

MINI-FOCUS ISSUE: TRANSCATHETER INTERVENTIONS

INTERMEDIATE

IMAGING VIGNETTE: CLINICAL VIGNETTE

Deep Sedation in a Patient Undergoing Transfemoral Tricuspid Valve Repair Using the PASCAL System



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ABSTRACT

A 70-year-old man with severe tricuspid regurgitation and large coaptation gap (0.8 cm) was referred to transfemoral valve repair using the PASCAL system. The procedure was successful in reducing tricuspid regurgitation. The PASCAL device facilitated maximum leaflet insertion and to span large coaptation gap in severe tricuspid regurgitation without ventilation maneuvers under general anesthesia. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2020;2:1109-11) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 70-year-old man presented with recurrent cardiac decompensation. In 2017 he already underwent successful edge-to-edge mitral valve repair with the MitraClip system because of severe mitral regurgitation. At that time there was no relevant tricuspid regurgitation (TR). His medical history included a coronary 3-vessel disease with highly impaired left ventricular function and a primary prophylactic implantation of an implantable cardioverter-defibrillator system. Transesophageal echocardiography revealed a remaining low-degree mitral regurgitation and a new secondary severe (torrential) TR along the implantable cardioverter-defibrillator lead with a large coaptation gap of 8 mm (**Figure 1A**). The right ventricle was enlarged with reduced ventricular function (tricuspid annular plane systolic excursion 16 mm) and a systolic pulmonary artery pressure of 57 mm Hg. Based on the decision of our interdisciplinary heart team, a percutaneous approach for TR repair was chosen. The procedure was performed under deep sedation (DS) with a total duration of 2 h and 46 min and without the presence of an anesthesiologist. Propofol (375 mg) was administered continuously for DS. IV anesthesia was delivered by piritramide (3 mg) before initiation of propofol sedation. The level of sedation was adjusted to DS based on a Richmond Agitation Sedation Scale score of -2 to -3. A nasopharyngeal airway was used. Intraoperative conversion to general anesthesia (GA) was not required. After clamping the posterior and septal leaflet with the PASCAL device producing a double orifice (**Figure 1A**) TR could be reduced from very severe to moderate TR (**Figures 1B and 1C**). The 3-dimensional effective regurgitation orifice area could be reduced from pre-transfemoral tricuspid valve repair 0.49 cm² to 0.28 cm² after clamping. There was no postinterventional functional tricuspid stenosis (Pmean 2 mm Hg at 60 beats/min). Because of prolonged peri-interventional transesophageal echocardiography and known esophageal varicose caused by cirrhosis cardiac, the patient was observed in the intensive care unit for 18 h and could be transferred to intermediate care unit. There was no major bleeding, no major adverse cardiac and cerebrovascular events,

