

Balloon Aortic Valvuloplasty as a bridge to Transcatheter Aortic Valve Implantation in a High-risk Patient with Severe Aortic Stenosis

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Surgical aortic valve replacement (SAVR) is the treatment of choice for patients with severe aortic stenosis (sAS). Balloon aortic valvuloplasty (BAV) was developed 40 years ago, and it was an alternative to conventional SAVR in elderly and frail patients for whom there were no other effective therapeutic options [1].

Transcatheter aortic valve intervention (TAVI) has expanded its indications during the last 20 years, from prohibitively high surgical risk of mortality to intermediate risk patients [2].

We reported a case of BAV that was used as a bridge to TAVI in an elderly patient with sAS, congestive heart failure (CHF), and ischemic hepatitis (IH).

PATIENT DESCRIPTION

A symptomatic 91-year-old male patient with severe AS was admitted for evaluation before TAVI procedure. He had a history of hypertension. At age 63 years, he had an inferior wall myocardial infarction and underwent stenting to right coronary

artery (RCA). At age 84 years he complained of chest pain on effort and underwent stenting to left anterior descending coronary artery and RCA. Physical examination demonstrated severe AS, which was confirmed by an echocardiogram (severe calcified AS with peak transvalvular gradient [PG] 64 mmHg, mean PG 34 mmHg, aortic valve area 0.9 cm²) and additional findings of left ventricular ejection function (LVEF) 60% despite inferolateral hypokinesia, moderate mitral valve regurgitation, and mild moderate aortic regurgitation (AR).

The patient was asymptomatic for 6 months until he began to experience dyspnea. The TAVI procedure was proposed. Cardiac catheterization was performed and demonstrated patent coronary arteries.

On admission, the patient's functional capacity was New York Heart Association Class III. An echocardiogram showed severe left ventricular failure (LVEF 30%), reduced right ventricular function, enlarged inferior vena cava, a peak aortic PG 58 mmHg, mean aortic PG 34 mmHg, moderate AR, and systolic pulmonary artery pressure gradient 73 mmHg. The main findings were pulmonary venous congestion and hypoperfusion to the liver and kidney. Clinical and laboratory findings confirmed diagnosis of ischemic hepatitis. The patient continued to be in a poor

clinical and hemodynamic state with right-sided and left-sided heart failure as well as shock liver.

Due to clinical instability, the patient was deemed at high risk for emergency TAVI. An urgent BAV was performed with the aim of stabilizing the patient and improving hemodynamics and ventricular function prior to a TAVI procedure. Under slight sedation, BAV was performed using two VACS II 23/60 OSYPKA balloon dilatation catheters (OSYPKA, Germany) through the right femoral artery and temporary RV pacing at a rate of 150 bpm [Figure 1]. The balloon size was chosen based on 2D echo left ventricular outflow tract diameter of 23 mm. Due to inadequate results after first balloon dilatation, a larger balloon (24/26 mm OSYPKA) was chosen, achieving

Figure 1. Successful balloon dilatation



reduction of peak-to-peak systolic gradient from 60 to 35 mmHg. The Perclose ProStyle (Abbott; St. Paul, MN, USA) suture device was used for femoral artery hemostasis.

An echocardiogram showed hemodynamic improvements (Peak aortic PG 51 mm/Hg, mean aortic PG 26 mm/Hg, pulmonary artery PG 45 mm/Hg), although LVEF remained at 30%.

During the following days, the overall clinical condition as well as liver, renal, hematologic, and metabolic laboratory data rapidly improved. The patient was discharged after 5 days, and 10 days later the TAVI procedure was successfully performed. A 29 mm transcatheter balloon-expandable valve Edwards Sapien S3 (Edwards Lifesciences, United Kingdom) was implanted without complications, through the right femoral artery approach.

After 4 months the patient was asymptomatic, with NYHA Class I functional capacity. An echocardiogram showed LVEF 55%, inferobasal dyskinesis, aortic peak PG 10 mmHg, mean PG 5 mmHg, mild mitral regurgitation, mild tricuspid regurgitation, and normal pulmonary artery pressure.

COMMENT

Despite initial hemodynamic stabilization and symptomatic improvement, the benefits of BAV are short

lived and limited by rapid aortic restenosis. Therefore, the utilization of BAV is currently reserved for urgent and palliative indications [3].

TAVI has emerged as an attractive treatment strategy for patients with sAS, particularly in inoperable or high risk AVR, aged or with severe comorbidities patients [3].

The rapid growing use of TAVI has led to significant advances in balloon technology and technique. These procedural improvements renewed interest in BAV and increased its use. Several single-center studies demonstrated the feasibility and safety of BAV as a bridge to TAVI, AVR, and non-cardiac surgery in hemodynamically unstable patients [4]. Current American College of Cardiology (ACC) and American Heart Association (AHA) guidelines state that BAV may be considered a bridge to TAVI in critically ill patients with AS [ACC/AHA Class IIb, Level of Evidence C-EO (consensus of expert opinion)] [5].

Our case showed the efficacious use of BAV for achieving short term stabilization and relief of symptoms in an acute, critical deterioration of a patient that immediately stabilized the patient and enabled an uneventful TAVI procedure several days later.

CONCLUSIONS

BAV is a relevant aortic valve procedure, which can be used in urgent salvage and as a temporary bridge to

critically ill patients who are acutely unstable to undergo TAVI.

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It is a curious thought, but it is only when you see people looking ridiculous that you realize just how much you love them.

Agatha Christie (1890–1976), English writer known for her 66 detective novels and 14 short story collections, particularly those revolving around fictional detectives Hercule Poirot and Miss Marple

The greatest analgesic, soporific, stimulant, tranquilizer, narcotic, and to some extent even antibiotic—in short, the closest thing to a genuine panacea—known to medical science is work.

Thomas Szasz (1920–2012), Hungarian-American academic and psychiatrist