Cardiovascular Pathology 25 (2016) 67–71

Contents lists available at ScienceDirect

Cardiovascular Pathology

Clinical Case Report

A case of sudden cardiac death due to eosinophilic coronary periarteritis: possible significance of coexisting atherosclerosis and eosinophilic inflammation of the esophagus

Masahiko Kobayashi [a,b,*], Stephen D. Cohle [c]

[a] Department of the Medical Examiner, City and County of Honolulu, 835 Iwilei Rd, Honolulu, HI 96817, USA
[b] Department of Pathology, John A. Burns School of Medicine, University of Hawaii, 651 Ilalo St, Honolulu, HI 96813, USA
[c] Department of Pathology and Laboratory Medicine, Spectrum Health Blodgett Campus, 1840 Wealthy St SE, Grand Rapids, MI 49506, USA

ARTICLE INFO

Article history:
Received 9 August 2015
Received in revised form 19 August 2015
Accepted 20 August 2015

Keywords:
Eosinophilic coronary periarteritis
Atherosclerosis
Mast cells
Vasa vasorum
Vasospasm
Coronary artery dissection

ABSTRACT

Background: Eosinophilic coronary periarteritis (ECPA) is a rare disease found in cases of sudden cardiac death due to coronary vasospasm or spontaneous coronary artery dissection. Currently, the etiology, pathogenesis, and pathophysiology of ECPA are unknown. Cases of ECPA with a history of allergic disorders are rare. Only one case of ECPA with tissue eosinophilia in another organ has been reported.
Methods: A 50-year-old male suddenly died after complaining of chest pain. An autopsy with histopathologic analysis was performed.
Results: A short segment of the left anterior descending artery had ECPA with dense eosinophilic inflammation of the adventitia and mild atherosclerosis. There were findings atypical of ECPA including mild focal eosinophilic infiltration of the intima and media associated with proliferation of vasa vasorum, fragmented internal and external elastic laminae, and fibrosis of the media. In addition, eosinophilic inflammation of the esophagus without mucosal involvement was present. The eosinophilic inflammation of the coronary artery and esophagus was accompanied by an increased number of mast cells.
Conclusions: This case suggests that ECPA and atherosclerosis may act synergistically by induction of inflammation and vasa vasorum neovascularization. Vasa vasorum and mast cell infiltration may trigger vasospasm and spontaneous coronary artery dissection. Although concurrent tissue eosinophilia elsewhere is rarely observed in cases of ECPA, collective analysis of these cases may elucidate the etiology and pathophysiology of ECPA.

1. Introduction

Although perivascular eosinophilic inflammation of coronary arteries has been known in occasional association with spontaneous coronary artery dissection (SCAD), eosinophilic coronary periarteritis (ECPA) appears to be recently established as a distinct type of coronary arteritis. Kajihara et al. [1] presented seven cases of ECPA and reviewed 15 cases of ECPA with SCAD and 11 cases without. They distinguished ECPA from the two major types of coronary vasculitis, polyarteritis nodosa and Churg–Strauss syndrome. The clinical features of ECPA they identified include (a) Prinzmetal's vasospastic angina; (b) rare history of allergy; and (c) sudden unexpected death. Characteristic pathologic findings are (a) eosinophilic inflammation limited to the adventitia and periadventitial soft tissue in the epicardial coronary arteries; (b) well-preserved medial smooth muscle and external and internal elastic laminae; (c) no fibrinoid necrosis or granulomatous change; (d) no vasculitis in any other tissues or organs; and (e) frequent association with SCAD in females. The etiology and pathogenesis of ECPA as well as pathophysiology of frequently associated conditions, vasospasm and SCAD, are currently unknown.

Only one case of ECPA with concurrent eosinophilic inflammation in other tissue has been reported to date [1]. We report a case of ECPA with eosinophilic inflammation of the distal esophagus. The coronary artery affected by ECPA revealed infiltration by mast cells and several histopathologic features atypical of ECPA that might be associated with coexisting atherosclerosis. The possible significance of these features is discussed.

