



BALLOON VALVULOPLASTY FOR EARLY BIOPROSTHETIC AORTIC VALVE STENOSIS IN SEPTUAGENARIAN - A RAY OF HOPE

Cardiology

**Dr.Chandra
Shekara Reddy G.B**

Apollo BGS Hospital, Senior Registrar

**Dr.siddarth Kumar
Chawath**

Apollo BGS Hospital Senior Registrar

Dr.Arun Srinivas*

Interventional Cardiologist MBBS, MD, DM Card , FESC, FACC HOD, Department of Cardiology Apollo BGS Hospital. *Corresponding Author

ABSTRACT

Calcific aortic stenosis (AS) remains a major cause of mortality and morbidity in the aging population¹. Surgical AV Replacement (SAVR) and Transfemoral Aortic Valve Implantation (TAVI) are available treatment options. With improvements in long term patient survival after AVR and increases in overall longevity, more patients are now seen with Prosthetic Aortic Valve failure. The management of patients with stenotic aortic bioprostheses is usually surgical. However, a proportion of such patients are unfit for such procedures. The technique of aortic balloon valvuloplasty as an alternative treatment strategy for such patients is explored. We report a case of seventy-three-year-old male with prosthetic aortic valve stenosis treated with balloon valvuloplasty with promising intermediate term outcome and describe the growing valve in valve procedure. Hence this case is reported to enhance our knowledge and potentiate literature regarding the management strategy of prosthetic aortic valve stenosis in old age.

KEYWORDS

AVR = Aortic Valve Replacement, SAVR = Surgical Aortic Valve Replacement, TAVI = Trans Valvular Aortic Valve Implantation, BAV = Balloon Aortic Valvuloplasty

INTRODUCTION

Calcific aortic stenosis (AS) remains a major cause of mortality and morbidity in the aging population¹. With improvements in long term patient survival after AVR and increases in overall longevity, more patients are now seen with Prosthetic Aortic Valve failure. Balloon aortic valvuloplasty was introduced as a palliative procedure for these patients, but was tempered by a high rate of recurrence, which has limited its usefulness. However, this can still be the preferred procedure in selected patients who are at too high risk for surgery with repeat valvuloplasty as needed for recurrences. Only few cases have been reported in literature with various treatment strategies and we present here a case with a long term follow up of more than five years.

CASE REPORT –

A seventy-three years old male was admitted with complaints of giddiness and tiredness for two days in Jan 2015. He was known case of ischemic heart disease and severe aortic stenosis, had underwent Coronary Artery Bypass Graft (CABG) and Bioprosthetic AVR in April 2012, details mentioned in Table 1.

Table 1 : Details of Coronary artery bypass graft and Aortic valve replacement

Table 1 - CABG Grafts					
CORONARY ARTERY	Size (in mm)	Quality	Conduit	Anastomosis	Suture
LAD	1.75	Good Wall	SVG	E - S	8.0
OM	1.5	Good Wall	SVG	E - S	7.0
Distal RCA	2.0	Thick Walled	SVG	E - S	7.0
Top End : Two Top ends on Aorta with 7.0 Polypropylene and SVG Grafts to OM was hooked on to LAD graft (SVG) with 8.0 Prolene					
SVG from Bilateral Lower Legs and procedure done under CPB					
AVR details					
Done with 19 mm BIOCOR Valve using Pledged 2.0 interrupted Polyester sutures					

On examination he was hemodynamically stable and cardiovascular examination revealed grade 3/6 ejection systolic murmur best heard at right intercostal space, while rest of other systemic examination were unremarkable. With the background of significant past history, he was diagnosed with Severe AV Restenosis with increased gradients, Unstable angina with positive Trop I (0.126) and LVEF 45%. He was advised Redo Surgical AVR or TAVI, but relatives were not willing for either. He was re hospitalized one week later as relatives agreed for

high risk BAV. As routine, pre procedural Bilateral Carotid Doppler study was done, reported as 70% right ICA and 30% Left ICA lesions. Advised medical management for ICA lesions. High risk consent for perioperative complications was taken as per hospital protocol.

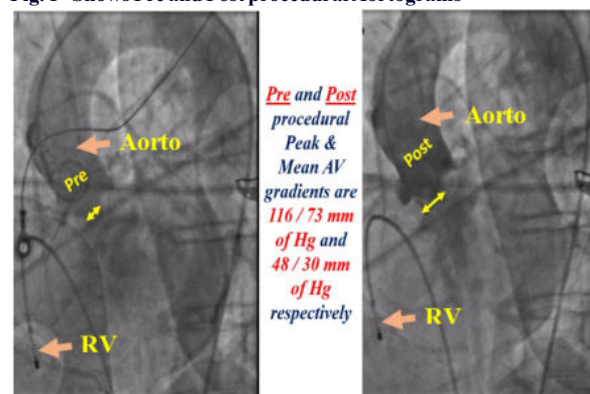
Procedural Summary :

Done on 2nd Feb 2015 in cathlab of Apollo BGS Hospital, Mysore, with a team including cardiologists, cardiovascular surgeons and cardiac anesthetist along with Intra-aortic balloon pump & Heart - Lung machine and adequate number of Blood & Fresh frozen plasma were kept ready to counter any untoward complications. Under General Anesthesia, he was intubated for Mechanical Ventilation support. Bi femoral arterial & Venous access for hemodynamic monitoring and Right ventricular Temporary Pacing. Then a Pigtail Catheter was placed at Aortic root for Aortogram, which may reveal any procedural complications like Aortic Regurgitation or Aortic Dissection during procedure.

