Subaortic ventricular septal defect closure: is the principle of harmony for a longer function no longer valid?

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During my training, I was taught a few golden rules, one of which never failed: what looks aesthetic and harmonious works better and longer. Indeed, flows remain laminar in pleasant curves, while they break in turbulences—with a loss of energy and an increased stress on the surrounding structures—around sharp angles. Textbooks further taught me the characteristics of subaortic ventricular septal defects (VSDs): anatomically, they present as a perimembranous VSD or are committed to both semilunar valves and stay at a distance of the conducting tissues; physiologically, they are usually restrictive and can be associated with a prolapse of the right coronary cusp, which in turn can lead to an aortic valve insufficiency.

Our surgical vision of the defect has been completed by the advent of peroperative transoesophageal echocardiography (TEE), an instrument that gives us an ‘on-line’ assessment of the defect [1]. It frequently adopts the shape of a moon and is of a malalignment type. Its inferior border is well delineated with a normal thickness of the septum, while its superior border is often less well demarcated with a rather thin conal septum. The whole right coronary sinus seems to bulge in the infundibulum, as if its wedging structures had too weakly supported it. It is the rotation of the sinus within the infundibulum that pulls the right coronary leaflet away from its coaptation line and is in part responsible for its prolapse. Because of the malalignment of the septum, turbulences occur, which progressively give rise to a fibrous membrane along the inferior border of the defect. The membrane extends progressively in the subcommissural triangles of the right coronary cusp and to the body of the leaflet itself [2]. The retraction of the leaflet and the restriction of its motion further add to its imperfect closure, in the same way as a classical circumferential subaortic membrane restricts the closure of a structurally normal aortic valve.

The surgical challenge to this defect lies less in the closure of the communication itself—the shunted blood is usually limited—than in the preservation or in the restoration of the function of the aortic valve. Therefore, a comprehensive treatment of the defect is recommended. It should not be limited to its sole closure, but it should also include the thorough resection of the fibrous tissue, especially if it has reached the valvular structures. We usually use a transatrial (often with a temporary detachment of the anterior leaflet of the tricuspid valve) [3] or a transpulmonary approach to close these VSD. When the tissues are of good quality, we like to close them directly [4], as this method realigns the septum and restores part of the failing support to the aortic annulus. We do not hesitate, however, to open the ascending aorta—before the closure—to ensure a complete resection of the fibrous membrane and a complete freeing of the right coronary leaflet. These two manoeuvres—the restoration of the full leaflet mobility and a stronger support to the aortic annulus—are usually sufficient to achieve a competent and stable aortic valve. In long-standing regurgitations, with a more pronounced prolapse of the right coronary leaflet, a central plicature of the leaflet should be added [5].

In Hu et al.’s series [6], published in this issue, one-third of the patients with a subaortic VSD were treated through a so-called ‘percardiac closure’, with the use of an asymmetric device. The results reported with this new method are reassuring on a short term period. A fundamental question, not alluded to in the paper, however, emerges. What is the outlook of the left ventricular outflow tract (LVOT) and aortic valve over time with such an intruding device? The published echocardiographic views (see their Figure 4) look alarming. They show a device pushing the septum towards the anterior leaflet of the mitral valve, on the one hand, and impinging on the right coronary leaflet, on the other hand. In short, the device creates an ‘en baillonnette’ LVOT and excludes the systolic function of the right coronary leaflet. Everyone who has opened an atrium a few years after the implantation of a similar device has witnessed its covering by scarring tissue, spreading on the adjacent structures. The same process is bound to exacerbate the obtrusive presence of the device: on its inferior part, turbulences will promote the development of a subaortic membrane, and much more concerning, on its superior part, the scarring tissue may reach the right coronary leaflet.

The results reported with this new method are reassuring on a short term period. Visually, however, the repair looks terrible, especially if it is compared with a direct closure of the defect, when the septum is realigned and malaligned, when the anatomy is very close to normal. The fact that no turbulences were detected on the...
peroperative TEE does not exclude their appearance in a situation when a higher cardiac output is set, a frequent occurrence in active young patients. Time will tell whether some of our concerns will materialize finally. For the time being, until a longer follow-up or a dynamic study is reported, I will continue to stick to the golden rules learnt during my training.

REFERENCES