2. Case report

A 50-year-old male of mixed race (Hawaiian/Caucasian/Asian), a military consultant, had a medical history of hyperlipidemia without pharmacologic therapy. There was no history of allergic disorders, including asthma. He had no symptoms suggestive of cardiac, respiratory, or gastrointestinal disorders. A clinical examination 10 months before his death revealed no leukocytosis or eosinophilia with 2.1% eosinophils among white blood cells. His spirometry test was unremarkable. He had

Funding: The authors have no funding sources to disclose.
* Corresponding author.
E-mail addresses: mkobayashi@honolulu.gov (M. Kobayashi), sdcohle@comcast.net (S.D. Cohle).

http://dx.doi.org/10.1016/j.carpath.2015.08.010
1054-8807/

been deployed to Afghanistan for 6 months and returned to Hawaii, United States, a few weeks before his death without a history of significant health problems. At 7:30 a.m. on the day of his death, he awoke and complained of stomach pain. At 8:00 a.m., he complained of chest pain and was taken to a hospital. He became unresponsive on the way to the hospital. Upon arrival to the emergency room, the electrocardiogram demonstrated asystole, and he was pronounced dead. His troponin I level at the emergency room was 0.07 ng/ml (reference range: <0.10 ng/ml).

An autopsy on the 175-cm, 101-kg, obese male body revealed a 450-g heart. The coronary arteries were right dominant and normally distributed. There was a less than 1-cm segment of mild focal atherosclerotic changes with approximately 25% narrowing in the proximal portion of the left anterior descending (LAD) artery. The segment with atherosclerosis was surrounded by small areas of white discoloration involving the periarterial adipose tissue. No intraluminal thrombus or coronary dissection was identified. The other coronary arteries were unremarkable. There was mild concentric myocardial hypertrophy with 1.6-cm-thick left ventricular free wall and interventricular septum. The valves and endocardium were unremarkable. The right and left lungs weighed 550 and 450 g, respectively, without abnormalities. The spleen weighed 100 g with a 2-cm, well-circumscribed, yellow, firm nodular lesion within the parenchyma. No gross abnormalities were identified in other organs including the esophagus and stomach. Toxicology testing was negative for ethanol or major drugs of abuse in the blood.

Microscopic examination of the LAD segment with gross abnormalities was remarkable for a dense infiltrate by eosinophils and mononuclear cells involving the adventitia circumferentially with a lesser degree of inflammation in the adjacent periadventitial fibroadipose tissue (Fig. 1). Multiple capillaries were present in the adventitia. The intima had atherosclerotic changes with slightly eccentric, fibromuscular thickening and focal extracellular lipid accumulation. Present within the thickest area of intima and underlying media were proliferation of vasa vasorum, mild infiltration by eosinophils and mononuclear cells, fragmentation of internal and external elastic laminae, and small patchy areas of fibrosis disrupting the media (Fig. 2). In the intima, adjacent to the vasa vasorum, were several distinctively dilated capillaries that appeared to connect with the arterial lumen (Figs. 1 and 2). The inflammatory infiltrate in the media was primarily present in the areas of fibrosis. The vascular walls with thinner intima did not show vasa vasorum or inflammation; however, the underlying media showed focal fragmentation of the elastic laminae and medial fibrosis. The changes of the media were diffuse. There was no arterial dissection, intraluminal thrombosis, fibrinoid necrosis, or granulomatous changes. The other coronary artery segments did not have eosinophilic inflammation or atherosclerosis. The myocardium had no acute or chronic ischemic changes or inflammation. The lungs had no eosinophilic inflammation of the bronchi, bronchioli, or blood vessels. The nodule of the spleen had findings similar to a Gamna–Gandy body, including spindly fibrocytes and hemosiderin-laden macrophages. The distal esophagus was infiltrated by eosinophils and mononuclear cells within the lamina propria, submucosa, and the connective tissue between smooth muscle fascicles of the muscularis propria (Fig. 3). The mucosa had a sparse mononuclear infiltrate without eosinophilic inflammation. A milder degree of eosinophilic infiltrate was present in the proximal cardia of the stomach. No eosinophilic inflammation was present in the distal cardia. The other portions of gastrointestinal tract were unavailable for histopathologic examination. The other organs did not show significant histopathologic changes. The cause of death was diagnosed as ECPA, and the mechanism of death was postulated to be coronary artery spasm.

