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CT Coronary Angiogram in Diagnosing IgG4 of Coronary Arteries Presenting as Acute Coronary Syndrome: A Case Report with Literature Review

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Abstract

Immunoglobulin G4-related disease (IgG4 RD), first described in 2001, as a case of autoimmune pancreatitis, is a multisystemic condition, involving the salivary glands, bile ducts, pancreas, retroperitoneal organs, and mesentery and is associated with raised level of serum IgG4. Reports of coronary involvement by IgG4 RD are scarce and we could find only 16 case reports in the literature. Here, we present a case of a 61-year-old lady, with no known comorbidities, who presented with rapid progression of coronary artery stenosis. Initially, she presented with mild stenosis of left anterior descending which rapidly progressed to significant triple vessel disease in 3 months. Serological workup for antibodies was negative, except for raised serum IgG4 antibodies. She was managed effectively with steroids.

Keywords
- coronary artery disease
- Immunoglobulin G4-related disease
- rapidly progressive coronary stenosis

Introduction

Immunoglobulin G4-related disease (IgG4 RD) is an autoimmune condition associated with increased level of IgG4 in the plasma. The first case described was of autoimmune pancreatitis.[1] Coronary involvement, albeit rare, is important in IgG4 RD, since it causes coronary stenosis presenting as acute coronary syndrome or coronary aneurysm rupture.[2] We present a patient of IgG4 RD with coronary vasculitis being the sole manifestation.

Case Presentation

A 61-year-old lady, with no known comorbidities, presented with recurrent attacks of palpitation for 6 months along with an acute single episode of atypical chest discomfort for last 6 hours. Electrocardiogram showed ST-segment depression in the inferior wall leads along with elevated troponin T (0.76 ng/mL) and pro-B-type natriuretic peptide (3160 pg/mL). In view of provisional diagnosis of non-ST-elevation myocardial infarction (NSTEMI), catheter angiogram was done which revealed no significant coronary disease (►**Fig. 1**). She was discharged on antiplatelets, statins, beta-blockers, and nitroglycerin.

However, 3 months later, she again presented with NSTEMI. Angiogram this time revealed significant diffuse narrowing of all three coronaries. To evaluate any underlying cause of this rapidly progressive disease, computed tomography coronary angiography (CTCA) was planned. CTCA revealed diffuse wall thickening with adjacent fat stranding along all three coronaries—suggestive of coronary periarteritis (►**Fig. 2**). No aneurysm or ectasia was seen. Erythrocyte sedimentation rate was elevated (86 mm/hr), C-reactive protein was positive. Vasculitis workup was negative, although serum IgG4 level was elevated (1.59 gm/L). Coronary artery

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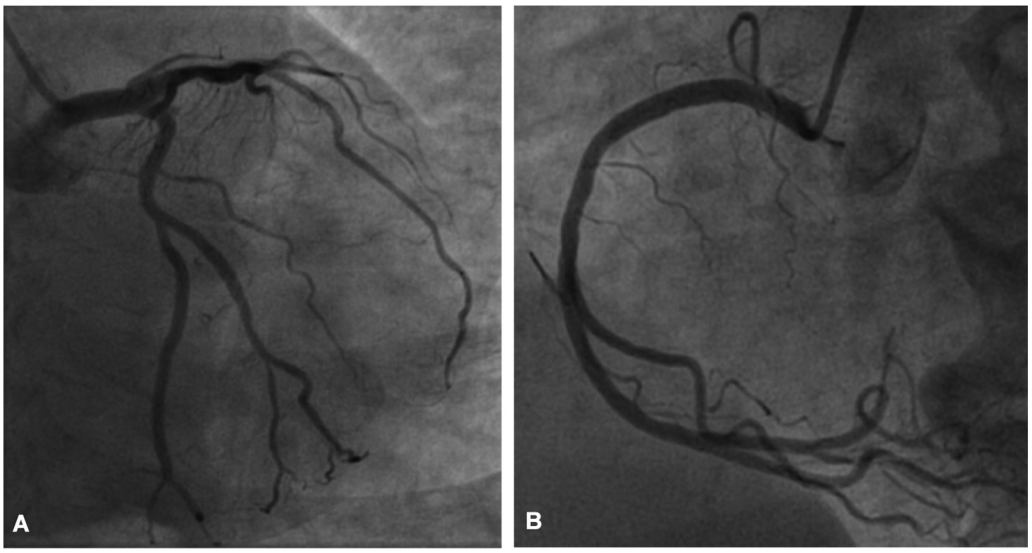

Fig. 1 Normal opacification of left anterior descending (LAD), left circumflex (LCx; **A**), and the right coronary artery (RCA; **B**). No obvious stenosis or occlusion seen.

