare that they have no conflict of interest and that they received no funding.
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**Table 1.** Reported cases of peripheral artery disease associated with DDA

| Reference (first author), year | Cases, Age, Sex | Clinical presentation | Location | Underlying diseases | Angiogram | Treatment | Outcome |
|------------------------------|-----------------|----------------------|----------|---------------------|-----------|-----------|---------|
| Krell [12], 1994            | 2 47 F          | large ulcer with erythematous border | rt. medial thigh | PAD | NA | rt. axillo-femoral bypass graft | re-epithelialized ulcer |
|                              | 63 F            | large painful EP, central erosions | lt. medial thigh | PAD | NA | revision of occluded graft | completely healed |
| Kinyai-Asadi [2], 1999      | 1 57 F          | blanching, reticulated, EP with 3-cm purpuric and necrotic area | lt. upper medial thigh | HT, smoking, PAD, CKD | complete occlusion of the lt. renal artery and the infrarenal aorta with collateral flow to the lower extremities | aortobifemoral bypass surgery | completely cleared |
| Kim [13], 2002              | 1 58 F          | violaceous plaque | lt. medial thigh | HT, DM, heavy smoking | bilateral ischemic disease (Doppler ultrasound) | NA | NA |
| Draper [10], 2006           | 1 53 M          | violaceous EP with focal ulcerations | lt. lateral leg | PAD, HT, CAD, COPD | 80% stenosis of the lt. external iliac artery | revascularization procedure | complete healing |
| Bauer [16], 2007            | 1 57 F          | adherent 6-mm eschar, surrounding erythema | rt. medial thigh | HT, protein C deficiency, anti-thrombin III deficiency, CKD, AF | NA | NA | NA |
| Kirkland [14], 2010         | 1 58 F          | violaceous, indurated and reticulated patches with central necrosis | lt. inner thigh, lt. buttck and lt. lower quadrant of the abdomen | heavy smoking, HT, PAD treated with bilateral iliac stents | decreased blood flow distal to lt. iliac artery | re-stent the lt. common iliac artery | failed |
| Morimoto [11], 2011         | 1 65 M          | painful, erythematous lesion with central necrosis | rt. lower leg | HT and heavy smoking | occlusion of the rt. superficial femoral artery | oral prednisolone, catheter recanalization, balloon angioplasty | improved |
| Walton [17], 2012           | 1 58 M          | nonhealing, painful, ulcerating plaques | bilateral thighs and buttocks | – | severe arterial disease | stent revascularization | improved |
| Cridx [15], 2015            | 2 71 F          | violaceous, ill-defined, maculonodular eruption with livedoid plaques, painful necrotic ulcerations | trunk and extremities | DM, HT, CKD and AF | atherosclerotic infiltration of the aorta and its branches without occlusion | colchicine, oral prednisolone and oxygen | failed |
|                              | 81 M            | bluish EP with telangiectasia | rt. shoulder | heavy smoking, severe PAD, HT, dyslipidemia | NA | NA | NA |

AF = Atrial fibrillation; CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; DM = diabetes mellitus; EP = erythematous plaque; HT = hypertension; lt. = left; NA = not available; PAD = peripheral artery disease; rt. = right.
Fig. 1. Serrated purpuric patch on the right thigh, with a superficial central ulceration covered by a hemorrhagic crust.

Fig. 2. Interstitial proliferation of spindle cells in association with extravasated red blood cells and sparse perivascular inflammatory cell infiltration in the dermis. Hematoxylin and eosin, original magnification ×100 (a), ×400 (b).
Fig. 3. Spindle cells were positive for CD34, suggesting vascular proliferation. CD34, original magnification ×400.

Fig. 4. Computed tomography angiography showing total occlusion of the right infrarenal aorta extending to the aortic bifurcation (arrow), both common iliac arteries and the internal and external iliac arteries.