Rev Port Cardiol. 2020;39(3):151–153

Revista Portuguesa de Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

EDITORIAL COMMENT

The role of surgery in infective endocarditis revisited

O papel da cirurgia na endocardite infeciosa revisitada

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Available online 13 April 2020

Infective valve endocarditis, of both native (NVE) and prosthetic valves (PVE), remains one of the most serious cardiac diseases, with high rates of mortality and other complications.[1] Although medical treatment with different associations of antibiotics has recently greatly improved outcomes, many patients require surgery because of severe valve dysfunction, extensive destruction of tissues, and large vegetations threatening embolization. Complex surgery may be required for replacement or reconstruction of the valves and annular tissues, which carries a high mortality risk. However, the majority of cases are simple single-valve procedures, which should have similar mortality to that of other valve surgeries, but this is strongly influenced by concomitant conditions, such as previous embolic episodes, renal failure and septicemia.

Prosthetic endocarditis, on the other hand, is often associated with extensive perivalvular tissue destruction that makes surgery more demanding, requiring a wide range of techniques and sometimes a degree of inventiveness, hence also subject to greater risk. In these cases, homograft implantation for treatment of the aortic valve appears to be associated with lower complication rates, including a lower incidence of recurrent infection. In the case of the mitral valve, a biological or mechanical prosthetic valve appears appropriate.

All of the above appears to indicate the need for preferential referral paths to centers of excellence, which combine volume-related experience not only of surgeons but also of specialists in other professional areas, included in the concept of the 'Endocarditis Team', as recommended by the most recent guidelines on the management of infective endocarditis.[2]

These considerations come apropos of a paper published in this issue of the *Journal* by Guiomar et al., from the Vila Nova de Gaia group, on the subject of cardiac surgery and in-hospital mortality predictors in infective endocarditis (IE).[3] To this end, the authors retrospectively analyzed the clinical characteristics of 145 patients (median age 72 years) who underwent cardiac surgery for IE between January 2006 and October 2017, and set out to identify factors predicting in-hospital mortality.

IE involved the native aortic valve in 54% of the patients (in a good portion also involving the mitral valve), biological valves in 22.1% and mechanical valves in 10.3%. The indications for surgery generally followed the current guidelines on the subject: cardiac surgery was emergent in 20% of cases, urgent in 70%, and elective in the remainder. Biological valves were implanted in 62.1% of patients and mechanical valves in 37.2%.

The authors report an operative mortality of 13%, predicted by occurrence of atrial fibrillation and by pre- and postoperatively decreased left ventricular ejection fraction, severe valve regurgitation and septic shock associated with cardiogenic shock, cardiac tamponade and need for renal replacement therapy. But the most important risk factor was

DOI of original article:
https://doi.org/10.1016/j.repc.2019.08.009
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https://doi.org/10.1016/j.repc.2020.03.009

the requirement for emergent surgery. They thus concluded that there is a need for better indicators to enable early identification of surgical candidates for IE, implementation of a heart team, and better surgical strategies, including more rapid intervention, more specific postoperative care, and optimal antibiotic therapy.

This is a relatively small series, hence the results and conclusions need to be treated with caution. Otherwise, the conclusions are in keeping with those reported by most investigators, including other Portuguese groups. As also reported by the authors, the groups at Hospital de Santa Marta (Lisbon) and Hospital de São João (Porto) have recently published their data.[4,5]

There are some aspects of this work that I would like to discuss. Firstly, the operative mortality reported seems rather high for a relatively recent cohort (last decade and a half), although the authors consider it comparable with those reported by others, but this comparison may not be entirely appropriate as it corresponds to different time frames. As the title of the paper indicates, the authors concentrated their effort on analysis of the factors leading to in-hospital death. Hence, there is no information about the incidence of other, non-lethal, complications, such as early recurrence of infection and thromboembolism. Naturally, death is the most serious complication, but some types of morbidity can be very disabling, with a significant impact on the patient's life.

