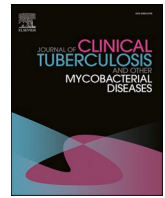




Contents lists available at ScienceDirect

Journal of Clinical Tuberculosis and Other Mycobacterial Diseases

journal homepage: www.elsevier.com/locate/jctube

Case Report

Resolution of coronary arteritis following tuberculosis treatment

Nestor Barreto-Neto^{a,*}, Alexandre W. Segre^b, Lissiane K.N. Guedes^a, Luciana P.C. Seguro^a, Rosa M.R. Pereira^a

^a Division of Rheumatology, Hospital das Clínicas HCFMUSP, Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP, Brazil

^b Heart Institute, Hospital das Clínicas HCFMUSP, Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP, Brazil

ARTICLE INFO

Keywords:

Coronary aneurysm
Tuberculosis
Takayasu arteritis
Aortic aneurysm

ABSTRACT

Background: Coronary artery aneurysm (CAA) in an uncommon condition usually associated with atherosclerosis, but systemic vasculitides constitute important differential diagnoses. A less recognized cause of CAA, tuberculosis (TB) has also been noted to occur simultaneously in patients with such vascular abnormalities.

Case report: A 60-year-old female presented to the Emergency Department with a non-ST segment elevation myocardial infarction. Angiography demonstrated segmental aneurysms of the left anterior descending coronary artery. Shortly after, she was also diagnosed with cutaneous TB, and treatment was promptly initiated. Reevaluation conducted several months later demonstrated that levels of inflammation markers had significantly decreased. New catheterization of coronary arteries evidenced complete resolution of coronary aneurysm images.

Conclusion: Due to the clinical and radiologic resolution with only TB treatment, as well as lack of evidence supporting atherosclerotic or vasculitic etiologies, TB can be considered a possible contributor to aneurysm formation in this case. Prospective studies are necessary to reliably demonstrate causality between TB infection and CAA.

1. Introduction

Coronary artery aneurysm in an uncommon condition reported in up to 5% of angiographic studies of patients with chest pain [1–3]. While atherosclerosis is commonly described as the main etiology, rheumatologic diseases, including Takayasu's arteritis, Giant-cell arteritis, polyarteritis nodosa, and others must be considered as differential diagnoses [4]. In developing countries, infectious diseases such as tuberculosis (TB) have also been noted to occur simultaneously in patients with such vascular abnormalities [5,6].

2. Case report

We report the case of a 60-year-old female with a history of hypertension who presented to the Emergency Department with acute oppressive chest pain (Fig. 1). She had no history of diabetes, obesity or smoking. After initial blood and ECG tests, a diagnosis of non-ST elevation myocardial infarction (NSTEMI) was made. Cardiac angiography demonstrated unusual sequential aneurysms of the left anterior coronary artery (LAD - Fig. 2A). To better assess these findings, the

patient was submitted to coronary CT-scan, which demonstrated a zero-calcium score and no other signs of atherosclerosis.

The patient also presented a three-year history of untreated painful skin nodules of the lower extremity associated with sporadic low-grade fever. Biopsy of skin nodules performed 4 months following NSTEMI showed septal panniculitis and lobular granulomatosis with suppuration, and cultures were positive for *Mycobacterium tuberculosis*. Chest CT scan demonstrated several 0.3 cm unspecified calcified micronodules, as well as up to 2.9 cm wide heterogenous paratracheal and axillar lymph nodes (Fig. 3). Treatment for TB was promptly initiated with isoniazid, rifampicin, pyrazinamide and ethambutol (HRZE) and maintained for six months, while NSTEMI was treated conservatively with antiplatelet (aspirin 100 mg/day and clopidogrel 75 mg/day) and statin (atorvastatin 80 mg/day) therapy. The presence of sequential aneurysms impaired endovascular treatment due to the impossibility of proper stent anchoring. The patient had also refused surgical revascularization.

Nine months after initiation of therapy described above, upon admission to the University Hospital Rheumatology Unit to resume investigation, there had been complete resolution of skin nodules, as well as improvement in angina. C-reactive protein (CRP) and

* Corresponding author at: Division of Rheumatology, Hospital das Clínicas HCFMUSP, Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP, Brazil
E-mail address: nestor.barreto@hc.fm.usp.br (N. Barreto-Neto).