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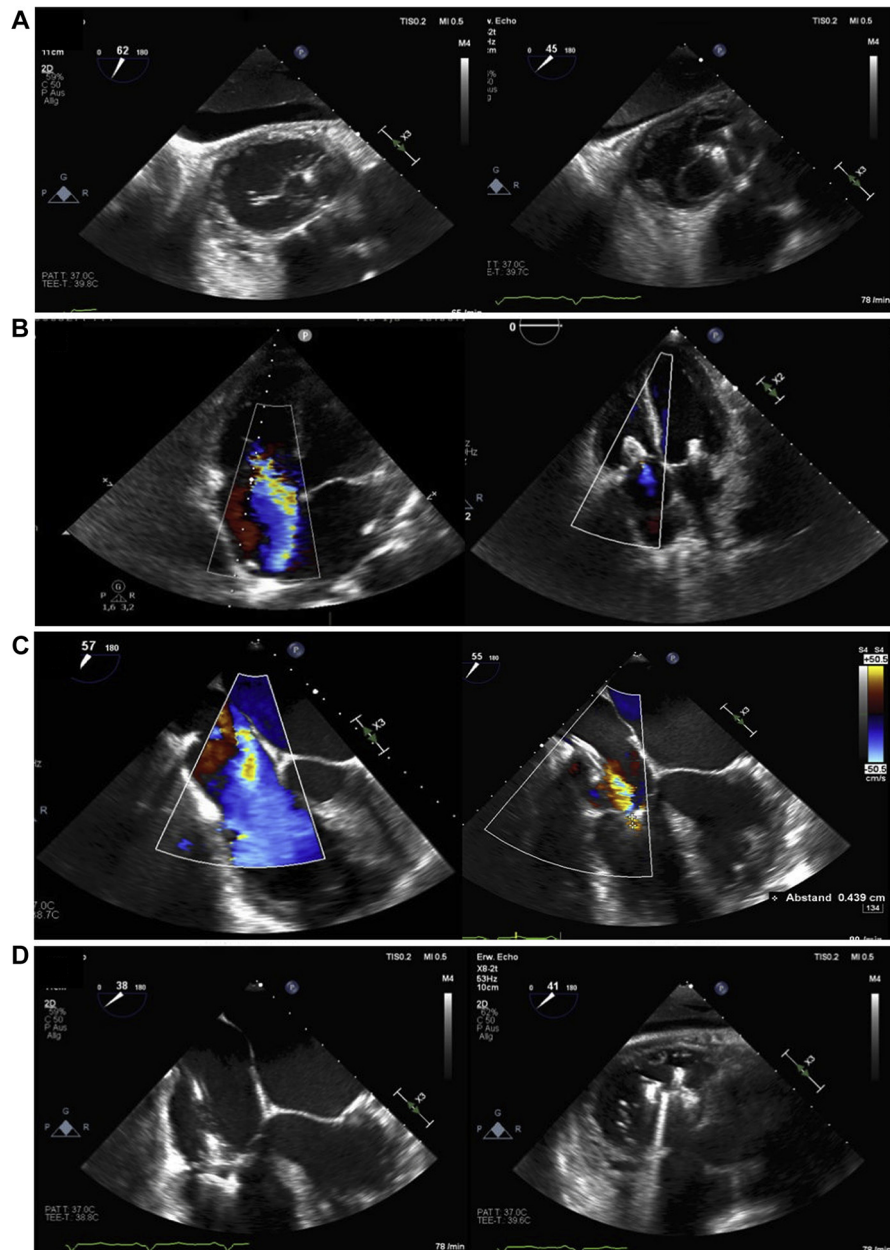
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**ABBREVIATIONS
AND ACRONYMS**

DS = deep sedation
GA = general anesthesia
TR = tricuspid regurgitation

conversion to surgery, or major vascular complication using DS approach. The patient was discharged from hospital with significantly improved symptoms. The transthoracic echocardiography showed a stable position of the PASCAL device and sustained procedural success with moderate TR after 3-month follow-up. Implantable cardioverter-defibrillator function and lead position was not affected.

FIGURE 1 Perioperative Transthoracic and Transesophageal Echocardiographic Images Showing Procedural Success



(A) Large coaptation gap between the tricuspid valve leaflets before clamping (**left**) and double orifice after successful clamping of septal and posterior leaflets in transesophageal echocardiography (TEE) imaging (**right**). **(B)** Severe tricuspid regurgitation (TR) before clamping (**left**) and moderate TR after successful clamping (**right**) in transthoracic echocardiography imaging. **(C)** TEE image of pre-interventional TR (**left**) and after successful placement of the PASCAL device (**right**). **(D)** Placing the PASCAL device between the posterior and septal leaflet at the site of maximum TR jet close to the implantable cardioverter-defibrillator pacemaker lead (**left**) and independent clamping of the posterior leaflet first and the septal leaflet second allowing to maximize leaflet insertion and to span the large coaptation gap (**right**). **(E)** TEE 3-dimensional view on tricuspid valve.

There are limited data on the use of the PASCAL system for treating severe TR under GA from small series of patients with good short-term results (1,2). We report the first transfemoral implantation of the PASCAL system in a tricuspid valve with severe TR using DS that resulted in a significant TR reduction. The performance of this procedure using DS instead of GA might be beneficial for this group of patients with high operative risk. In particular with tricuspid interventions it is difficult to plan the total amount of device implantations. Therefore a careful planning with adequate pre-procedural imaging is of utmost importance to accurately identify the pathomechanism and geometry of TR. This allows to minimize duration of transcatheter TR interventions under DS.

Larger studies are required to confirm the feasibility, safety, and efficacy of the transfemoral tricuspid valve repair with the PASCAL system using DS in patients with severe TR. The possibility of independent leaflet grasping using the PASCAL device facilitates maximum leaflet insertion and to span large coaptation gaps in severe TR (Figures 1D and 1E) without ventilation maneuvers under GA as being important for simultaneous grasping of tricuspid leaflets with the MitraClip (3).

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KEY WORDS deep sedation, PASCAL device, tricuspid regurgitation