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Commentary: Should we book a seat on the aortic neocuspidization rocket?

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CENTRAL MESSAGE

AVneo has demonstrated outstanding early outcomes, but will the glutaraldehyde-treated autologous pericardial aortic valve become regurgitant or calcify in the long-term?

Like space aficionados clamoring for the next seat on the Virgin Galactic (Mojave, Calif) or SpaceX rockets (Hawthorne, Calif) to outer space, should we get on board the aortic valve neocuspidization (AVneo) ship? In the article "Short-term Outcomes of Aortic Valve Neocuspidization for Various Aortic Valve Disease,"[1] Khatchatourov and colleagues reported on 70 patients with AVneo who had their native pericardium treated with glutaraldehyde, cut into parabolic shapes, and sutured to the aortic annulus to replace the excised leaflets of the stenotic or regurgitant native aortic valve.

Amazingly, the 70 patients comprised 16% of the authors' 437 patient aortic surgical population. Being able to convince 16% of any group is off the charts in the current environment. Perhaps the 50% incidence of bicuspid aortic valves, which, if not repairable, would have required replacement offers partial explanation for the patients' willingness to enroll in the AVneo trial.

The authors results were spectacular, with the operated patients having a postoperative aortic valve area of 2.5 $\pm$ 0.6 cm^2, postoperative peak aortic gradient of 13 $\pm$ 7 mm Hg, 30-day or in-hospital mortality of 1.4%, and with only 1 of 70 requiring standard valve replacement due to technical failure. The absence of patient–prosthesis mismatch was also noteworthy. I congratulate the authors for incorporating the technique into their practice without a learning curve.

The authors documented an average 14 $\pm$ 6 days of hospitalization, which was the result of the "inflammatory" process having normalized, and recommended colchicine treatment in 3 patients. The authors should detail "the inflammatory" process, its morbidities, if any, and how they select postoperative patients for colchicine therapy.

The authors mention that in the relatively short 24- $\pm$ 12-month follow-up, 2 patients required reoperation—one due to recurrent aortic stenosis and one secondary to endocarditis. In the 15 patients with grade I aortic regurgitation at discharge, 3 had progressed one aortic regurgitation grade at the 24- $\pm$ 12-month follow-up interval. This poses the question if aortic regurgitation may continue to progress with longer follow-up or if a band to prevent further annular dilatation in the aortic regurgitation cohort should be considered.

The reoperated patients had evidence of neoleaflet fibrinoid inflammatory reaction with giant cells and macrophages. This response to the glutaraldehyde may cause long-term injury to the neoaortic leaflets and a significant incidence of reoperation. The literature is dotted with reports of glutaraldehyde-treated autologous pericardium or other cardiac implants becoming fibrotic or calcified with long-term follow-up. Fukunaga and colleagues[2] cataloged glutaraldehyde-treated autologous pericardium used for mitral valve repairs as a risk factor for redo mitral operations. Glutaraldehyde-treated autologous pericardial patch dehiscence, progressive fibrosis, and partial tears were documented after mitral valve repair by Shomura and colleagues.[3] A case report of severe glutaraldehyde-treated

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autologous pericardial calcification causing limited movement of the anterior mitral leaflet and mitral stenosis was documented by Fukunaga and colleagues.[4]

AVneo appears promising as another technique the cardiac surgeon will need to add to his or her armamentarium. I will await longer long-term follow-up to ensure aortic valve neocuspidization does not develop significant regurgitation or incite an inflammatory milieu, which will lead to aortic valve malfunction, before grabbing a seat on the AVneo rocket!

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