Editorial

There's something about that name: Nomenclature of anomalous coronary arteries

Coronary artery anomalies recognized during cardiac catheterization are not uncommon with reported frequencies ranging from 0.95% to 2% in the adult population. The anomalies can be of the origin of coronary arteries or it can be of an anomalous course or distribution. Many of the anomalies are silent and are detected as incidental findings during coronary angiography. But some of the anomalies can lead to myocardial ischemia and sudden cardiac death (SCD) and also cause problems during or after cardiac surgery.

In this issue, Gupta et al. (page xx–xx) report an interesting case of anomalous coronary artery. They report the anomaly as congenital ostial atresia of right coronary artery (RCA) and describe the left circumflex artery (LCX), through an “unusual inter-coronary communication” continuing in the right atrioventricular groove (AV groove) as the RCA. They discuss two possibilities – right coronary ostial atresia versus single coronary artery (SCA).

In this context, we have to define few entities.

RCA – is the artery which runs in the right AV groove. Inter-coronary communication or coronary cascade is a rare entity where a connecting blood vessel communicates either one way or two way between the right and left coronary arteries. Two types of coronary cascade have been described: communication between the left circumflex and the RCA in the posterior atrioventricular groove and the communication between the left anterior descending (LAD) and posterior descending artery (PDA) in the distal portion of the posterior interventricular groove.

There are differences between the usual coronary collaterals which form in obstructive CAD and coronary cascade. Coronary collaterals usually consist of more than one small, tortuous channels of different sizes and lengths while coronary cascade is larger in diameter (>1 mm), extramural, and straight (Fig. 1). The histological structure of coronary cascade is typical of an epicardial coronary artery, with a well-defined muscular layer.

Coronary artery ostial stenosis/atriesia (COSAs as they are called) is a very rare entity frequently accompanied by congenital defects. Majority of the reported COSAs are of the left coronary artery (L-COSA), but there are four reports of COSA of RCA, two of them isolated anomalies. In the two other cases, COSA of RCA was associated with Marfan syndrome in a 45-year-old woman and aortic-ventricular tunnel in a 6-week-old baby.

Musiani et al. who published a report of COSA of left coronary artery (L-COSA) reported that most adult patients with congenital ostial left main artery atresia had a normal unrestricted childhood and adolescence, and began showing symptoms only at an advanced age. Similarly, the case of R-COSA reported by Karadag et al. also presented in adult life.

In adult patients with COSA, acquired causes may also need to be considered as etiological factors – atherosclerosis, Kawasaki disease, syphilis and Takayasu’s arteritis.

The management of L-COSA is mainly surgical revascularization. But out of the four reported cases of R-COSA, one was kept on medical follow-up as the patient was a symptomatic on anti-anginal drugs. The other three underwent surgical correction – saphenous vein patch repair, re-implantation of RCA, and RCA bypass using polytetrafluoroethylene (PTFE) graft respectively.

Single Coronary Artery (SCA) is another entity which is also uncommon. It is defined as “a vessel arising from a single coronary ostium, which provides flow to the whole coronary tree without interruption of continuity and without evidence of collateral vessels”. SCA constitutes approximately 2–4% of all coronary anomalies.

SCA is classified using the modified Lipton Classification, which categorizes the anomalous vessels based on three characteristics – location of the ostium, anatomical distribution, and course of the transverse trunk (Table 1). SCA belongs to two main types. The first type is the ectopic origin of the right or left coronary artery from the opposite sinus, which shares a proximal common trunk with the normally originating coronary artery. The second type is the less frequent variant where the ectopic artery originates from a distal segment of the contralateral artery. An example is the “right coronary artery”, which originates from the left coronary artery at the crux and takes a retro-cardiac course and runs in the right atrioventricular groove. The second type is benign, but some of the variants of the first type (where the anomalous vessel courses between the great vessels) can be symptomatic and may lead to sudden cardiac death.
2. The artery running in the right AV groove (anomalous RCA) was tapering towards the proximal right AV groove, indicating that the artery is running from the crux region retrograde to the proximal AV groove and not vice versa.

3. On the CT or invasive coronary angiography images provided, the stump of proximal RCA could not be visualized. (I agree that it may not be demonstrated always, but it is a supporting feature if it was present.)

