Giant Right Coronary Artery Aneurysms

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Described herein are 2 adults with right coronary artery aneurysms measuring ≥4.0 cm in maximal diameter. Each aneurysm contained huge intra-aneurysm thrombus and each coronary artery contained atherosclerotic plaques diffusely. Each aneurysm was resected without complication and each patient has resumed preoperative level of activities without limitations. **(Am J Cardiol 2020;125:1599−1601)**

Most coronary artery aneurysms are <2 cm in maximal diameter. Aneurysms ≥4 cm are rare. A description of certain clinical and morphologic findings in 2 patients with "giant" right coronary artery (RCA) aneurysms is the purpose of this report.

Case comments

Pertinent clinical and morphologic features in the 2 patients are summarized in Table 1. Both underwent resection of the RCA aneurysm which measured 4 and 10 cm, respectively, in maximal diameter. In both patients, the aneurysm was saccular and contained huge intra-aneurysmal thrombi (Figures 1 to 5). The sac (case #1 only) containing the thrombus was consistent with the previous coronary arterial wall. In case #2, only the intra-aneurysmal thrombus was excised without its wall. Both patients, 6 months postoperatively, are back doing their preoperative activities without limitations.

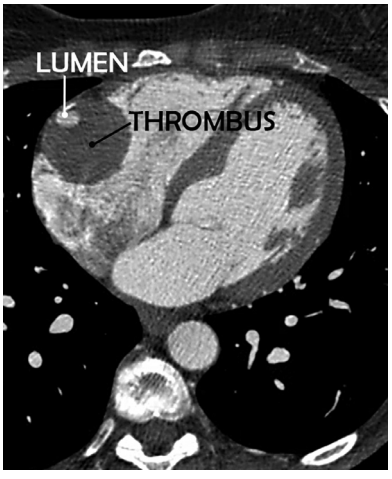

Figure 1. (Case #1, Table 1). Computed tomographic image of the giant RCA aneurysm containing a huge intra-aneurysmal thrombus.

Discussion

There are few reports describing coronary aneurysms ≥4 cm in diameter. Virmani et al[1] described 52 patients at autopsy with coronary aneurysms. Of the 38 adults in

Table 1
Pertinent clinical and cardiac morphologic findings in the 2 patients with huge right coronary arterial saccular aneurysms resulting from atherosclerosis

Patient		Case #1	Case #2
1)	Age (years)	48	58
2)	Sex	Woman	Man
3)	Race	Black	White
4)	Body mass index (kg/m^2)	32	25
5)	Symptoms	CP, D	O
6)	Comorbidity	Cancer (breast)	Multiple sclerosis
7)	Age (years) aneurysm first diagnosed	40	58
8)	Blood pressure (mmHg)	135/90 (I)	110/75
9)	Total 12-lead QRS voltage (mm)	102	140
10)	Total cholesterol (mg/dL)	107*	229†
11)	LDL cholesterol (mg/dL)	47*	102†
12)	HDL cholesterol (mg/dL)	44*	37†
13)	Triglycerides (mg/dL)	41*	172†
14)	Coronary calcium score	–	2800
15)	Other coronary aneurysm	+	+
16)	Size (cm) of the huge coronary aneurysm	4.0	10.3
17)	RCA aneurysm weight (g)	52	139
18)	LV cavity dilated	0	0
19)	Left ventricular ejection fraction	"Normal"	60%
20)	Maximal coronary diameter narrowing		
	Left main	–	0
	Left anterior descending	0	0
	Left circumflex	0	0
	Ramus	0	0
	Right	95%	?
21)	Coronary bypass	+	+

CP = chest pain; D = dyspnea; HDL = high-density lipoprotein; I = indirect; LDL = low-density lipoprotein; LV = left ventricular; O = none; RCA = right coronary artery.

* On rosuvastatin, 20 mg and ezetimibe 10 mg/day.

† On rosuvastatin, 20 mg/day.

