Isolated Coronary Vasculitis as a Cause of Unexpected Sudden Death

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Sudden death from natural causes may be attributed to a wide range of disorders. The most common cause, particularly in men above the age of 40, is, by far, coronary artery disease, which is overwhelmingly atherosclerotic in nature. However, several other entities have been recorded. Coronary arteritis is a rare form of coronary artery disease. Various forms of systemic vasculitis may involve major epicardial coronary arteries (Takayasu disease, temporal arteritis, Kawasaki disease, rheumatoid arthritis, polyarteritis nodosa, etc.), but isolated involvement of the coronary arteries is rare. These cases are difficult to diagnose prior to death, and in the absence of a high index of suspicion are usually misdiagnosed. We describe the case of an unexpected sudden death due to coronary vasculitis.

PATIENT DESCRIPTION

A 54 year old hypertensive male, a heavy smoker, was admitted to our department after 3 days of a burning sensation over his chest with no accompanying dyspnea. This sensation appeared intermittently and was not related to physical activity. During the night prior to his admission he experienced aggravation of the pain, with profuse diaphoresis, which was partially relieved by an antiacid drug. The patient had no history of previous cardiac disease.

Upon admission, the patient complained of a mild heartburn. His physical examination was unremarkable. An electrocardiogram showed no significant signs of cardiac ischemia, and his initial troponin test was within normal limits (0.06 ng/ml). A chest X-ray showed no abnormality. He was admitted for observation and continuous monitoring of ECG and cardiac biomarkers. Treatment with a proton pump inhibitor, atenolol, aspirin and simvastatin was begun in addition to his usual anti-hypertension regimen (disothiazide and enalapril).

The following morning, the patient was free of complaints, except for a mild heartburn. Suddenly he collapsed and seized. Cardiac monitoring demonstrated ventricular fibrillation. Cardiopulmonary resuscitation was immediately initiated and continued for 40 minutes. However, the patient expired.

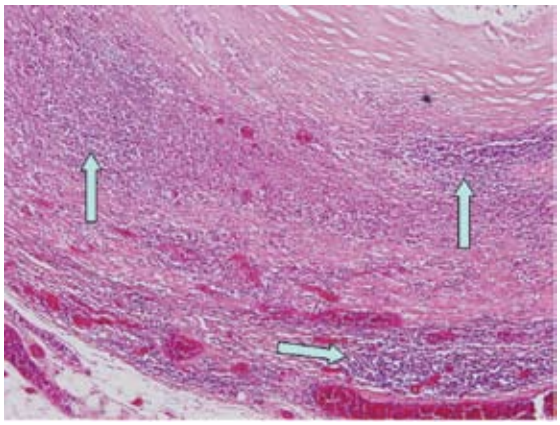
On postmortem gross examination, the heart was of normal size and shape. The myocardium of the left ventricle and inter-ventricular septum was edematous and soft and contained indiscrete areas of red and white discoloration. The coronary arteries showed severe atherosclerotic changes. The proximal left anterior descending artery was 90% narrowed by atherosclerosis and a dark red thrombus. Histological examination did not demonstrate any extensive myocardial infarction; however, a microinfarct was observed, which most likely developed as a result of the vasculitic processes. Interestingly, the wall of the LAD artery was also severely inflamed throughout all layers and particularly within the media and adventitia layers [Figure]. The exudates were composed primarily of B cell lymphocytes (CD20+), but T cell lymphocytes (CD4-CD3+), plasma cells (CD138+) and histiocytes (CD68+) were also present. Theses changes are consistent with non-granulomatous coronary artery vasculitis. Marked atherosclerotic lesions were also detected throughout the aorta.

COMMENT

Sudden cardiac death is most often the result of atherosclerotic coronary artery disease. Other, rarer causes include myocarditis, hypertrophic obstructive cardiomyopathy, conduction abnormalities, and various congenital malformations. Another rare cause is coronary vasculitis.

Coronary vasculitis is a rare form of coronary artery disease, and a rare cause of

Section of the anterior descending left circumflex artery, with a non-specific panarteritis and a mild fibrous thickening of the entire vessel wall. (hematoxylin & eosin, x 40).



