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IMAGES IN INTERVENTION

Transcatheter Tricuspid Valve Repair With the PASCAL System

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An 82-year-old woman presented with advanced right heart failure, recurrent hospitalizations, and secondary tricuspid regurgitation (TR). She had persistent New York Heart Association functional class IV dyspnea, severe fatigue, ascites, and peripheral edema. Past history included coronary artery bypass graft, atrial fibrillation, and chronic kidney disease. Echocardiography demonstrated torrential TR (effective regurgitant orifice area: 1.3 cm^2, tricuspid annular dimension: 44 mm) with leaflet tethering, severe right ventricular dilatation and preserved left ventricular function (**Figures 1A to 1C**, Online Videos 1, 2, and 3). After Heart Team review, the patient was treated with the Pascal transcatheter repair system (Edwards Lifesciences, Irvine, California) (1).

The 22-F Pascal System was introduced into the right atrium via the right femoral vein. Under transesophageal echocardiography and fluoroscopic guidance, the device was placed by independently grasping the anterior leaflet followed by the septal leaflet to maximize leaflet insertion (**Figure 1D**, Online Video 4). A second device was placed between the posterior and septal leaflets using the same technique, leading to TR reduction from torrential to moderate (effective regurgitant orifice area: 0.3 cm^2), with a mean gradient of 1 mm Hg (**Figure 1E**, Online Videos 5 and 6). The patient's condition significantly improved, allowing hospital discharge 3 days later. At 1 month follow-up, the patient was in New York Heart Association functional class II with resolution of ascites and reduced diuretic requirements. Quality of life (Minnesota Living With Heart Failure Questionnaire) score improved by 43 points and 6-min walk distance increased by 135 m. Transthoracic echocardiography demonstrated mild TR (**Figure 1F**, Online Video 7) with reverse RV remodeling (tricuspid annular dimension: 39 mm).

Transcatheter tricuspid edge-to-edge repair is currently the most prevalent technique for treating patients with severe TR and heart failure (2,3). However, some patients are not candidates or have suboptimal TR reduction due to large coaptation gaps and leaflet tethering. The Pascal System offers a unique, intuitive steering system to deliver a spacer to fill large coaptation gaps, thereby allowing treatment of challenging anatomy to achieve significant TR reduction, as demonstrated in this report. Further research to assess durability, safety, and comparative efficacy with other devices is needed, along with a determination of the impact on long-term clinical outcomes.

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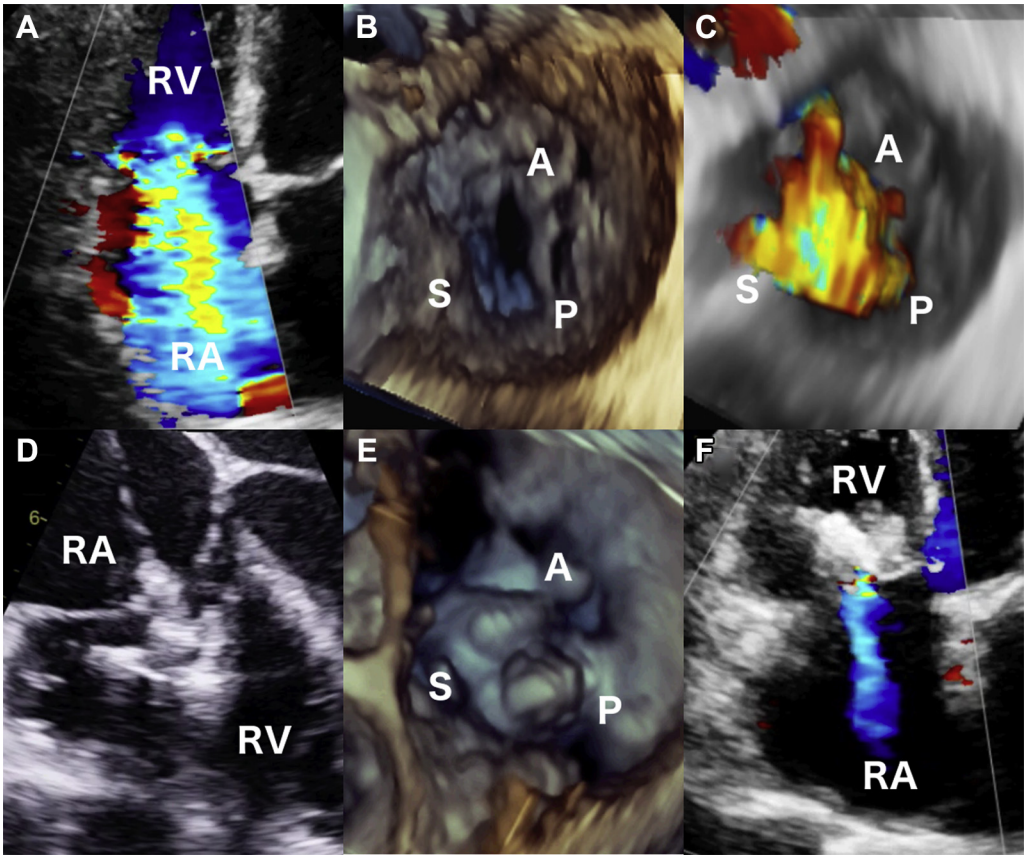
FIGURE 1 Procedural Steps of Tricuspid Repair With the Pascal System



(A) Baseline right ventricular (RV)-focused transthoracic echocardiographic view demonstrating torrential tricuspid regurgitation (TR). **(B)** Three-dimensional transesophageal echocardiographic (TEE) view of the tricuspid valve showing a large central coaptation gap. **(C)** Three-dimensional TEE view with color Doppler. **(D)** Four-chamber TEE view of leaflet grasping. **(E)** Three-dimensional TEE view after implantation of 2 Pascal devices. **(F)** RV-focused transthoracic echocardiographic view demonstrating mild TR at follow-up. See Online Videos 1, 2, 3, 4, 5, 6, and 7. A = anterior; P = posterior; RA = right atrium; S = septal.

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KEY WORDS heart failure, transcatheter leaflet repair, tricuspid regurgitation

APPENDIX For supplemental videos, please see the online version of this paper.