4. The authors claim that there is a “connecting vessel” between the LCA and RCA in the crux region, and it is a coronary cascade. Had it been a coronary cascade, the vessel should be straight and will be different in caliber than the vessels which are being connected (Fig. 1). But on reviewing the images provided by them, we can clearly see that the connecting vessel is of the same caliber and tapers smoothly towards its expected course. The appearance is that of a continuing vessel than a separate connecting vessel.

5. COSA will usually be associated with multiple collateral channels. Here, there are no collateral channels visible near the proximal RCA, i.e. the region of occlusion.

6. In COSA, the blood flow is always centripetal, since it flows retrogradely (from the periphery to the center) in at least one of the target arteries. In SCA, the blood flow is always centrifugal, flowing from the center to the periphery, and from bigger to smaller arteries as we see in the images.

With the support of all the above facts, I believe that the case reported by Gupta et al., is a case of SCA of the type L-II, a benign anomaly. Coming to the management of this case, since this patient does not have ischemia or flow-limiting lesions in the coronary, and the course of the anomalous artery is benign, he should be kept on follow-up.

What’s in a name? that which we call a rose

By any other name would smell as sweet

William Shakespeare – Romeo and Juliet

Table 1 – Classification of angiographic types of single coronary artery (Modified Lipton’s Classification*).

| Ostial location | Anatomical distribution | Course of the transverse trunk |
|-----------------|--------------------------|-------------------------------|
| R Right sinus of Valsalva | I Solitary dominant vessel follows the course of either a normal RCA or LCA (R-I or L-I) | A Anterior to great vessels |
| L Left sinus of Valsalva | II One coronary artery arises from the proximal part of the normally located other coronary (R-II or L-II) | B Between the aorta and pulmonary arteries |
|                   | III LAD and LCX arise separately from common trunk originating from the right sinus of Valsalva (R-III) | P Posterior to the great vessels |
|                   |                           | S Septal type: part of the route passes through interventricular septum |
|                   |                           | C Combined type: combination of diverse routes |
|                   |                           | RCA, right coronary artery; LCA, left coronary artery; LAD, left anterior descending coronary artery; LCX, left circumflex coronary artery. |

Fig. 1 – Intercoronary communication or coronary cascade. RCA injection in AP cranial view filling the LCA. The connecting vessel is different in caliber and also is straight (arrows).

Source: Harikrishnan et al.5

Conflicts of interest

The author has none to declare.

REFERENCES

1. Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Cathet Cardiovac Diagn. 1990;21:28–40.
2. Harikrishnan S, Jacob SP, Tharakan J, et al. Congenital coronary anomalies of origin and distribution in adults: a coronary arteriographic study. Indian Heart J. 2002;54:271–275.
3. Longenecker CG, Reemtsma K, Creech O. Surgical implications of single coronary artery. A review and two case reports. Am Heart J. 1961;61:382–386.
4. Harikrishnan S, Bhat A, Tharakan JM. Double right coronary artery. Int J Cardiol. 2001;77:315–316.
5. Harikrishnan S, Remash K, Nair K, Tharakan JM. Intercoronary communication between right and left...
coronary artery with bidirectional flow – a rare angiographic finding. Indian Heart J. 2010;62:181–182.
6. Angelini P. Congenital coronary artery ostial disease: a spectrum of anatomic variants with different pathophysiolgies and prognoses. Tex Heart Inst J. 2012;39:55–59.
7. Lea JW, Page DL, Hammon JW. Congenital ostial stenosis of the right coronary artery repaired by vein patch angioplasty. J Thorac Cardiovasc Surg. 1986;92:796–798.
8. Karadag B, Ayan F, Ismailoglu Z, Goksedef D, Ataev Y, Vural VA. Extraordinary cause of ischemic chest pain in a young man: congenital ostial atresia of the right coronary artery. J Cardiol. 2009;54:335–338.
9. Lee JW. Right coronary artery atresia in Marfan’s syndrome: a case report. Korean J Thorac Cardiovasc Surg. 2001;34:720–723.
10. Rauzier JM, Bonnet D, Zniber L, et al. [Aortic-ventricular tunnel with right coronary artery atresia]. Arch Mal Coeur Vaiss. 1997;90:725–727.
11. Musiani A, Cernigliaro C, Sansa M, Maselli D, De Gasperis C. Left main coronary artery atresia: literature review and therapeutical considerations. Eur J Cardio-Thorac Surg. 1997;11:505–514.

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Available online 19 January 2016

http://dx.doi.org/10.1016/j.ihj.2016.01.004
0019-4832/
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