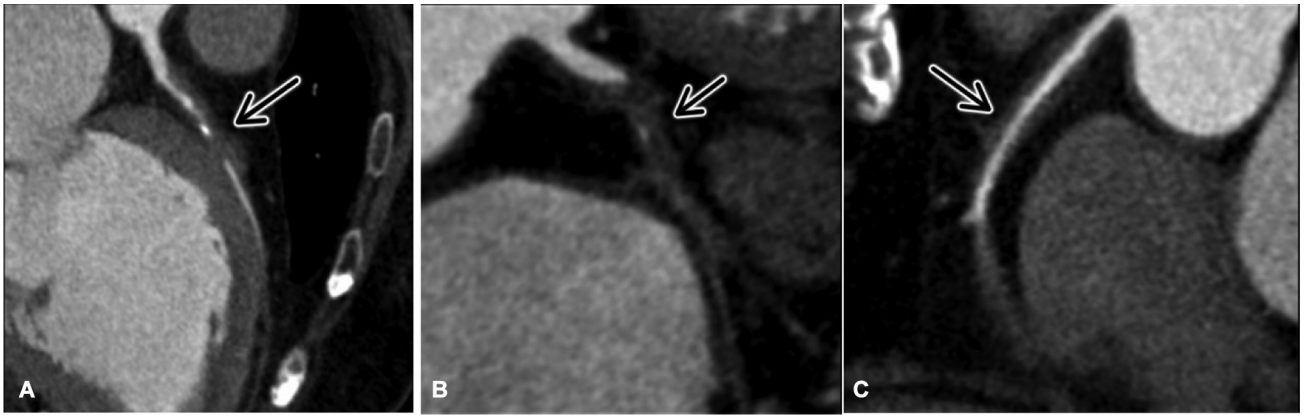

Fig. 2 Periarterial soft tissue thickening (arrows) along the left anterior descending (LAD) (**A**), left circumflex (LCx) (**B**), and right coronary artery (RCA) (**C**) causing significant stenosis of all three coronaries.

bypass grafting was not feasible as distal vessels were poorly graftable and left anterior descending stenting was not done in view of on-going coronary inflammation and high risk of stent thrombosis.

Positron emission tomography showed tracer uptake along the walls of the infrarenal aorta, around bilateral common iliac arteries and the femoral arteries (►**Fig. 3**). Patient was started on prednisolone and azathioprine. Follow-up CT after 3 months of steroid showed resolution of wall thickening around the right coronary artery (RCA) (►**Fig. 4**) and fall in the serum IgG4 levels to 1.1 gm/L. There was minimal resolution of pericoronary wall thickening of the left-sided coronaries. The patient has been kept on close medical management with dose adjustments of steroids and immunomodulators and has been doing fine for the last 2 years.

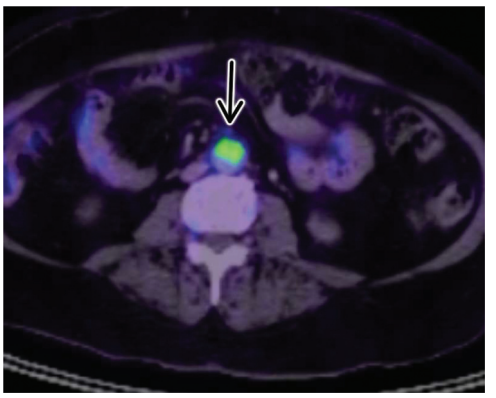

Fig. 3 Increased positron emission tomography (PET) tracer uptake along the anterior wall of the infrarenal abdominal aorta.

