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FELLOWS FORUM

WILEY Congenital Heart Disease

Forgotten knowledge of the coronary-cameral connections and the rediscovery of their dynamic nature in development: The result of a misnomer, ambiguous use of nomenclature, and varied evaluation methods

To the Editor,

Tannous et al. report a case series that utilizes a semiquantitative grading system for following children with congenital heart disease and connections between the coronary arteries and heart chambers as identified on coronary artery angiography.[1] However, the authors are not the first to demonstrate the dynamic nature of the coronary artery-cameral connections.[2,3] In addition, Sirker et al. reported a case of coronary artery fistula that was initially grade zero and then progressed to a higher grade.[4]

The inaccurate conclusion that their case series is the first report to describe the dynamic "thebesian vein" changes may be secondary to the literature's lack of consistent terminology.[5] Tannous et al. astutely noted that there is a difference between the arterioluminal and venoluminal connections.[1] However, they mistakenly refer to both types of connections as "thebesian veins," and cite a reference that utilizes inaccurate nomenclature.[6]

Thebesius did not study the arterioluminal connections, and the arterioluminal connections are not veins (Figure 1).[3,5,7–12] The authors appear not to have translated the original works of either Vieussens or Thebesius as Wearn has done,[1,9] and thus inferred from an inaccurate source[6] that both Vieussens and Thebesius studied thebesian veins. Raymond Vieussens performed necropsies, examined the endocardial surface, and noticed small tendrils of blood clots that appeared to run into the walls of the heart.[9] Vieussens hypothesized that the tendrils connected to the coronary circuit. Therefore, he injected saffron into the coronary arteries and observed it escape through small openings in the auricles and ventricles.[9] In contrast, Thebesius blew air into the cardiac veins while the heart was submerged in water and observed bubbles escape from the heart wall.[9,13]

Pratt studied hearts by injecting the coronary veins and wrote that the "vessels of Thebesius open from the ventricles and auricles into a system of fine branches that communicate, with the coronary arteries and veins by means of capillaries, and with the veins—but not with the arteries—by passages of somewhat larger size."[7]

Pratt's definition indicates that the "vessels of thebesius," are on the venular side of the capillary bed, and thus properly referred to as "thebesian veins." When injecting coronary arteries, it is usually best to not refer to ventricular filling as "thebesian," unless there are specific angiographic findings that suggest the contrast traversed the capillary bed and then entered an auricle or ventricle.

It is a misnomer to refer to the artery-cameral connections as veins since they are on the arterial side of the capillary bed. The authors cited Ansari for their definitions of thebesian veins. However, Ansari defined arterioluminal vessels as both (1) connecting arteries to Thebesian veins and (2) connecting arteries to heart chambers.[2] The first definition presented by Ansari is incorrect.[6,9] Wearn reported two types of coronary artery-to-heart chamber connections—the less prevalent arterioluminal vessels, and the more common arteriosinusoidal vessels (Figure 1).[8,9] The eponym "vessels of Wearn" has been offered to describe those thebesian-like vessels on the arterial side of the capillary bed.[3,5,10,11] Regardless of whether the eponym is adopted, the medical and scientific community would be well served if a consistent terminology was agreed upon.

Although Wearn referred to the arterioluminal connections as "thebesian vessels" in his 1928 publication, he later clarified that the vessels studied by Thebesius are separated by a capillary bed from those discovered by Vieussens.[9] It was Wearn's seminal publication on the topic in 1933 that clearly established that thebesian veins are not on the same side of the capillary bed as the arterioluminal vessels. Therefore, it is not only a misnomer to refer to these arteries as "thebesian veins," but it is inaccurate to attribute such connections to Thebesius. There are cases where the delineation between the thebesian veins and vessels of Wearn is not possible by coronary artery angiography, and the terminology needs refinement.[12,14] However, in many cases, the distinction between thebesian veins and vessels of Wearn is possible by coronary artery angiography.[15] In addition to the radiographic appearance, the type and nature of the artery-cameral connections can be elucidated if consideration is given to the clinical scenario and the relative ventricular pressures. A large fistulous connection, sometimes referred to as "sinusoidal flow," may be a "vessel of Wearn" that is abnormally prominent due to pathologic alteration from the elevated right ventricular pressure.[3,15] Other cardiac angiographers such as Singhal and Gollan refer to the thebesian system as a venous one.[16] In contrast, other publications mistakenly refers to coronary artery-cameral connections as veins.[17,18]

If angiographers decide to continue to use the term "thebesian" to report cases where there is ventricular extravasation of contrast dye after arterial injection, they should at least use the term "thebesian-like vessels" to avoid the misnomer of veins and the misattribution to

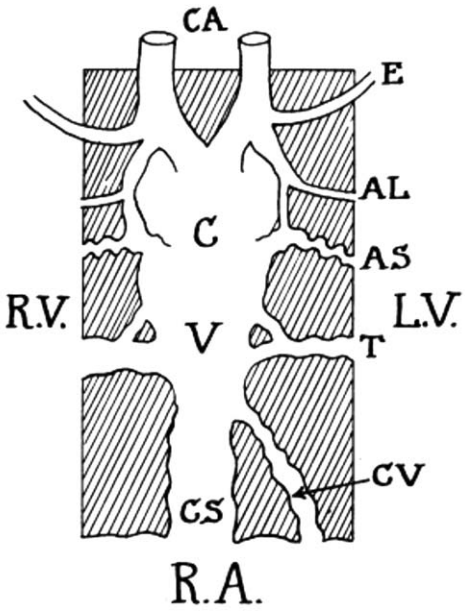

Fig. 1

CA—coronary arteries.
E—extracardiac branches.
AL—arterio-luminal vessels.
AS—arterio-sinusoidal vessels.
C—capillaries.
T—Thebesian veins.
V—coronary veins.
CV— " "
CS—coronary sinus.
R.V.—right ventricle.
R.A.—right auricle.
L.V.—left ventricle.

FIGURE 1 Courtesy of the New York Academy of Medicine

Thebesius. It is very important to be cautious when reviewing the literature, because although the dynamic change of "thebesian veins" may not be well-reported, the dynamic change of ventriculocoronary arterial connections has been well-reported.[2,10]

CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

Dr. Snodgrass drafted and revised the manuscript. Dr. Chilakala made substantive changes to the content of the manuscript.

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