

## The Justified Revival of a Well-known Technique

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Eberhard Grube<sup>1</sup>, Lutz Buellesfeld<sup>1</sup>

**P**ercutaneous balloon aortic valvuloplasty (BAV) was developed as a nonsurgical option in the 1980s for treatment of patients with severe aortic valve stenosis. The true effects of a dilated balloon within a severely degenerated, usually calcified aortic valve is only partially understood, but there are several mechanisms discussed which lead to an increased effective orifice area in patients with significant aortic valve stenosis. The most common effect is intraleaflet fractures within calcified nodular deposits which increases flexibility within the calcified aortic root improving valve opening. Other possible mechanisms include scattered leaflet microfractures, cleavage planes along collagenized stroma, and uncommon separation of fused leaflets. Enhanced compliance of the rigidly calcified adjacent aortic root, which may follow BAV, may further contribute to greater leaflet flexibility.

In the early phase, high complication rates and in-hospital mortality were reported, suggesting complications in 25% of patients within 24 hours of the procedure and periprocedural death in about 5% of patients<sup>1</sup>. The most common complication was transfusion in 20%, related predominantly to vascular entry site complications. Cumulative cardiovascular mortality before discharge was 8% in the National Heart, Lung, and Blood Institute (NHLBI) registry. Restenosis and recurrent hospitalization were common<sup>2</sup>.

However, for optimally medicated but still symptomatic patients without any other option, BAV was at least a tool in the armamentarium the cardiologist could offer, balancing the procedural risk and the high natural risk of symptomatic aortic valve stenosis not eligible for valve replacement. And despite a high restenosis rate, survivors reported consistently fewer symptoms over the subsequent 1.5 years post BAV as kind of symptomatic palliation. This results in a reduction of repeated hospitalizations for heart failure, an increase in physical performance, and herewith an improved quality of life.

However, all in all, complication, restenosis and reintervention rate made that BAV was found in the past

to be of no utility for patients who were acceptable candidates for aortic valve replacement, and only of limited utility at the most in patients acceptably stable on medical treatment.

In daily practice, this led to the predominantly remaining BAV indication of managing unstable and critically ill patients such as those in cardiogenic shock or refractory heart failure, enabling for temporary relief as bridging option. Finally, BAV became a kind of forgotten therapy in several cath labs, heavily associated with a lack of experience.

But interventional techniques progress and improve. Today, in the era of transcatheter aortic valve implantation (TAVI), modern BAV experiences a true renaissance. As mandatory part of the TAVI procedure, preparing the valve for the device implant, BAV is now performed with rapidly increasing numbers along with the rapid increase of TAVI procedures world-wide. And the BAV technique fortunately improved compared to the early beginning: catheters became smaller, balloons more reliable, rapid ventricular pacing (200 to 220 bpm) now arrests mechanical systole to preserve balloon stability across the aortic valve during inflation, inflation-deflation times are faster, better guide wires are available and percutaneous closure devices almost guarantee a complete and fast closure of the vascular access site. In addition, brachytherapy after balloon valvuloplasty has recently been investigated and represents an interesting approach to reduce early restenosis<sup>3</sup>.

In this issue, Agatiello et al.<sup>4</sup> report their results on surgical high risk patients with first and repeated balloon aortic valvuloplasty for treatment of severe aortic valve stenosis using contemporary techniques and tools. They found that BAV can be performed very safely and reliably with an acceptable complication profile which is remarkably improved to the problems observed in the beginning of this technique. In addition, they analyzed a cohort of patients undergoing repeated BAV (re-BAV) and put them in comparison to the group undergoing only one BAV procedure. Whether the lack of significant

<sup>1</sup> HELIOS Heart Center – Siegburg, Germany.

**Correspondence:** Eberhard Grube, MD. Department of Cardiology/Angiology – HELIOS Heart Center – Ringstrasse 49 – 53721 – Siegburg, Germany  
E-mail: GrubeE@aol.com

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differences demonstrate equivalent outcome in both groups as stated by the authors, or the obvious trend towards more complications in the re-BAV – yet not significant – might turn out as a substantial difference in larger trials remains to be seen. However, the message is: BAV has remarkably improved over the years and BAV is back. And this is good, because interventional cardiologists need to get re-familiarized with BAV as they are likely to face more and more cases with indications for this technique – not only due to the fact that BAV is implemented in a routine TAVI procedure. Given the presented results and progress, BAV has the potential to play an increasingly important role in the future as stand-alone procedure as well in patients which are neither surgical nor TAVI candidates. More data are certainly needed to evaluate and characterize this particular indication and patient population. However, the paper of Agatiello et al.<sup>4</sup> already nicely supports it.

#### **CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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