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“Vieussens ring” — an unusual form of inter-coronary collateral from conus artery to diagonal artery

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A 74-year-old diabetic and hypertensive male presented with exertional angina which was Canadian Cardiovascular Society (CCS) — class II for past 2 years progressing to class III for past 6 weeks despite guideline directed medical therapy. His routine blood examinations and biochemistry were normal. Transrthoracic echocardiogram revealed mild concentric left ventricular hypertrophy, grade-II diastolic dysfunction, and normal systolic function with an ejection fraction of 60%. He was taken up for coronary angiogram after informed consent by transradial route. Angiogram revealed normal appearing left main, discrete lesion with critical stenosis of proximal left circumflex (LCx), while left anterior descending artery (LAD) revealed diffuse disease of mid segment with critical stenosis and dissection. However, diagonal branch could not be visualized. Both LAD and LCx were supplying grade I renetrop inter-coronary collaterals to right coronary artery (RCA). Right coronary artery revealed chronic total occlusion of mid segment. However, the large and tortuous conal branch was filling the large diagonal branch LAD. In lieu of angiographic finding, he was subsequently referred for coronary artery bypass surgery.

In patients with critical stenosis or total occlusion of either the left anterior descending artery or right coronary artery, the conus branch of RCA sometimes serves as a major source of inter-coronary collateral [1]. These collateral channels form the *Vieussens ring*. Although conus branch arises as a first branch of RCA in majority of cases, it can arise separately from right sinus in about 40% of cases where it is known as isolated conus artery (ICA) [2]. Under such circumstances, failure to recognize this normal variant, one may miss the feeding branch and thus non-visualization of LAD. It may either lead to incorrect interpretation of angiogram, or patient may undergo additional modalities of investigation like coronary tomography or magnetic resonance coronary angiography. The anterior and superior course of the conus artery is usually short, and supplies the right ventricular outflow tract and the supraventricular crest. Occasionally, it forms an anastomoses with the left

anterior descending artery (left conus artery), thereby forming the so-called “arterial circle of Vieussens or Vieussens ring.”

In our case, Vieussens ring was serving as collateral to diagonal branch instead of LAD. It has both diagnostic, as well as therapeutic implication. It helps surgeon to avoid any inadvertent damage to the conus artery especially if surgery involves manipulation of the right infundibulum. Furthermore, if it has separate origin, one may need to selectively cannulate the conus branch for retrograde injection in case of antegrade recanalization of chronic occlusion of the LAD to visualize the distal segment of LAD and advancing the guidewire correctly [3]. Sometimes, it may serve as an alternative to the retrograde route when the lesion cannot be successfully crossed using an antegrade approach if it is feeding LAD but one should always choose epicardial collateral as the last resort as these are very tortuous, and their perforation may be catastrophic [4].

Key Words: Chronic total occlusion; Conus branch; Diagonal artery; Vieussens ring