A guide wire was then passed across Aortic Valve and a Balloon was placed across. Graded Balloon dilatations was done. Initially with 14 X 40 mm of Atlas Balloon with no significant drop in Aortic Valve gradients and then again tried with 18 X 40 mm of Atlas Balloon. At each Balloon inflation, rapid Right Ventricular pacing was done at 180 beats/min through Temporary Pacing.

Complete hemodynamics were monitored. Balloon Aortic Valvuloplasty was successful with significant drop in AV gradients as noted in cathlab (Fig 1).

Fig. 1 - Shows Pre and Post procedural Aortograms



He was extubated on day 1 and all the supports were stopped on day 2. His hospital stay was uneventful. He was discharged four days later with stable hemodynamic condition and was advised Betablocker, Statin and Diuretic. Table 2 & 3 shows gradual drop in Aortic Valve gradients as noted in Cathlab and by 2D Echocardiography respectively. He has been followed up clinically (from Feb 2015 to till date) without worsening of the disease or re hospitalizations.

Table 2 : Fall in Aortic Valve gradients.

Hemodynamics of aortic valve			
	Aorta	LV	Pe Gr.
Pre procedure	130/80	230/18	100
Post procedure	130/80	140/20	15

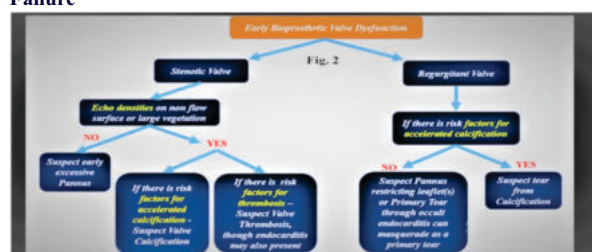
Table 3 : Fall of AV gradients as per 2D Echocardiography

AV gradients by 2D Echo		
Day	Aortic & Gradients (mm of Hg)	
	Peak	Mean
1st Admission	138	94
2nd Admission	116	73
2nd day of procedure	48	30
3.5 months	30	16
59 months	26	13

DISCUSSION

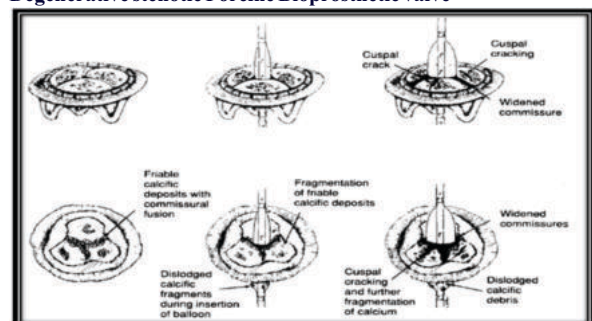
Bioprosthetic valves rarely fail within 5 years of the index surgery². Early Bioprosthetic valve failure may be due to accelerated calcification and Hypertension. Fig.2 shows its simplified approach⁷.

Fig. 2 –Simplified approach to causes of Early Bioprosthetic Valve Failure



For Severe AS, Surgical AVR and TAVI are recommended therapeutic options. Many times neither SAVR nor TAVI are possible because of surgical inoperability, elderly age, associated comorbid conditions and financial constrain especially in developing countries. BAV is an emerging, cost-effective option. Fig 3 shows Mechanisms⁵ of catheter balloon valvuloplasty in Degenerative Porcine Bioprosthetic valve that includes Cuspal Cracking, Widened commissures, Fragmentation and Displacement of Calcifications.

Fig. 3 – Mechanisms of catheter balloon valvuloplasty in Degenerative stenotic Porcine Bioprosthetic valve⁵



Because of its clinically unpredictable results, its use is highly restricted to patients with no evidence of thrombosis, regurgitation or sub-valvular fibrous tissue ingrowth⁴. BAV can be re considered with introduction of smaller-profile balloons, rapid pacing and closure devices¹. There is a paucity of literature on failed bioprosthetic Aortic Stenosis management & transcatheter valve durability.³ BAV requires almost care with good cathlab setup, user friendly hardware and good teamwork.

Financial Disclosures – None

Conflicts of Interest – None

REFERENCES:

1. Dejam A, Hokinson M, Laham R. Repeated successful balloon valvuloplasty of a bioprosthetic aortic valve in a nonagenarian. *Catheterization and Cardiovascular Interventions*. 2011 Mar 1;77(4):589-92.f
2. Cremer PC, Rodriguez LL, Griffin BP, Tan C, Rodriguez R, Johnston DR, Pettersson GB, Menon V. Early bioprosthetic valve failure: a pictorial review of rare causes. *JACC: Cardiovascular Imaging*. 2015 Jun;8(6):737-40.
3. Rodriguez-Gabella T, Voisine P, Puri R, Pibarot P, Rodés-Cabau J. Aortic bioprosthetic valve durability: incidence, mechanisms, predictors, and management of surgical and transcatheter valve degeneration. *Journal of the American College of Cardiology*. 2017 Aug 22;70(8):1013-28.
4. Head SJ, Çelik M, Kappetein AP. Mechanical versus bioprosthetic aortic valve replacement. *European heart journal*. 2017 Jul 21;38(28):2183-91.
5. Waller B, Vantassel J, McKay C, Allen M. Catheter balloon valvuloplasty of stenotic porcine bioprosthetic valves: part II: mechanisms, complications, and recommendations for clinical use. *Clinical cardiology*. 1991 Sep;14(9):764-72.