<https://doi.org/10.1016/j.jctube.2021.100295>

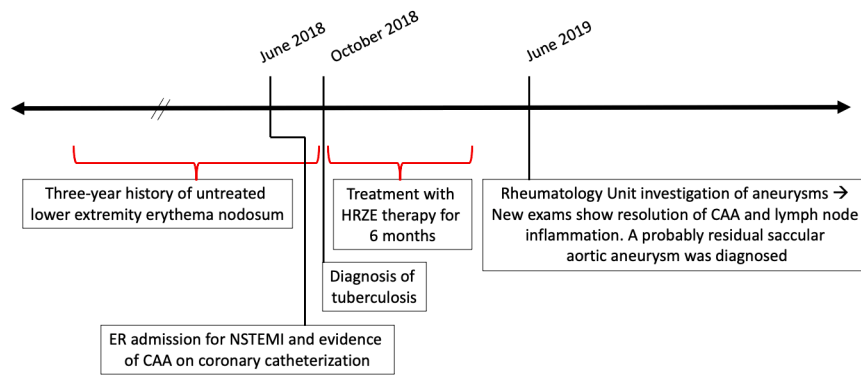


Fig. 1. Timeline of Events. CAA = coronary artery aneurysms.

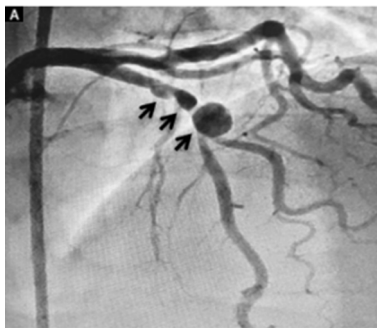


Fig. 2A. Coronary aneurysms (black arrows) on Left Anterior Descending Coronary Artery (LAD), as shown in coronary catheterization performed two days after NSTEMI.



Fig. 2B. Coronary catheterization performed 12 months after NSTEMI and initiation of TB treatment. There are no more signs of aneurysm in the middle portion of the LAD.

Erythrocyte Sedimentation Rate (ESR) levels, which were elevated prior to TB treatment, had significantly decreased. Viral serologies, as well as autoantibody tests, were negative. She was submitted to a new angiographic study, which showed no more evidence of coronary aneurysms (Fig. 2B), though critical stenosis (>90%) remained. Due to the unexpected findings, whole-body CT-angiography was performed. It demonstrated a saccular pseudoaneurysm the infra-renal aorta (Fig. 2C), which was asymptomatic. Increased lymph nodes around the celiac trunk were also noted. However, PET-CT scan demonstrated no signs of active inflammation at that moment. The exam also demonstrated reduction of axillar and paratracheal lymph nodes.

After follow-up angiography, there was an attempt to perform over-the-wire microcatheter recanalization of the LAD, but the procedure failed as catheter progression was impaired due to residual coronary thrombosis. The patient refused further cardiovascular procedures.



Fig. 2C. A 1.1 cm saccular pseudo-aneurysm of the infra-renal aorta (white arrow), as depicted in CT angiography. The patient did not report abdominal pain on physical examination.

3. Discussion

Atherosclerosis is the most important cause of CAA in adults, accounting for approximately 50% of cases worldwide [4]. Plaque formation disrupts blood flow, further damaging vessel wall and contributing to aneurysm formation [1]. While our patient had hypertension and age as risk factors, a calcium score of zero and absence of distinct plaques on coronary CT scan, besides no other cardiovascular risk factors decreases the possibility of atherosclerosis as the source of aneurysm formation, and therefore, other causes of aneurysm formation must be investigated.

Several systemic vasculitides are associated with coronaritis. Polyarteritis nodosa, for instance, which affects small and medium-sized vessels, is associated with coronary involvement in 76% of cases [7] and aneurysms in 9% [8]. It typically manifests itself with multi-organ involvement, depending on the affected vessel, which includes renal, hepatic and visceral arteries [7]. In the reported case, however, the lack of inflammation of other medium or small-sized vessels, together with evidence of large vessel involvement (infra-renal aorta), as well as a non-characteristic skin biopsy, do not favor this diagnosis.

