Transprosthetic leak after biological aortic valve replacement: There's a hole in the valve!

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A trivial transvalvular regurgitation, usually originating from the central leaflet coaptation area of the implanted biological prosthesis, is frequently observed early after surgical aortic valve replacement (sAVR) and in most cases considered physiological.¹ In contrast, the presence of a paravalvular leak (PVL), usually located between the sewing ring of the prosthesis and the aortic annulus, necessitates further assessment.¹ The incidence of PVL after circumferentially sutured biological sAVR ranges from 2% to 10%.^{2,3} Risk factors for PVL include heavy annular calcification, tissue frailty, use of a running suture technique, use of a mechanical valve prosthesis, and supra-annular valve positioning.

The recently published statement of the Paravalvular Leak Academic Research Consortium (PVL-ARC) introduced a novel 5-class grading scheme for PVL severity and summarizes detailed recommendations for uniform evaluation after sAVR.⁴ Surgical treatment options for symptomatic patients include repeat sAVR or direct closure, with a recent single-center experience reporting a 30-day mortality of 5%.⁵ In symptomatic patients who are at high risk for redo surgery, percutaneous PVL has emerged as an attractive alternative treatment.¹

In this issue of the *Journal*, Arakawa and colleagues⁶ present a rare case of a transvalvular leak following sAVR with a widely implanted tissue valve. Intraoperative echocardiography after sAVR revealed a noncentral and non-PVL between the base of the stent post and the sewing ring, termed “transprosthetic.” In a subsequent pump run, structural valve dysfunction or PVL was excluded by the surgeons, and reimplantation of a new valve of the same size and brand resolved the issue. The explanted bioprosthesis was sent to the manufacturer for inspection, to ensure proper function and integrity of the bioprosthesis.

This report raises 2 important questions. First, what is the underlying cause of a transprosthetic leak after sAVR? Kuroda and colleagues have described a potential fabrication problem in a previous report of 2 comparable cases of

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Central Message

A transprosthetic leak between the stent post and sewing ring of a bioprosthesis was detected after surgical aortic valve replacement (AVR). This complication should be considered next to transvalvular and paravalvular leaks following AVR.

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transprosthetic leak after sAVR using the same valve type and size.⁷ However, based on the high implantation rate and excellent results of this bioprosthesis worldwide, along with my personal experience, it seems to me that other technical issues during implantation may have played a role. For example, extensive force or traction on surgical sutures during valve fixation within the annulus can lead to local dehiscence within the sewing cuff, which could promote this type of leak. This also could explain the fact that both the manufacturer and surgeons were unable to localize an SVD after excision, and that the transprosthetic leak resolved shortly after protamine administration in another report.⁷

Second, is there a treatment strategy that can be acutely followed when a transprosthetic leak is observed during sAVR? Considering the limited experience with this complication,^{6,7} grading the severity of transprosthetic leak using the PVL-ARC criteria before and after protamine administration seems to be a promising approach to allow a reproducible assessment. If a mild transprosthetic leak persists after protamine

administration, then a repeat pump run and SAVR, as performed in the present case report, seems to be the safest approach for the patient.

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