LAD = left anterior descending

Table 1. Case reports of isolated coronary vasculitis

- A 47 year old man collapsed and died after an acute onset of chest pain. All three coronaries were concentrically narrowed. Histological diagnosis: marked intimal fibrosis with destroyed internal elastic lamina [1].
- A healthy 26 year old man collapsed and died 40 minutes following the onset of chest pain. Histological diagnosis demonstrated severe concentric narrowing of the left main coronary artery with intimal hyperplasia and a fresh thrombus occluding the lumen [1].
- A 27 year old man who complained of chest pain was found dead. Histological diagnosis demonstrated acute arteritis with superimposed thrombus in the left anterior descending artery [1].
- A healthy 19 year old woman died 2 hours after a sudden onset of severe chest pain. Autopsy revealed acute necrotizing vasculitis [2].
- A 68 year old healthy man was found dead. Autopsy showed severe sclerosis in the aorta and coronary arteries with transmural infiltrate, consisting mostly of B cell lymphocytes (*reference available from the corresponding author*).
- An 89 year old woman was found dead. Autopsy revealed pronounced atherosclerosis of the aorta and main branches with an infiltrate consisting of giant cells characteristic of giant cell arteritis (*reference available from the corresponding author*).
- Review of four cases of sudden death due to non-atherosclerotic coronary pathology: a 31 year old man with epicardial coronary arteritis, a 57 year old man with intramyocardial vasculitis, a 45 year old woman with spontaneous coronary dissection, and a 50 year old man with intramyocardial vascular humps (*reference available from the corresponding author*).

sudden cardiac death. It can be classified as either infectious (syphilitic, mycobacterial, etc.) or autoimmune [1]. In most cases, autoimmune coronary vasculitis appears in the context of systemic autoimmune vasculitis, although the involvement of major epicardial coronaries leading to myocardial infarction and death is rare in those systemic syndromes. However, in extremely rare cases, isolated coronary artery vasculitis may occur.

In the case presented here, no antemortem signs or symptoms of any systemic vasculitis (autoimmune or infectious) were reported. Furthermore, no involvement of other organs or arteries was detected during autopsy. Scanning the literature for similar cases of sudden death due to coronary vasculitis yielded a few case reports [Table 1].

Apart from the inflammatory changes, autopsy revealed severe atherosclerotic changes in the coronary arteries and aorta. In the LAD, those changes were accompanied by severe inflammation, comprising mainly B lymphocytes, as well as some T lymphocytes and plasma cells.

The two processes – coronary arteritis and atherosclerosis – are probably connected. Inflammation is believed to have a significant role in atherosclerosis [1-5]. Endothelial damage leads, among other processes, to the secretion of cytokines. In turn, those cytokines induce migration of inflammatory cells, primarily monocyte-derived macrophages and T cells, into the damaged area. Those cells produce and secrete a variety of cytokines, enzymes and growth factors that play an important role in the formation and remodeling of the atherosclerotic plaque. It is worth noting though that the infiltrate in the case presented here was composed mainly of B lymphocytes, suggesting a process of a different nature (i.e., coronary vasculitis).

From a different angle, systemic vasculitides are associated with premature and accelerated atherosclerosis. Patients suffering from Takayasu's arteritis, rheumatoid arthritis or systemic lupus erythematosus show a higher prevalence of atherosclerosis compared to their matched-age and gender groups and are at greater risk for coronary artery disease [4,5]. Interestingly, atherosclerotic plaques tend to appear in areas of vasculitic processes. This might explain the co-location of atherosclerotic and inflammatory changes in our patient.

In conclusion, we have described a 54 year old man who died unexpectedly. The sudden death was induced by the rare cause of isolated coronary artery vasculitis. The exact incidence of this phenomenon is unknown. Being confined to the coronary arteries, there are no antemortem signs or symptoms of systemic vasculitis in these patients; therefore, it is extremely difficult to clinically distinguish this entity from atherosclerotic disease prior to death. In addition, since the clinical profile of these patients might differ considerably from the classical ischemic heart disease patient (as demonstrated by the variety of cases reviewed in the Table), these cases might be particularly elusive and difficult to diagnose. Due to the rarity of these cases, whose diagnosis is limited to autopsy, it is doubtful that any inflammatory markers will be valid for proper antemortum diagnosis.

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"The cardinal doctrine of a fanatic's creed is that his enemies are the enemies of God"

Andrew Dickson White (1832-1918), U.S. diplomat, historian, and educator an co-founder of Cornell University