CAA is also a possible, albeit rare, manifestation of Behçet's disease, as noted in several case reports [9]. The absence of a history of oral or genital ulcers, neurologic symptoms or pseudofolliculitis, as well as a comparatively late age of onset, speaks against this hypothesis.

Kawasaki disease (KD), a small and medium-vessel vasculitis that classically affects children, may also present in adults. Clinically, however, adults present with fewer CAA (5–20%) and more cervical adenopathy, liver function test abnormalities and arthralgia, while features such as fever, desquamation, conjunctivitis are similar between both age groups [10]. Aside from CAA, our patient presented none of the other characteristic clinical features of KD.

IgG4-related disease may also be associated with vascular disease.

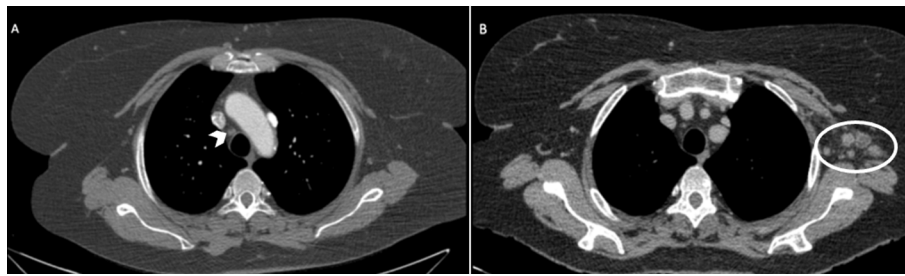


Fig. 3. Chest CT-scans demonstrating increased and heterogenous paratracheal (white arrowhead – A) and axillary (white circle – B) lymph nodes prior to TB treatment.

Coronary involvement is a relatively rare finding compared to aortitis and periaortitis, and typically presents as stenosis, although aneurysms may occur [11]. IgG4 tests were not performed in this case, but the presence of granulomatous disease evidenced by histopathology is an uncommon finding of the disease and suggests other diagnoses.

Large-vessel vasculitides, including Takayasu's arteritis (TA) and Giant-cell arteritis (GCA), can also be included in the differential diagnosis of coronaritis. TA affects coronary arteries in 12% of cases [12], while there have been reports linking GCA and coronaritis [13]. Supporting this hypothesis is the fact that large vessel involvement is also present in this case. Moreover, several studies conducted in both developing and developed countries have shown a considerably high frequency of TB (21.8 to 70%) in patients with diagnosed TA, especially when comparing to the overall TB prevalence in the country the study took place. For instance, in India, patients with TA were 46.6 times more likely to manifest TB than the overall population [5].

Tuberculosis is also known to increase myocardial infarction rates, as demonstrated in a Taiwanese retrospective cohort, in which the TB group was 40% more likely to have had myocardial infarction [14]. Possible mechanisms of cardiovascular disease related to TB include indirect damage caused by systemic inflammation as well as direct injury of the heart [6,15]. Although rare, the latter has been shown in case reports of post-mortem histologic analyses of the heart [16]. TB has also been reported as a cause of aortic aneurysms. Although some studies report aortic compromise secondary to a contiguous injury as the most common mechanism, which was not the case with this patient, tuberculous aortic aneurysms tend to be saccular and false, as clearly demonstrated in this case [17,18].

A final observation must be made regarding the skin lesions the patient presented on the lower extremities. Skin tuberculosis is a rare manifestation of the disease, accounting for less than 1% of all tuberculosis cases. Lesions may be secondary to direct TB infection or hypersensitivity reactions. Diagnosis may be challenging, since acid fast bacilli are not often isolated [19]. In the presented case, the occurrence of multiple nodules which yielded a positive culture result, as well as no close evidence of a contiguous source of infection suggests hematogenous dissemination. This assumption is compatible with the evidence of vascular involvement previously described.

4. Conclusion

Although a direct link between TB infection and formation of CAA in this patient could not be established, as a biopsy of the coronary artery or aorta would be too risky in a patient who already presented resolution of symptoms, the coincidence of manifestations makes it plausible to consider TB as a potential contributor to TA-like lesions in this patient. Investigating mycobacterial infection may be of diagnostic interest in patients with otherwise unexplained large-vessel and coronary aneurysms.

5. Ethics and consent statement

The patient described in this case report has signed a written consent allowing her data to be published.