Discussion

IgG4 RD is an enigmatic disease, first described in 2001 in Japan.[1] The 2020 revised comprehensive diagnostic by Umehara et al is useful in diagnosis.[3] Diagnostic criteria includes clinical and radiological, serological, and histopathological features. Histopathological confirmation is often difficult to achieve, and fulfilling of clinical/radiological and serological items satisfies the criteria of "possible diagnosis." It usually involves the salivary glands, pancreas, thyroid, retroperitoneum, and orbits. Coronary involvement as a manifestation

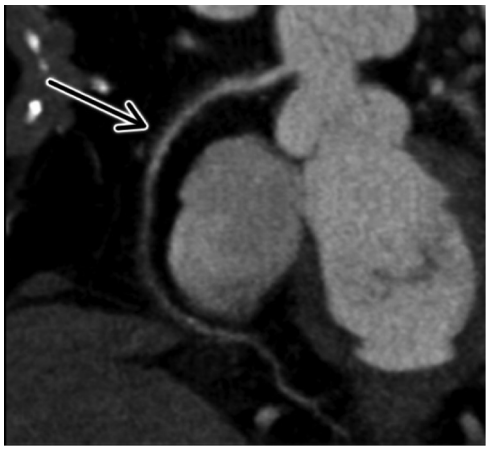

Fig. 4 Significant reduction of soft tissue (arrow) along the right coronary artery (RCA) posttreatment with steroids.

of IgG4 RD is rare and we could find 16 cases reported in the literature (►**Table 1**). A review of these cases revealed male-to-female ratio of 15:1, with only one case being a female. This is contrary to the general belief of autoimmune disease being more prevalent in females.

The primary findings in our case were rapidly progressive diffuse triple vessel stenosis and pericoronary wall thickening. Differentials considered can be Takayasu arteritis (TA), giant cell temporal arteritis (GCTA), polyarteritis nodosa (PAN), cytoplasmic antineutrophil cytoplasmic antibody (c-ANCA)-associated vasculitis, Behcet's disease (BD), IgG4 RD, and Erdheim–Chester disease (ECD).[20] Our case had no large or medium artery involvement, no renal artery stenosis, no complaints of any headache or jaw claudication, or no hypertension, thus virtually ruling out TA and GCTA.[21] c-ANCA and perinuclear ANCA both were negative, there was no medium-sized vessel aneurysm, no renal function abnormality, no hematuria, and no history or any genital, oral, or ocular ulcer—thus excluding PAN, Wegener's disease, and BD.[22] IgG4 RD and ECD—both are rare conditions—can have considerable overlap in their clinical-radiological features with biopsy being the definitive way of differentiating between the two.[23] However, bone involvement is almost seen in around 95% of cases of ECD, which was absent in our case. Thus,

Table 1 Summarizing coronary involvement of IgG4 related disease, reported previously in the literature

Reported case	Age	Sex	Coronary artery features	ACS	Coronary involved	Any other system involved	Treatment
Nishimura et al[4]	60	M	Stenosis and aneurysm. No soft tissue thickening	No	RCA and LAD.	CNS - recurrent MCA Strokes	Steroids
Tanigawaet al[5]	66	M	Periarterial thickening and subtotal occlusion	AMI	RCA and LCx	No	CABG
Bito et al[6]	69	M	Aneurysm, no stenosis or soft tissue	AMI	RCA and LMCA-LAD	No, past H/O lymphoma	Steroids f/b CABG
Matsumo et al[7]	60	F	Pericoronary pseudotumor, no stenosis or aneurysm	No	RCA	IRAAA	CABG and surgical repair of AAA
Ikutomi et al[8]	75	M	Stenosis, ectasia, and pericoronary soft tissue	Angina	Stenosis of LAD, LCx, ectatic RCA, soft tissue around all	Pancreas and parotid	CABG and steroids
Tajima et al[9]	68	M	Pericoronary soft tissue thickening and multiple aneurysms	No	Not mentioned	Multiple large and medium vessel aneurysm, parotitis	Low dose steroids—lead to ruptured splenic aneurysm and death
Inokuchi et al[10]	38	M	Stenosis and occlusion	Yes - SCD	RCA and LAD	Not known	Postmortem dx
Urabe et al[11]	84	M	Aneurysm and wall thickening	Yes	All 3	Celiac, renal arteries, DTA, and AA	Steroids - tapering lead to sudden death due to ruptured DTA aneurysm
Patel et al[12]	53	M	Severe stenosis with wall thickening	Yes - SCD	TVD	Kidney, pancreas, retroperitoneum, and mediastinal nodes	Postmortem study
Guo et al[13]	88	M	Periarterial soft tissue thickening	No	All 3 coronaries	Nasal cavities, maxillary sinus, orbits, nodes, IRAAA, lung involvement	Steroids
Takei et al[14]	71	M	Aneurysms and stenosis	No	TVD	Salivary glands, biliary system, respiratory tract, IRAAA	Steroids and cyclophosphamide
Keraliya et al[15]	53	M	Aneurysms, wall thickening, and stenosis	Yes	LMCA - proximal LAD, RCA	AAA and SMA aneurysm	CABG
Sakamoto et al[16]	67	M	Soft tissue thickening and stenosis	No	LAD and RCA	Pancreatitis	Steroids