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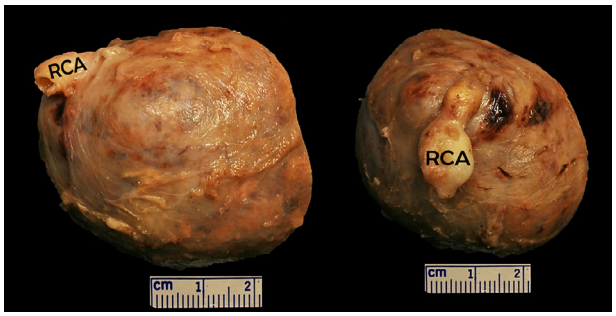

Figure 2. (Case #1, Table 1). Two views of the exterior of the giant coronary aneurysm arising from the RCA. Both the aneurysmal wall and the intra-aneurysmal thrombus were totally excised as well as the attached RCA. An aortosaphenous venous graft was placed distally.

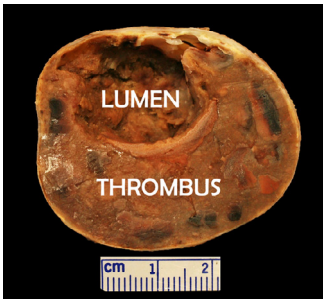

Figure 3. (Case #1, Table 1). Cross section of the giant saccular aneurysm showing not only the intra-aneurysmal thrombus but the lumen through which blood flowed in the RCA.

whom atherosclerosis was considered the cause of the aneurysm, none had a diameter >2 cm. Of 22 cases of coronary aneurysm reported by Harikrishman et al,[2] 2 patients (9%) had aneurysms >4 cm in diameter. Of 20 adults with coronary aneurysms reported by Roberts,[3] 5 (25%) had aneurysms ≥4 cm in maximal diameter. Of 1,561 adults with coronary aneurysms reported by Núñez-Gil et al[4] from a European registry, 82 (5%) had aneurysms ≥4 cm in size. At least 7 case reports[5–11] have appeared describing coronary aneurysms ranging in size from 6 to 10 cm.

Figure 4. (Case #2, Table 1). Computed tomographic image of the heart showing the coronary aneurysm, both lumen and intra-aneurysmal thrombus.

Figure 5. (Case #2, Table 1) Photographs of the intra-aneurysmal thrombus *(left)* and a cross section *(right)*. The area where the lumen was present is the space where the ruler is placed *(right)*. The wall of the aneurysm was not resected.

Although its usefulness in patients with small (<2 cm) coronary aneurysms is unclear, resection of large (>4 cm) coronary aneurysms is undoubtedly proper to prevent severe narrowing or obstruction of the lumen of the coronary artery from which they arise to prevent their bulging into a cardiac chamber potentially causing obstruction, valve regurgitation or arrhythmia, and to prevent rupture, a rare occurrence.[12–17] In 978 cases of coronary aneurysm reported by Swaye et al,[18] none ruptured. A variety of operative procedures have been performed: aneurysmal resection with proximal and distal ligation and coronary bypass (as was done in both of our cases); aneurysmal thrombectomy without sac resection (as was done in our case #2). Anticoagulation appears reasonable in all patients with coronary aneurysms, small or large.

Disclosures

The authors have no conflicts of interest to report.

1. Virmani R, Robinowitz M, Atkinson JB, Forman MB, Silver MD, McAllister HA. Acquired coronary arterial aneurysms: an autopsy study of 52 patients. *Hum Pathol* 1986;17:575–583.
2. Harikrishnan S, Sunder KR, Tharakan JM, Titus T, Bhat A, Sivasankaran S, Bimal F. Saccular coronary aneurysms: angiographic and clinical profile and follow-up of 22 cases. *Indian Heart J* 2000; 52:178–182.
3. Roberts WC. Natural history, clinical consequences, and morphologic features of coronary arterial aneurysms in adults. *Am J Cardiol* 2011; 108:814–821.
4. Núñez-Gil IJ, Cerrato E, Bollati M, Nombela-Franco L, Terol B, Alfonso-Rodríguez E, Camacho Freire SJ, Villablanca PA, Amat Santos IJ, de la Torre Hernández JM, Pascual I, Liebetrau C, Camacho B, Pavani M, Albistur J, Latini RA, Varbella F, Jiménez-Díaz VA, Piraino D, Mancone M, Alfonso F, Linares JA, Rodríguez-Olivares R, Jiménez Mazuecos JM, Molinero JP, Sánchez-Grande Flecha A, Gomez-Hospital JA, Ielasi A, Lozano I, Omedè P, Bagur R, Ugo F, Medda M, Louka BF, Kala P, Escaned J, Bautista D, Feltes G, Salinas P, Alkhouli M, Macaya C, Fernández-Ortiz A, Martínez Benítez P, Gomez Menchero A, Jimenez JL, Díaz Fernandez JF, Makkiya M, Bulcha N, Suri S, Rojas P, Garcia Camarero T, Avanzas P, Morís C, Berndt C, Trujillo P, Vignolo G, Mila R, Buccheri D, Silva P, Quadri G, Tomassini F, Rolfo C, Hernández Hernández E, Baz Alonso JA, Romo AI, Teresi G, Andolina G, Calcagno S, Navarrete G, Rivero F, Cuesta J, Benedetto D, Arslan F, Stella PR, Barrionuevo Sánchez MI, Gómez Vicente R, Clares Montón P, Carballeira D, Yanes Bowden G, Vargas Torres M, Fernández Cisnal A, Canepa Leite JP, Grigis G, Moretti C, Montefusco A, D'Ascenzo F, Capasso P, Bande M, Casilli F, Morkous R, Yang E, Ramakrishna H, Poloczek M, Miklik R, Hallak AA, Cortese B, Jiménez Quevedo P, Gonzalo N, del Trigo M, de