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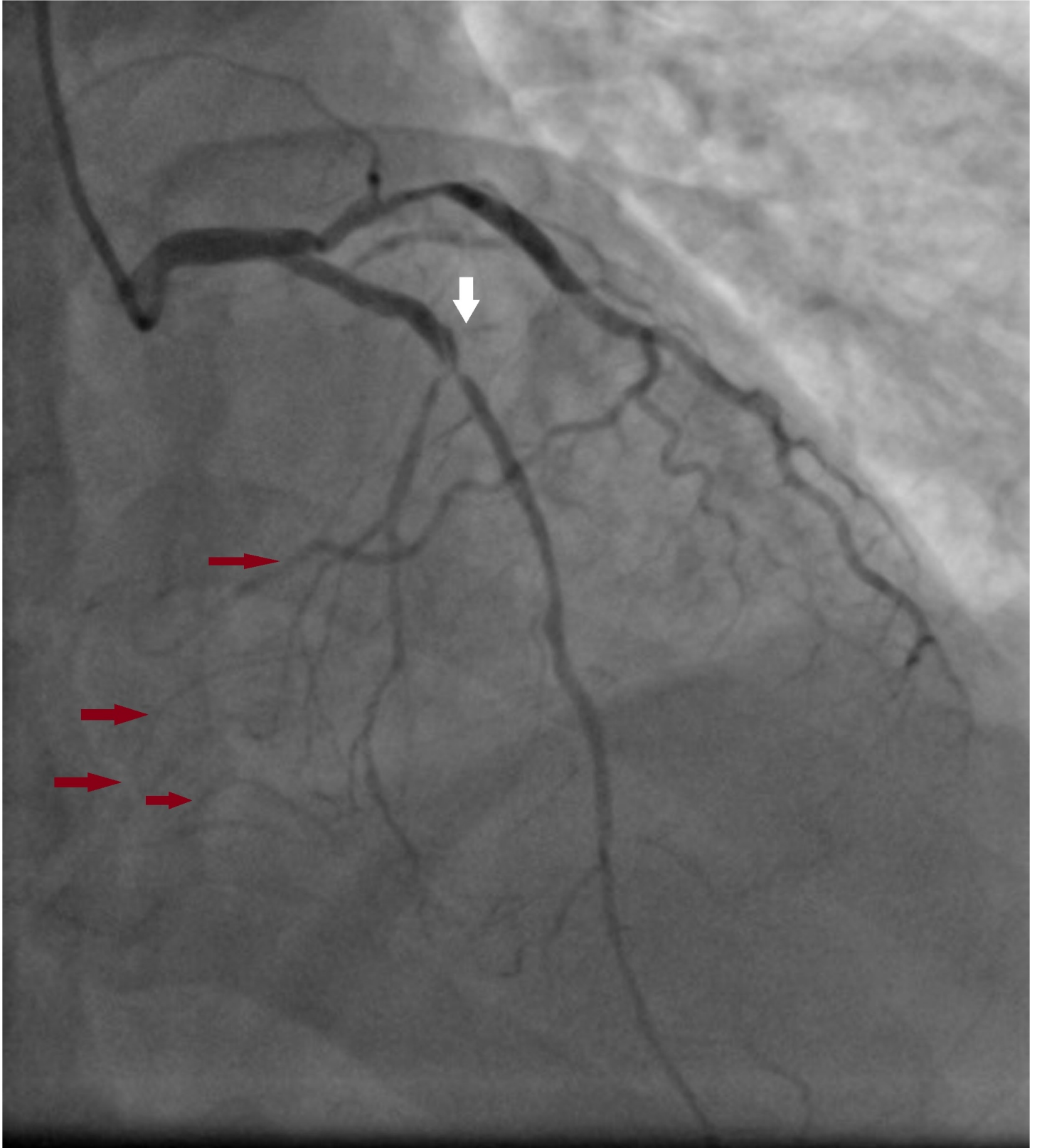
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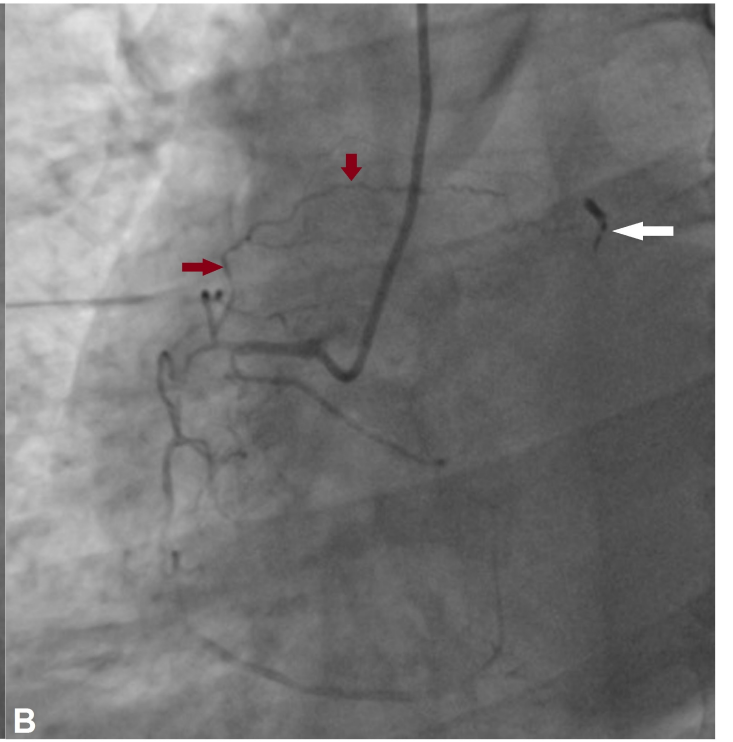
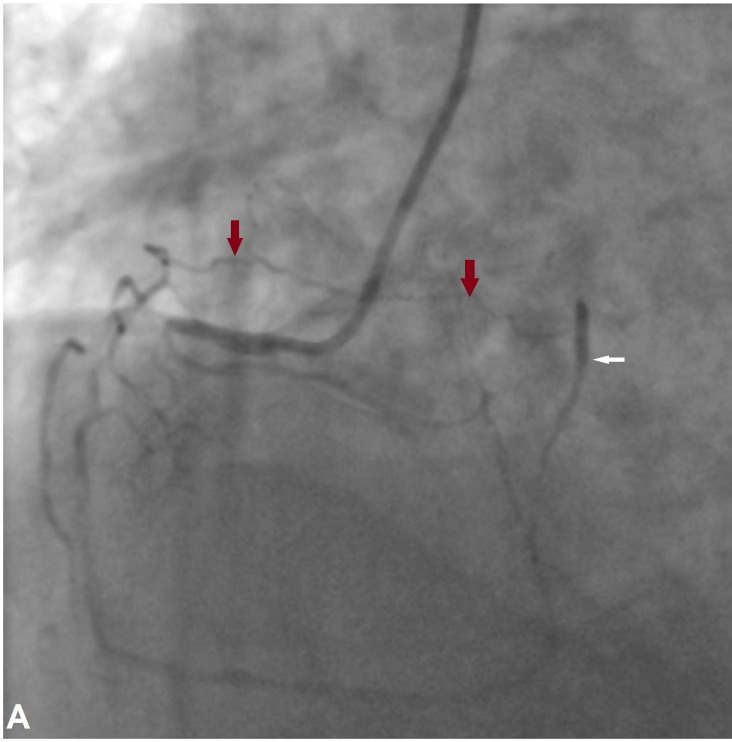
Figure legend

Figure 1. Antero-posterior view showing diffuse disease of LAD along with a dissection with total occlusion (white arrow) of diagonal branch (D) while LCx is showing discrete lesion. Both are giving faint collaterals (red arrow) to RCA

Figure 2. RCA showing chronic total occlusion in its mid segment. Diagonal branch (white arrow) of LAD is being filled by Vieussens ring (red arrow) from RCA (A-Straight lateral view; B-Left anterior oblique view)

Figure 3. RCA showing chronic total occlusion in its mid segment. Diagonal branch (white arrow) of LAD is being filled by Vieussens ring (red arrow) from RCA (A-Antero-posterior view with cranial angulation; B- Right anterior oblique view with cranial angulation)





A

B