(*Continued*)

Table 1 (*Continued*)

Reported case	Age	Sex	Coronary artery features	ACS	Coronary involved	Any other system involved	Treatment
Komiya et al[17]	59	M	Soft tissue thickening	No	RCA and LAD	Submandibular sialadenitis, IRAAA	Steroids
Kan-o et al [18]	68	M	Aneurysm, wall thickening	No	RCA and LAD	IRAAA, chronic pancreatitis, nephritis	Steroids and surgical treatment of IRAAA
Okuyama et al[19]	74	M	Occlusion and wall thickening	Yes	RCA and LAD	Pancreatitis	PCI to LAD

Abbreviations: AA, aortic aneurysm; AAA, abdominal aortic aneurysm; ACS, acute coronary syndrome; AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; CNS, central nervous system; DTA, descending thoracic aorta; dx, diagnosis; F, female; f/b, followed by; H/O, history of; IRAAA, infrarenal abdominal aortic aneurysm; LAD, left anterior descending; LCx, left circumflex; LMCA, left main coronary artery; M, male; MCA, middle cerebral artery; PCI, percutaneous coronary intervention; RCA, right coronary artery; SCD, sudden cardiac death; SMA, superior mesenteric artery; TVD, triple vessel disease.

excluding other causes, presence of IgG4 in the serum and response to treatment lead us to a provisional diagnosis of IgG4 RD.

Coronary involvement in IgG4 RD mainly has three forms —stenosis, aneurysm, and pericoronary soft tissue thickening. Of the 16 cases reported in literature, 12 had coronary involvement in the form of wall thickening. Coronary stenosis was seen in 8 cases and coronary aneurysms were seen in 7 cases. Coronary aneurysms are associated with high risk of rupture and mortality and thus warrant high-dose prednisolone and/or surgical therapy. Of the coronaries, proximal RCA involvement was seen in 100% of the cases, thus it may be a specific feature in IgG4 RD. Involvement of the proximal coronaries were more commonly seen. Isolated distal coronary arterial involvement was not seen.

For confirmation of diagnosis, tissue biopsy is the gold standard. But in isolated coronary involvement with sparing of the glands or any other accessible sites, biopsy is difficult. Thus, radiology with clinical history and serology becomes diagnostically important.

Conclusion

Pericoronary wall thickening, stenosis, and aneurysms in the elderly with absence of risk factors of atherosclerosis with rapid progression of stenosis should point toward IgG4 RD. The entity should be kept in the differential since management is different from atherosclerosis and the condition responds favorably from immunosuppression.

Patient Consent

The authors confirm that written consent for submission and publication of this case including images and associated text has been obtained from the patient in line with COPE guidance.

Authors' Contributions

The authors confirm contribution to the paper as follows: study conceptualization (J.V.), data collection and interpretation (A.R.C., J.V., S.S.), manuscript and figure preparation, manuscript revision based on feedback from coauthors (A.R.C., J.V., A.A.), supervision, manuscript critical revision (J.V., A.A., S.S.). All authors reviewed the results and approved the final version of the manuscript.

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Conflict of Interest

None declared.

