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Transcatheter Treatment of Subaortic Stenosis Via Transcaval Access

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A 34-year-old woman with Down syndrome with a history of an atrioventricular canal repair and a mechanical mitral valve replacement came to our hospital due to worsening symptoms of heart failure. Echocardiography and computed tomography imagings revealed a thickened bicuspid aortic valve without significant stenosis and discrete subaortic stenosis (SAS) (mean pressure gradient 67.4 mm Hg) despite resection of subvalvular membrane at her last surgery 11 years prior (**Figures 1A and 1B**, Online Video 1). Because of her significant cognitive impairment and 2 prior sternotomies, she was deemed a poor surgical candidate. Transcatheter treatment, using the same technique as transcatheter aortic valve replacement, was planned for SAS. Multidetector computed tomography revealed her arterial access was inadequate for traditional transfemoral access or transsubclavian access. Again because of her cognitive impairment, other surgical alternative access (transaortic, transapical, and transcarotid) were not attempted, and therefore the procedure was performed via transcaval access (1,2).

The procedure was performed under general anesthesia in the catheterization laboratory. A Confianza Pro wire (Abbott Vascular, Santa Clara, California) was crossed into the aorta (**Figures 1C and 1D**, Online Video 2), subsequently exchanged to a Lunderquist wire (Cook Medical, Bloomington, Indiana). After the establishment of transcaval access, a 14-F sheath was advanced from the right femoral vein into the aorta. After balloon valvuloplasty with a 20-mm Z-Med balloon (NuMED, Hopkinton, New York) to confirm the position of the stenosis (**Figures 1E**, Online Video 3), a 23-mm SAPIEN 3 valve (Edwards Lifesciences, Irvine, California) was deployed covering the stenosis with neither paravalvular leakage nor interference of the mitral valve (**Figure 1F**, Online Video 4). Aortocaval fistula was closed with a 10/8-mm Amplatzer duct occluder (St. Jude Medical, St. Paul, Minnesota) (**Figures 1G and 1H**, Online Video 5). The mean gradient had improved to 12.6 mm Hg (**Figures 1G and 1H**, Online Video 6). The patient was discharged with symptom relief on post-operative day 1.

SAS is often observed in patients with congenital heart disease. Although surgical treatment for SAS remains the gold standard for therapy, reoperation rates are high (3–5). We demonstrated the feasibility of transcatheter treatment as an alternative therapy for SAS in patients with very high surgical risk.

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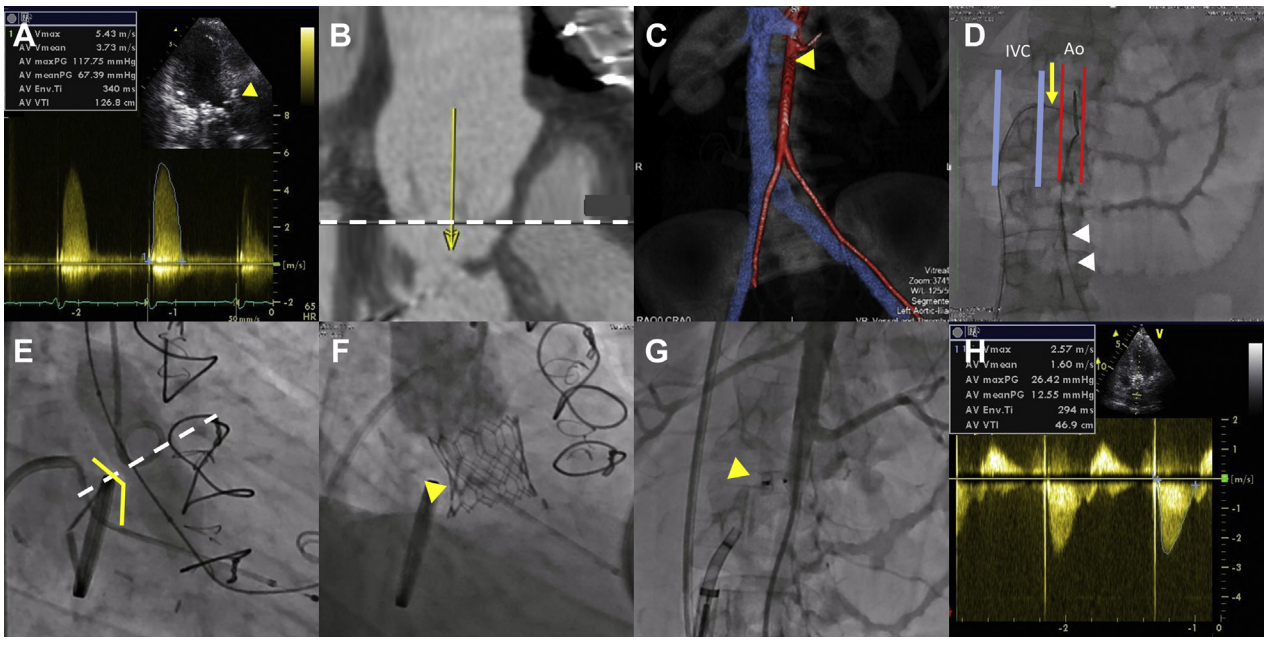
FIGURE 1 Transcatheter Treatment of Subaortic Stenosis Via Transcaval Access



(A) The mean gradient had improved to 67.4 mm Hg. Transthoracic echocardiography identified subaortic stenosis **(arrowhead)** (Online Video 1). **(B)** Multidetector computed tomography revealed subaortic stenosis **(arrow)** under the annulus plane **(broken line)**. **(C)** Puncture point was located near the top of the second lumbar vertebrae **(arrowhead)**. **(D)** A Confianza Pro guidewire (Abbott Vascular, Santa Clara, California) **(arrow)** was crossed from the inferior vena cava (IVC) into the aorta (Ao) toward a snare catheter **(arrowheads)** (Online Video 2). **(E)** Remaining indentation of the balloon indicated location of the subaortic stenosis (along with **yellow line**) under annulus plane **(broken line)** (Online Video 3). **(F)** A SAPIEN 3 valve (Edwards Lifesciences, Irvine, California) was deployed covering the stenosis **(arrowhead)** without paravalvular leakage (Online Video 4). **(G)** Aortocaval fistula was closed with an Amplatzer duct occluder (St. Jude Medical, St. Paul, Minnesota) **(arrowhead)** (Online Video 5). **(H)** The mean gradient had improved to 12.6 mm Hg without interference of the mitral valve (Online Video 6).

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APPENDIX For supplemental videos and their legends, please see the online version of this article.