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EDITORIAL COMMENT

Imaging techniques: Paving the way for paravalvular leak closure

Técnicas de imagem: solidificar o caminho para o encerramento de fugas paravalvulares

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The present editorial refers to the article on paravalvular leak (PVL) closure by Galrinho et al. published in this issue of the *Journal*.[1] The authors report a single-center experience in a retrospective review and analyze possible predictors of success. They performed 33 percutaneous PVL closures in 26 patients. All mitral and aortic prostheses were studied previously with three-dimensional (3D) transesophageal echocardiography (TEE). 3D TEE and fluoroscopy were used for the assessment, planning, and guidance of the interventions. In 12 patients they also performed computed tomography angiography (CTA) for better characterization. Closure was successful in 17 patients (65.4%), partially successful in four (15.4%) and unsuccessful in five (19.2%). There was a relationship between clinical improvement and reduction of PVL (p=0.0001). In the follow-up, cardiac-related events were more frequent in patients with partially successful or unsuccessful closure, and there was a relationship between cardiac-related events and death.

PVL is a not uncommon complication after surgical or transcatheter valve replacement that can develop years after the intervention. About 1-5% of PVLs lead to serious consequences, including hemolytic anemia and congestive heart failure.[2] Symptomatic PVLs are known to increase morbidity and mortality among patients with implanted prosthetic valves. Traditionally, surgical reintervention has been considered the gold standard for symptomatic patients with PVLs. However, it is associated with high morbidity and mortality, and the percutaneous option has emerged as a less invasive alternative. The surgical options are PVL repair or prosthesis replacement, depending on the size and extent of the PVL, the condition of the native valve, and the patient's clinical history. In some studies, surgical management of PVLs shows better technical success rates than transcatheter techniques.[3] Nevertheless, there is a higher risk of mortality and morbidity following redo cardiac surgery for PVL. In addition, after repeated surgeries, there is a considerable risk of PVL recurrence due to tissue friability.[4]

The percutaneous approach emerged initially as an alternative to medical treatment for inoperable patients or those at high surgical risk, but for many experienced centers it has become the first-line therapy for patients with PVL. The use of modern software (especially with 3D TEE and CTA) can improve outcomes. Fusion technology, which integrates ultrasound images with fluoroscopy for procedural guidance, has also simplified the percutaneous procedures of transcatheter PVL closure.[5,6]

Although high technical success rates in percutaneous closure of PVLs are reported in multiple small series,[7,8] there is a paucity of data on both acute and long-term outcomes in this group of patients. Some studies suggest that successful percutaneous reduction of the PVL to mild or less is associated with significant mid-term survival benefit.[9]

One of the strengths of percutaneous treatment of PVLs is the low rate of procedural complications (since it is less invasive than the surgical option), even in unsuccessful procedures.[10] Furthermore, the percutaneous option

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does not exclude the possibility of future surgical interventions. Technology has evolved, imaging has improved and transcatheter techniques have advanced, as has operator experience.

However, sometimes transcatheter procedures are not completely successful, which leads to a higher risk of hospitalizations and worse functional class during follow-up, but does not necessarily increase mortality.[11] In fact, successful treatment of PVL through transcatheter techniques is associated with the same risk of death at three years of follow-up as that of surgically managed patients.[11] Improving results of PVL closure is based on thorough planning of the procedure with the available imaging technology. It is known that a satisfactory technical result leads to a better prognosis. In this regard, in the article by Galrinho et al., only 46% of the patients had previous CTA (12 of 26 patients).[1] CTA can help to localize the PVL and provide a better assessment of its size, which when measured on CTA correlates with the regurgitant grade on echocardiography.[12] In addition, fusion of CTA and fluoroscopy data enables visualization of soft tissue structures and creates targets that move with the c-arm, facilitating the procedure. Fusion imaging can help by guiding PVL closure and providing dynamic targets as an overlay on live fluoroscopy, reducing the time needed for wire cannulation across the PVL and procedural time.[13]

In the absence of randomized studies, the evidence shows that transcatheter techniques are an effective and safe option. They should be considered the treatment of choice in experienced centers, using all the available technology for improving results, including imaging techniques that can help in the planning of the procedure.

Conflicts of interest

The authors have no conflicts of interest to declare.

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