References

1 Hamano H, Kawa S, Horiuchi A, et al. High serum IgG4 concentrations in patients with sclerosing pancreatitis. N Engl J Med 2001;344(10):732–738
2 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(07):1934–1948
3 Umehara H, Okazaki K, Kawa S, et al; Research Program for Intractable Disease by the Ministry of Health, Labor and Welfare (MHLW) Japan. The 2020 revised comprehensive diagnostic (RCD) criteria for IgG4-RD. Mod Rheumatol 2021;31(03): 529–533
4 Nishimura S, Amano M, Izumi C, et al. Multiple coronary artery aneurysms and thoracic aortitis associated with IgG4-related disease. Intern Med 2016;55(12):1605–1609
5 Tanigawa J, Daimon M, Murai M, Katsumata T, Tsuji M, Ishizaka N. Immunoglobulin G4-related coronary periarteritis in a patient presenting with myocardial ischemia. Hum Pathol 2012;43(07): 1131–1134
6 Bito Y, Sasaki Y, Hirai H, et al. A surgical case of expanding bilateral coronary aneurysms regarded as immunoglobulin G4-related disease. Circulation 2014;129(16):e453–e456
7 Matsumoto Y, Kasashima S, Kawashima A, et al. A case of multiple immunoglobulin G4-related periarteritis: a tumorous lesion of the coronary artery and abdominal aortic aneurysm. Hum Pathol 2008;39(06):975–980
8 Ikutomi M, Matsumura T, Iwata H, et al. Giant tumorous lesions (correction of legions) surrounding the right coronary artery associated with immunoglobulin-G4-related systemic disease. Cardiology 2011;120(01):22–26
9 Tajima M, Hiroi Y, Takazawa Y, et al. Immunoglobulin G4-related multiple systemic aneurysms and splenic aneurysm rupture during steroid therapy. Hum Pathol 2014;45(01):175–179
10 Inokuchi G, Hayakawa M, Kishimoto T, Makino Y, Iwase H. A suspected case of coronary periarteritis due to IgG4-related disease as a cause of ischemic heart disease. Forensic Sci Med Pathol 2014;10(01):103–108

11 Urabe Y, Fujii T, Kurushima S, Tsujiyama S, Kihara Y. Pigs-in-a-blanket coronary arteries: a case of immunoglobulin G4-related coronary periarteritis assessed by computed tomography coronary angiography, intravascular ultrasound, and positron emission tomography. Circ Cardiovasc Imaging 2012;5(05):685–687
12 Patel NR, Anzalone ML, Buja LM, Elghetany MT. Sudden cardiac death due to coronary artery involvement by IgG4-related disease: a rare, serious complication of a rare disease. Arch Pathol Lab Med 2014;138(06):833–836
13 Guo Y, Ansdell D, Brouha S, Yen A. Coronary periarteritis in a patient with multi-organ IgG4-related disease. J Radiol Case Rep 2015;9(01):1–17
14 Takei H, Nagasawa H, Sakai R, et al. A case of multiple giant coronary aneurysms and abdominal aortic aneurysm coexisting with IgG4-related disease. Intern Med 2012;51(08):963–967
15 Keraliya AR, Murphy DJ, Aghayev A, Steigner ML. IgG4-related disease with coronary arteritis. Circ Cardiovasc Imaging 2016;9 (03):e004583
16 Sakamoto A, Tanaka T, Hirano K, Koike K, Komuro I. Immunoglobulin G4- related coronary periarteritis and luminal stenosis in a patient with a history of autoimmune pancreatitis. Intern Med 2017;56(18):2445–2450
17 Komiya Y, Soejima M, Tezuka D, Kohsaka H. Early detection and intervention of coronary artery involvement in immunoglobulin G4-related disease. Intern Med 2018;57(04):617–622
18 Kan-o M, Kado Y, Sadanaga A, Tamiya S, Toyoshima S Sakamoto M. Immunoglobulin G4-related multiple cardiovascular lesions successfully treated with a combination of open surgery and corticosteroid therapy. J Vasc Surg 2015;61(06): 1599–1603
19 Okuyama T, Tanaka TD, Nagoshi T, Yoshimura M. Coronary artery disease concomitant with immunoglobulin G4-related disease: a case report and literature review. Eur Heart J Case Rep 2019;3 (01):ytz013. Doi: 10.1093/ehjcr/ytz013
20 Accessed September 15, 2024 at: https://www.acc.org/Latest-in-Cardiology/Articles/2019/03/13/06/50/Vasculitis-of-the-Coronary-Arteries
21 Betrains A, Blockmans D. Diagnostic approaches for large vessel vasculitides. Open Access Rheumatol 2021;13:153–165
22 Dillon MJ, Eleftheriou D, Brogan PA. Medium-size-vessel vasculitis. Pediatr Nephrol 2010;25(09):1641–1652
23 Quinaglia-Silva T, Medina F, Ramos CD, Coelho-Filho OR. Cardiac involvement in Erdheim-Chester disease. Circ Cardiovasc Imaging 2018;11(12):e008531