Hoyos y Fernández de Córdova A, de Agustín JA, Munir A, Vivas D. Coronary artery aneurysms, insights from the international coronary artery aneurysm registry (CAAR). *Int J Cardiol* 2020;299:49–55.
5. Walsh J, Siklos P, KAl-Rufaie H. Massive aneurysm of the right coronary artery causing sudden death. *Int J Cardiol* 1998;64:213–214.
6. Ohara K, Kimura T, Karasawa T, Tokuyama H, Wakino S, Hayashi K, Itoh H, Okada Y. A large coronary aneurysm and its probable precursor lesions in a patient with autosomal dominant polycystic kidney disease: an implication for the process of aneurysmogenesis. *Pathol Int* 2012;62:758–762.
7. Ramankutty R, Albacker TB, Reyes KG, Navia JL. Successful management of a posterior saccular coronary artery aneurysm at the left main coronary artery bifurcation. *J Card Surg* 2011;26:37–39.
8. Chauhan A, Musunuru H, Hallett RL, Walsh M, Szabo S, Halloran W. An unruptured, thrombosed 10 cm right coronary artery aneurysm mimicking a pericardial cyst. *J Cardiothorac Surg* 2013;8:2.
9. Kondo T, Takahashi M, Nakagawa K, Kuse A, Morichika M, Sakurada M, Asano M, Ueno Y. Rupture of massive coronary artery aneurysm resulting in cardiac tamponade. *Leg Med (Tokyo)* 2015;17:388–390.
10. Park SM, Jeong H, Hong KS, Kim C. A huge saccular aortic aneurysm compressing right coronary artery 7 years after aortic valve replacement due to bicuspid aortic valve insufficiency: a rare case report. *Medicine* 2016;95:e4860.
11. Namba Y, Yamanaka T, Ida J, Oka T. Implantation of multiple polytetrafluoro-ethylene covered stent inside drug eluting stent to rescue purulent coronary artery ectasia with giant saccular aneurysm. *Int J Cardiovasc Imaging* 2018;34:1143–1146.
12. Zhang LJ, Zhou F. A patient with multiple coronary artery aneurysms. *JAMA Cardiol* 2019;4:388–389.
13. Scott DH. Aneurysm of the coronary arteries. *Am Heart J* 1948; 36:403–421.
14. Plachta A, Speer FD. Aneurysm of the left coronary artery. Review of the literature and report of three cases. *Arch Pathol* 1958;66:210–213.
15. Aintablian A, Hamby RI, Hoffman I, Kramer RI. Coronary ectasia: incidence and results of coronary bypass surgery. *Am Heart J* 1978;96: 309–315.
16. Kimura S, Miyamoto K, Ueno Y. Cardiac tamponade due to spontaneous rupture of large coronary artery aneurysm. *Asian Cardiovasc Thorac Ann* 2006;14:422–424.
17. Urban M, Novotny J, Kovac J, Netuka I. Giant right coronary artery aneurysm presenting as cardiac tamponade. *Eur J Cardiothorac Surg* 2011;40:1267.
18. Swaye PS, Fisher LD, Litwin P, Vignola PA, Judkins MP, Kemp HG, Mudd JG, Gosselin AJ. Aneurysmal coronary artery disease. *Circulation* 1983;67:134–138.