Editorial comment

How much can we do to reach the ideal valve prosthesis?

Since the introduction of the first prosthetic heart valve for orthotopic implantation, by Starr and Edwards in the early sixties, a countless number of devices have been created, marketed and used clinically. Many have not stood the test of time and some even constituted true clinical disasters with serious consequences for the patients. The most notorious was the problem of strut fracture of the initial models of the Björk–Shiley C–C valve, in the 1980s, which caused the death of many patients and obliged to elective reoperation for substitution of the prosthesis in many others, and resulted in a major legal battle and compensation to the patients which eventually led to the disappearance of the manufacturers.

A much more recent problem was that of the St. Jude Silzone valve (St. Jude Medical, Minneapolis, MN, USA). This prosthesis was a modification of the original St. Jude valve by inclusion of a silver-coated sewing ring aiming at reducing paravalvular regurgitation around a Silzone valve seems to be different than the tissue surrounding a conventional valve. But that is still hypothetical.

Your question gives me also the possibility to look at some limitations of the trial, because we cannot exclude confounders here. If we have intraoperative findings like a calcified annulus or weak tissue, that is difficult to explain or hard to collect in a study. Some other confounders like the surgeon itself cannot be ruled out in such a trial. There are still only hypothetical explanations about factors which cause this higher rate of paravalvular leak in Silzone patients, which was seen only in the AVERT database.

In a paper published in this issue of the journal, Englberger et al. [1] proposed to examine the risk factors for major PVL events after heart valve replacement with the Silzone valve. To this end, the authors of this multi-institutional study analysed the late outcome of 807 patients randomised into the Artificial Valve Endocarditis Reduction Trial (AVERT). Twenty-one major PVL were reported (11 after aortic, 9 after mitral, and 1 after double valve replacement). Six of the 404 (1.5%) patients who received conventional valves experienced a major PVL event versus 15/403 (3.7%) in the Silzone group. The incidence was much higher (10/172; 5.8%) in patients with non-pledged valve suture technique versus that in the patient group with pledgeted sutures (11/635; 1.7%). The final multivariable model showed that only suture technique without pledges was an independent significant risk factor for major PVL events, while the Silzone cuff “showed a strong trend” towards statistical significance.

They thus conclude that the high incidence of unfavourable events associated with the Silzone valve was not associated exclusively to the modified sewing ring.

The AVERT clinical randomised trial was designed precisely to evaluate the efficacy of this prosthesis and began recruitment of patients in July 1998. Although the initial results of the trial were published in 2002 [2], reports of a higher incidence of PVL in the Silzone group led to suspension of patient enrolment in January 2000 and the manufacturer voluntarily recalled all the Silzone valves from the market. Hence, the current report may appear to be of a very limited interest. The results are fairly well known and the prosthesis no longer exists, although many patients still live with it, the vast majority without complications. Since the complication is easily diagnosed and could be successfully corrected in all but one of the reported cases, there was no indication for prophylactic prosthetic replacement. As anything that can be said about a valve that can no longer be used it is of only academic importance, this paper can, as one of the reviewers in the process of evaluation for consideration for publication put it, be accepted as “the last and final report on the AVERT trial”.

Nonetheless, the AVERT investigators continue to follow the 807 randomised patients and their late findings may be of interest for the management of these patients. Because the number of events registered during the follow-up period was relatively small (only 20/21 patients had reoperation due to major PVL and one died), this should tranquilise the remaining patients. It is highly unlikely that the complication that led to
the termination of the trial and the withdrawal of the valve may occur at this stage, except if prosthetic endocarditis occurs, it could occur with any other prosthesis.

The main conclusion drawn by Englberger et al. is that only suture technique without pledgets was an independent significant risk factor for major PVL events. In the whole AVERT study population, the majority of implanted valves had pledgeted sutures, but other aspects of the technique used were not homogeneous and may be confounding factors. On the other hand, the investigators found that the use of Silzone-coated cuff was not an independent factor for the occurrence of major PVL when other factors were taken into account (it “did not reach conventional significance \( p = 0.055 \)”). This is justified by the authors by the much longer follow-up period than previously reported results from the AVERT, but the \( p \)-value is extremely close to significance.

In any case, it is difficult to believe that the decision to remove the valve from the market was based on just that apparently small difference in the incidence of PVL (3.7% vs 1.5%). Certainly this report must not be seen as an attempt to rehabilitate the Silzone valve. On the other hand, contradictory findings were observed in many other trials and individual reports, some of which, as the Cardiff Embolic Risk Factor Study (CERFS), have also shown significantly higher rates of thromboembolic events in patients with implanted Silzone valves [3].

Although it is impossible to be absolutely sure that the silver coating was the cause for the PVL, this case well illustrates the complications inherent to the clinical use of inadequately tested valve prostheses, even if they are just a “minor” modification of time-honoured devices. This was not the first, and it certainly will not be the last, of these “disasters”. Although new technical developments in the field of valve prostheses, in the quest for the ideal valve, are to be encouraged, surgeons ought to be selective and resist the temptation of trying just anything that comes into the market, especially in our continent, where regulations about the new devices are much softer than those we used to see from the other side of the Atlantic. That is, in my mind, the most important lesson to be drawn from this unfortunate experience.

References


Manuel J. Antunes
Cardiothoracic Surgery, University Hospital,
Coimbra, Portugal

E-mail address: antunes.cct.huc@sapo.pt