Funding

This paper has required no funding. Publication costs will be managed by the Division of Rheumatology, Hospital das Clinicas HCFMUSP, Faculdade de Medicina da Universidade de Sao Paulo.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] Mata KM, Fernandes CR, Floriano EM, et al. Coronary Artery Aneurysms: An Update. Umashankar Lakshmanadoss, IntechOpen: Novel Strategies in Ischemic Heart Disease; 2012.
- [2] Elguindy MS, Elguindy AM. Aneurysmal coronary artery disease: An overview. *Glob Cardiol Sci Pract* 2017;3:e201726.
- [3] Sheikh AS, Hailan A, Kinnaird T, Choudhury A, Smith D. Coronary artery aneurysm: Evaluation, prognosis, and proposed treatment strategies. *Heart Views* 2019;20(3):101. https://doi.org/10.4103/HEARTVIEWS.HEARTVIEWS_1_19.
- [4] Cohen P, O'gara PT. Coronary artery aneurysms: a review of the natural history, pathophysiology, and management. *Cardiol Rev* 2008;16(6):301–4.
- [5] Pantell RH, Goodman BW. Takayasu's arteritis: the relationship with tuberculosis. *Pediatrics* 1981;67(1):84–8.
- [6] Huaman MA, Henson D, Ticona E, Sterling TR, Garvy BA. Tuberculosis and cardiovascular disease: linking the epidemics. *Trop Dis Travel Med Vaccines* 2015; 1:10.
- [7] Lypsky P.E. IN: Isselbacher KJ, Braunwald E, Wilson JD: Harrison's principles of internal medicine. Mc-Graw-Hill; 1994:1648–53.
- [8] Kastner D, Gaffney M. TAK T: Polyarteritis nodosa and myocardial infarction. *Can J Cardiol* 2000;16:515–8.
- [9] Cevik C, Otahbachi M, Nugent K, Jenkins LA. Coronary artery aneurysms in Behçet's disease. *Cardiovasc Revasc Med.* 2009;10(2):128–9.
- [10] Sève P, Stankovic K, Smail A, Durand DV, Marchand G, Broussolle C. Adult Kawasaki Disease: report of two cases and literature review. *Semin Arthritis Rheum* 2005;34(6):785–92.
- [11] Oyama-Manabe N, Yabusaki S, Manabe O, Kato F, Kanno-Okada H, Kudo K. IgG4-related Cardiovascular Disease from the Aorta to the Coronary Arteries: Multidetector CT and PET/CT. *Radiographics* 2018;38(7):1934–48.
- [12] PANJA M: Coronary artery lesions in Takayasu's arteritis—clinical and angiographic study. *J Assoc Physicians India.* 1998;46:678–81.
- [13] Mednick Z, Farmer J, Khan Z, Warder D, Hove MT. TEN HOVE M: Coronary arteritis: An entity to be considered in giant cell arteritis. *Can J Ophthalmol* 2016; 51(1):e6–8.
- [14] Chung W-S, Lin C-L, Hung C-T, Chu Y-H, Sung F-C, Kao C-H, et al. Tuberculosis increases the subsequent risk of acute coronary syndrome: a nationwide population-based cohort study. *Int J Tuberc Lung Dis* 2014;18(1):79–83.
- [15] Bakalli A, Osmani B, Kamberi L, Pillana E, PLLANA E: Acute myocardial infarction and pulmonary tuberculosis in a young female patient: a case report. *Cases J* 2008; 1(1). <https://doi.org/10.1186/1757-1626-1-246>.
- [16] Kinare SG, Bhatia BI. Tuberculous coronary arteritis with aneurysm of the ventricular septum. *Chest* 1971;60(6):613–6.

- [17] Long R, Guzman R, Greenberg H, Safneck J, Hershfield E. HERSHFIELD E: Tuberculous mycotic aneurysm of the aorta: Review of published medical and surgical experience. *Chest* 1999;115(2):522–31.
- [18] Canaud L, Marzelle J, Bassinet L, Carrié A-S, Desgranges P, Becquemin J-P. Tuberculous aneurysms of the abdominal aorta. *J Vasc Surg* 2008;48(4):1012–6.
- [19] Frankel A, Penrose C, Emer J. Cutaneous tuberculosis: a practical case report and review for the dermatologist. *J Clin Aesthet Dermatol* 2009;2:19.