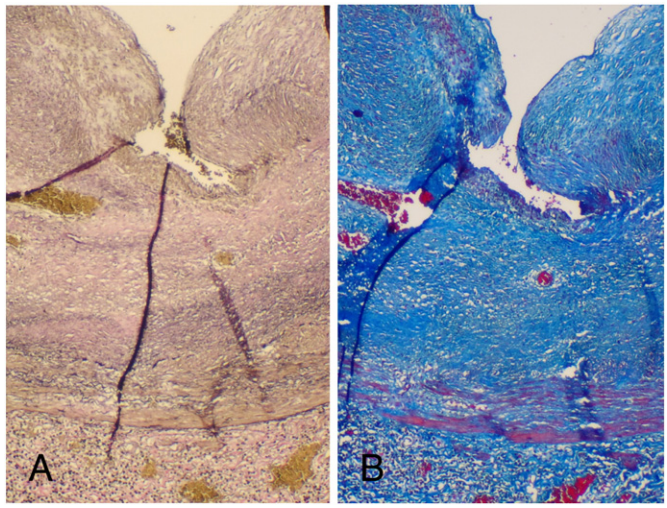

Fig. 2. Sections showing apparent connection between the coronary arterial lumen and dilated capillaries in the intima. (A) Disruption of internal and external elastic laminae. Verhoeff–Van Gieson stain; (B) Areas of fibrosis disrupting smooth muscle of the media. Masson trichrome stain.

Mast cells have been known in association with eosinophilic inflammation in multiple disorders. Immunohistochemistry for mast cell tryptase (Ventana Medical Systems, Inc.; Tucson, AZ, United States) was performed on the sections of the coronary artery (Fig. 4) and

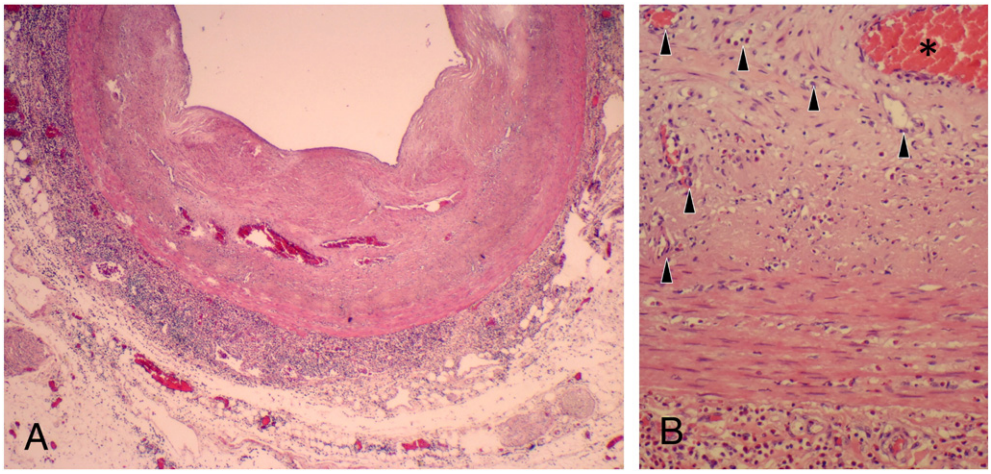

Fig. 1. LAD artery with ECPA. (A) Dilated capillaries are present within the thickened intima due to atherosclerosis; hematoxylin and eosin; (B) Mild infiltration by eosinophils and mononuclear cells is present in the intima and media with presence of vasa vasorum. Hematoxylin and eosin. *: A dilated capillary in the intima. Arrow heads: Vasa vasorum in the intima.