Review Article

Review of transcatheter aortic valve replacement procedure in aortic valve stenosis

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Severe symptomatic aortic stenosis is one of the commonest valve diseases due to various etiologies in elderly. Surgical aortic valve replacement (SAVR) was the treatment of choice in such cases. Transcatheter aortic valve replacement (TAVR) is the new alternative for patients with symptomatic severe aortic stenosis for whom traditional open chest surgery has intermediate or high risk. TAVR is less invasive with very short hospital stay. With availability of technical expertise and newer generation valves both the short term and long term results have significantly improved. Paravalvular leak after TAVR is quite common with first generation valves. But in newer generation valves with longer skirts the incidence of aortic regurgitation has come down. Vascular sequelae are independent predictors of death, largely attributed to the wider sheaths (inner diameter, 24F. 26F) required by earlier-generation devices. As the sheath sizes decrease with the new generation devices (14 F-equivalent system) the rate of vascular sequelae and the incidence of bleeding continue to decrease. India is very promising with percutaneous valve replacement therapy for other indications and other valves evolving fast.

[*J Indian Med Assoc* 2018; **116:** 10-3]

Key words **: Aortic stenosis, valve, transcatheter, percutaneous, TAVR.**

Severe symptomatic aortic stenosis is one of the commonest valve diseases due to various aetiologies in elderly[1]. When asymptomatic aortic stenosis starts to develop symptoms, there overall life expectancy decreases accordingly. Surgical AVR was the treatment of choice in these cases. But its utility is limited in patients with higher operable risk due to substantial periprocedural risk[2].In 1985, Cribier *et al* performed the first aortic valve balloon valvuloplasty in an inoperable 77 year old who had severe symptomatic aortic stenosis. The procedure resulted in reduction in aortic valve gradientand improvement in quality of life. This laid the foundation of transcatheter aortic valve procedures in high risk severe symptomatic aortic stenosis. In 2002, cribier *et al*, demonstrated the first trancatheter aortic valve replacement in inoperable high risk 57 year old patient who had undergone balloon valvuloplasty one week prior. He underwent emergency transcatheter aortic valve replacement with good immediate result.The implanted device exhibited an excellent hemodynamic performance during the first 9 weeks of follow-up. The patient died at the fourth month of follow up because of noncardiac cause.

Three years later, Paniagua *et al* performed the first TAVR through the retrograde route. The deployed device was implanted through the transfemoral access. Although the valve seemed to function well and there was an initial improvement in patient clinical status, the third postprocedural day the patient suddenly developed respiratory distress and refractory hypotension and was treated for pulmonary embolism but he died 2 days later.

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Evidence from Trials :

Results from various trials have shown transcatheter aortic valve replacement (TAVR) has better result over surgical aortic valve replacement (SAVR) in patients with symptomatic severe aortic stenosis. Over a period of time interventional cardiologists have become better with the techniques and the complication rates have reduced due to advancements in the hardwares. The Placement of Aortic Transcatheter Valves (PARTNER) Cohort B study evaluated the TAVR in inoperable patients and showed that patients treated with TAVR had a lower mortality rate compared with those treated only with medications, or with medications and balloon aortic valvuloplasty (20.5% mortality in the TAVR group at 1-year follow-up versus 44.6% in the control group; hazard ratio, 0.39; 95% confidence interval, 0.27–0.56; P<0.001)[3]. PARTNER 1cohort A trial compared TAVR and SAVR in high operative risk patients[4]. There were no differences in mortality at 1- (24.2% for the TAVR sub-group and 26.8% for the SAVR sub-group; P=0.44) and at 2-year follow-up (33.9% for the TAVR arm and 35.0% for the SAVR arm; P=0.78), those undergoing TAVR were likely to have a neurological event (11.2% *versus* 6.5%; P=0.05) or major vascular complications (11.6%