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EDITORIAL

Aortic Valve Repair: The Unfulfilled Destiny

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The review in this issue of *Heart and Lung and Circulation* by Harky et al. in the UK — *Aortic Valve Repair: Where Are We Now*?, highlighted the importance of aortic valve repair (AVr) and the need to expanse teaching and mentoring of the different techniques to improve long-term survival, and quality of life for adult patients with aortic valve disease [1]. Unfortunately, there are no products to sell, so commercial interest in AVr development is limited, and therefore investments in education and training are ''underprovided''.

Although AVr is surgically and logically more desirable, there is concern about its proficiency to yield consistent, long-lasting, outstanding outcomes appropriate to the diverse pathology of valvular heart disease compared with aortic valve replacement (AVR). In addition, there have been continual advancements in the design and performance of valve substitutes. These mystifying features result in obscurities regarding the optimal surgical treatments for individual patients [2]. A sound approach to this challenge relies on comprehensive understanding of the complexity of function and anatomy of each valve and its interaction with other components of the heart, particularly the myocardium [3].

Our forefathers made giant leaps inventing repair procedures for valvular abnormalities since shelf-ready aortic valve prostheses were not available to them [4]. They all had much broader paediatric cardiac surgery experiences, and repair procedures were part of mandatory training. Until now, there were no substitutes suitable for a growing child with valvular heart disease.

The only options available were fresh homograft and pulmonary autograph (Ross procedure), and since the original description of AVR with a pulmonary autograft by Donald Ross in 1967, cardiac surgeons have had an uneasy relationship with this method for managing aortic valve disease [5,6]

Alternative AVr techniques continued to be developed — David's, Yacoub, Lansac, El Khoury [7], (Figure 1) — and adapted by only the interested few surgeons; thus, available only to a handful of patients.

The dearth of a noteworthy survival benefit associated with one prosthesis type over another pivots decision-making on patients' lifestyle considerations, including the burden of anticoagulation medication and monitoring, and the relative risks of major morbidity [8,9]. The commonly held belief that mechanical prostheses are a lifelong alternative is not supported by global registries and the small number of randomised clinical trials [9,10].

In the current era, with good long-term follow-up, the choice of an aortic valve substitute in young and middle age adults undergoing surgery for isolated aortic valve disease is a difficult decision. The ideal AVR that combines durability, low risk of long-term complications, and good long-term survival remains elusive [2].

In adults undergoing elective isolated mechanical AVR, survival remains suboptimal compared with an age and gender-matched general population. Currently the global longer life expectancy in the west exposes them to a higher lifelong risk of prosthesis-related complications after AVR, most notably in the form of thromboembolic events, haemorrhage, and reoperation, valve thrombosis, sudden unexplained death, mediastinal infection, endocarditis, myocardial infarction, heart failure, paravalvular leak and prosthesis-patient mismatch [11].

Bioprosthetic valves have limited long-term durability, and therefore carry an inherent risk of reoperation in young adults. Furthermore, there is a low but constant hazard of prosthetic valve reintervention after mechanical AVR.

An exemption from that fate is the survival following AVr with the Ross and David's procedures, which seems to be as good as that of the general age-matched population [12,13]. It remains unclear whether restoring life expectancy to normality by curing valvular disease is a consequence of the autograft

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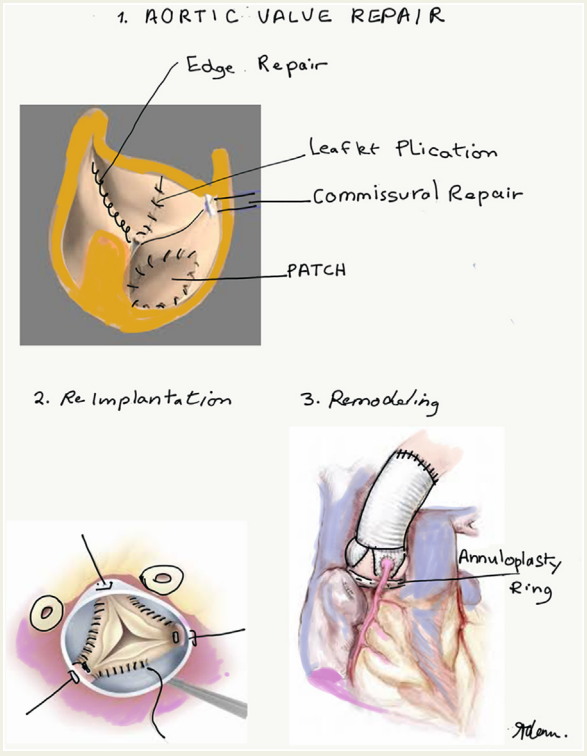

Figure 1 Aortic valve repair technique.

attributes (living valve with superior haemodynamic and low valve-related event rates) or the careful selection of patients.

To obtain an answer to the perplexing question of whether to repair or replace the aortic valve, the method of choice would be, a randomised controlled trial. However, compared to the current palliation with aortic valve replacement, repair has proved itself in expert hands, not many surgeons are willing to randomise young adult patients among the AVr techniques, a mechanical prosthesis, a stentless bioprosthesis, or a stented bioprosthesis. The choice by most surgeons for young adults is not backed by data, but by a clear preference for a particular prosthesis driven by trends, expertise, only a handful of surgeons are experienced with the Ross, David's, other repair techniques.

It is also important to note that a focus on minimising procedural risk of reintervention, reoperation, or percutaneous implantation of a prosthesis is unlikely to have a major effect on reducing any excess mortality associated with bioprostheses. Late deaths in patients with bioprosthetic valve dysfunction are largely related to the impact of severe aortic regurgitation and stenosis, not procedural risk [14].

Reoperation following valve repair seems to be then the primary criticism of AVr. Mazine et al. found the cumulative risk of reintervention on the autograft AVR or the replaced pulmonary valve was 8% at 15 years after Ross operation and 13% at 20 years postoperatively [15]. This risk was higher (hazard ratio, 1.86) but not significantly different from the risk of reoperation following AVR with a mechanical valve (6% at 15 and 20 years, postoperatively); the same for David's procedure [16].

Enthusiasm among surgeons for the aortic valve repair procedures has waxed and waned over the last 3 decades, fundamentally because of the lack of evidence that, for most patients, long-term clinical benefit outweighs the additional complexity of the procedure. This is why we have to support and encourage continued use of the aortic repair procedures in adult patients and share the experience with specialised surgical teams who have a dedication to mastering the technique. We need to encourage training and proctoring, and provide the necessary time and funding to expand expertise. We have to adhere and commit to careful follow-up of patients for possible late complications, and to improve and develop durable repair solutions for the aortic valve on par with the mitral valve repair success story. By following our forefathers, footsteps, we could fulfil this destiny.

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