

# Congenital Aortic Valve Stenosis: To Dilate or Operate?



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## Keywords

Congenital Aortic Stenosis • Aortic Valvuloplasty • Balloon Dilatation • Congenital Heart Disease  
• Surgery • Interventional Cardiology

Congenital aortic stenosis is a lifelong disease often requiring multiple interventions. Management remains controversial. Surgical repair was first described by Lillehei and colleagues in 1956 [1], and has evolved from simple commissurotomy to complex repairs utilising cusp extension techniques with pericardial patches. However, over the past three decades, balloon aortic valvuloplasty has been the intervention of choice for many centres, seen to be a safer and less invasive alternative. An important article by Auld and colleagues is published in the current issue of *Heart, Lung and Circulation* [2]. They described 64 patients, with age ranged from 2 days to 18.8 years, including 15 neonates, who underwent balloon aortic valvuloplasty at a single institution between 2001 and 2015. They demonstrated freedom from re-intervention of 75% at a mean follow-up period of 3 years, with no early or late deaths, a commendable result. Kaplan–Meier freedom from re-intervention at 10 years was 58%. Eleven patients (17.2%, 11/64) ultimately underwent Ross procedure, at a mean time of 1.8 years after original balloon valvuloplasty. In their neonatal cohort, balloon valvuloplasty delayed surgical re-intervention to infancy or childhood in all but one neonate. Longer-term results are yet to be seen.

It is clear that excellent early outcomes can be achieved with balloon aortic valve dilatation. It is far more important what is to happen long-term, particularly when the initial aortic valve intervention occurred in infancy, and even more so in the neonatal period. In Melbourne, our strategy

is to perform aortic valve repair rather than balloon valvuloplasty as the primary intervention. In 2013, we compared 86 patients who underwent surgical aortic valve repair and 37 patients who underwent balloon aortic valvuloplasty [3]. Freedom from re-intervention at 10 years was 65% after surgical repair and 27% after balloon valvuloplasty, with balloon valvuloplasty an independent risk factor for re-intervention on multivariate analysis. Additionally, children who underwent balloon valvuloplasty required re-operation much sooner after initial repair compared to those who underwent surgical repair (median time to re-intervention 11 months for balloon valvuloplasty compared to 5 years for surgical repair). Undoubtedly at our centre, superior results are achieved with surgical repair compared to balloon valvuloplasty. We further demonstrated excellent long-term results with surgical aortic valve repair with a study of 142 patients including 13 neonates, published in 2013 [4]. We demonstrated a Kaplan–Meier freedom from re-intervention of 80% at 7 years and further intervention on the aortic valve was delayed by a median of 3.6 years. The low rate of surgical mortality in our cohort was related to obstruction of coronary ostium by pericardial patches used for cusp extension of bicuspid valves, a technique that is now abandoned.

Many attempts have been made to compare balloon aortic valvuloplasty with surgical aortic valve repair. In 2016, we published an extensive review demonstrating that current literature on the topic is often confusing as all published

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studies are retrospective, non-randomised and often comprised of heterogeneous groups of patients with variable numbers of neonates and infants [5]. To add to the confusion, some studies also included adults up to 30–40 years of age [6,7]. Nonetheless, generally, there are higher rates of re-intervention following balloon valvuloplasty as a first intervention, particularly, in neonates and infants. This trend has also been observed in a meta-analysis published by Hill and colleagues in 2016 [8]. In their large analysis of 1,835 balloon valvuloplasty patients and 533 surgical patients, they found no difference in early outcomes such as mortality (early and late) or post-intervention peak systolic gradient. They did, however, find a significantly higher rate of re-intervention following balloon valvuloplasty, with a 10-year freedom from re-intervention of 46% for balloon valvuloplasty compared to 73% for surgical repair. Results were consistent in sensitivity analysis restricted to the subset of infants alone, indicating that surgery is just as safe and effective as balloon intervention in this vulnerable age group.

While balloon aortic valvuloplasty is clearly a safe procedure that provides effective short-term aortic gradient reduction, there is significant evidence that balloon valvuloplasty results in higher rates of re-intervention, and a shorter time to re-intervention. It is our belief that surgical aortic valve repair offers a greater longevity of repair, and may therefore be more cost-effective and beneficial to the patient in the longer

term, compensating for the invasiveness of surgery. Time will tell.

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