Secondly, the authors identified the risk factors for mortality pertaining to patients' demographic characteristics and some aspects of the surgical procedure. But other factors are important when analyzing outcomes in this disease. Surgical times (length of the operation and clamping times), related not only to the patient's anatomy but also to the techniques used, have a significant impact on both mortality and morbidity. The length of hospital stay after surgery is important with regard not only to the quality of care but also to the economic costs involved,[6] an aspect that is not to be disregarded in Portugal. It is well known that this condition usually requires prolonged hospitalization, not only because of the duration of antibiotic treatment but also due to perioperative morbidity. Average hospitalization times can, therefore, provide information about the quality of the treatment.

The authors acknowledge the absence of these and other data as an important shortcoming in their study. These are quality criteria for the surgical treatment provided, analysis of which would be of the utmost importance for improving the quality of care. Knowledge of all these data, certainly difficult to obtain in retrospective studies, can lead to changes in policies, particularly in the acceptance of borderline cases. They may also correlate with complications in the medium and long term, such as recurrence of endocarditis or even death.

One other question that needs discussion is the timing of surgery. There is still a great attraction among cardiologists and surgeons for the concept of emergency surgery. ''The patient will require surgery, so why wait?'' Indeed, some studies appear to confirm the superiority of earlier intervention. That is probably correct, if it means surgery before infection becomes too extensive, but may not apply to already very advanced cases where attempts at prior control of infection and of heart and renal failure, the most commonly identified risk factors, may lead to better results. This is quite clear from current guidelines that restrict indications for emergency surgery to patients with aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary edema or cardiogenic shock.[2] And 'refractory' means that there must be at least a serious attempt at treating medically. All other indications, including uncontrolled infection and prevention of embolism, fall into the categories of urgent (within a week) or elective. The Gaia group claim to have followed these policies, but the rates of 75% and 20%, respectively, for urgent and emergency procedures, still appear excessive and do not correspond to my experience of over 45 years.[7]

Finally, there is the type of valve procedure, repair or replacement, and, in the latter case, the choice of prosthesis. Currently, there is no evidence of superiority of either biological or mechanical valves.[8] For the aortic valve, the choice may be influenced by the type and extension of the infection. As discussed above, homograft implantation appears to be associated with lower complication rates, including a lower incidence of recurrent infection. The aortic homograft and its attached anterior mitral leaflet may be extremely useful in the repair of periannular abscesses. The problem here is the limited availability of homografts in this country. We have been collecting our own from hearts removed from recipients of heart transplantation and from non-heart organ donors. The grafts are stored, for up to eight weeks, at 4-6 °C, in an aseptic environment of tissue preservation solution with low-dose antibiotics. We have not observed any cases of early failure or infection of the grafts implanted, even in patients with very complex and active periannular abscesses.[9]

In cases of major destruction of the mitral valve apparatus, replacement is required. However, in a significant number of patients the involvement of the mitral valve is limited and amenable to repair, especially when the primary infection is of the aortic valve. Isolated perforations of the anterior leaflet can be repaired with pericardial patches, and involvement of the chordae tendineae, with or without rupture, can be treated by replacement with artificial chordae made from PTFE. In the series described here by our colleagues from Gaia, mitral valve repair was undertaken in only two cases, for removal of vegetations, which appears unsatisfactory. Toyoda et al., at Mount Sinai Hospital in New York, were able to preserve 19% of infected mitral valves.[10] These authors found that in active endocarditis, mitral valve repair is associated with better survival and lower risk of recurrent infection compared with valve replacement and should be the surgery of choice when feasible. Naturally, the experience of Mount Sinai may not reflect the real world.[11]

In conclusion, the paper from the Gaia group, following those published previously by other Portuguese centers, is welcome as an effort to further characterize the panorama of IE in this country, which does not in fact appear to be significantly different from that described in other European countries. But it should be followed by further in-depth studies that go beyond the simple analysis of hospital mortality. Perioperative morbidity and long-term outcomes are essential to fully understand this serious disease and its modes of treatment.

Conflicts of interest

The author has no conflicts of interest to declare.

The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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