**Evolution in aortic valve replacement**

Minimally-invasive surgery (MIS) is changing the way that complex heart valve surgery is performed. It has the potential to bring a plethora of benefits to patients suffering with aortic stenosis (AS).¹

Each year in Europe, thousands of aortic valve replacement (AVR) operations are undertaken to treat patients with AS – a form of progressive valvular heart disease which when severe poses a very real threat to survival as well as diminishing quality of life.²⁻⁵ Approximately 100,000 such procedures are performed by conventional cardiac surgery while about 20,000 patients, typically at very high risk elderly patients, are treated by catheter-based interventions.⁶

Surgical AVR can alter patient outlook dramatically, allowing patients to move from a prospect where more than 50% will die within five years of diagnosis, to one where life expectancy may be returned to close to normal for the patient’s age.²⁻⁴,⁷

**The surgical approach**

Cardiac surgeons are well-known for their willingness to pioneer new techniques and practices in order to help advance the treatment of patients with heart disease.

Traditionally, surgical AVR has required making an opening in the chest cavity (a median sternotomy) that is large enough to allow the surgeon good access to the heart and aorta. Although this may involve some patient trauma, the life-saving benefits of surgical AVR are well-recognized and current treatment guidelines on the management of severe AS describe AVR as the definitive treatment for this condition.²

Over the years, surgeons have searched for less invasive surgical approaches that continue to allow successful AVR and have shown that a smaller chest incision – a partial upper sternotomy or ministernotomy / hemisternotomy or right anterior thoracotomy – is feasible and permits AVR at no increased risk to the patient.⁸⁻¹⁰

**Complications reduced**

Far from increasing risks, MIS offers a number of real clinical benefits when compared with traditional surgery. MIS for AVR has been associated with reductions in bleeding and the need for blood transfusions, fewer respiratory complications, less post-operative pain for patients and a reduction in the time patients need to recover in the cardiac intensive care unit, as well as in their overall length of stay in hospital.¹,⁹⁻¹³

**Better recovery and reduced costs**

Avoiding large traumatic operations and prolonged stays in hospital are important for patient recovery, and reducing complication rates and intensive care stay helps lower the costs of AVR.¹,¹⁴ Indeed there is long-standing evidence that valve MIS can be performed safely and with outcomes that provide a higher level of patient satisfaction than is seen with conventional surgery.¹⁵ Wounds and scars are smaller, and patients welcome this over the larger, more unsightly scars of traditional surgery.¹

**Learning to operate by MIS**

While the potential benefits offered by MIS for AVR are highly appealing, the trade-off for the surgeon is that the job of valve replacement is made more complex when conducted through a smaller aperture.
Although this has been reported in early studies of MIS, there is a recognized learning curve with any new procedure, and high-volume, specialist centres undertaking AVR have shown that MIS can be performed as safely and expeditiously as conventional surgery.1

**Continuing advances – the need for speed**

The shorter the time taken to perform AVR, the better. As surgeons continue to perfect MIS techniques, a potential benefit of modern-day aortic MIS using the most up-to-date prosthetic valves is that it can help reduce cardiopulmonary bypass time and cross-clamping time (the time during which the systemic circulation is separated from the outflow of the heart, and the time the heart is stopped, while a new valve is placed in position).

Prolonged cross-clamp time has been shown to significantly correlate with major post-operative morbidity and mortality.16

**Rapid deployment valves**

It's not just surgical techniques and MIS approaches that contribute to improving patient outcomes after an AVR procedure – advances in valve technology also mean that it is now easier for surgeons to implant replacement valve substitutes.

In particular, the development of rapid deployment valves, sometimes called “sutureless valves” (i.e. valves that quickly expand to fit the aortic vessel requiring only few guiding sutures) may help reduce cross-clamp times, reduce overall surgical time and also help minimize unnecessary, valve-fixing procedures that damage delicate tissue and that can lead to complications following surgery.17 Such valves have been described as a new and promising tool for treatment of AS that could help increase the applicability of surgical AVR even in traditionally hard-to-treat patients such as the elderly with severe comorbid diseases,17 or in patients requiring complex interventions.

Rapid deployment valves which facilitate MIS approaches may hold the key to helping surgeons perform more efficient and effective AVR.

Data from a recent multicentre European study assessing a new class of rapid-deployment aortic valve, reported that cross-clamp and cardiopulmonary-bypass times for placement of the EDWARDS INTUITY Valve System, were less than those for conventional surgical AVR.18 This rapid deployment valve was shown to function well when assessed one-year after surgery.

**Towards new ideals**

Advances in valve technology and MIS that will allow lower-risk patients to undergo AVR, coupled with drives to ensure that patients once deemed ‘too-high risk’ for AVR are offered surgery, will see a larger number of patients being managed at new dedicated HEART VALVE CLINICS (HVCs) and by heart teams that experts believe should be at the centre of AS patient care.3

Surgical advances are already changing the way AVR is performed and increasing the options for patients with AS.3 Technological advances in valve design are helping move the field towards an ideal where more patients will undergo MIS and where surgeons can perform effective and rapid AVR, with minimal complications.

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References


