



EDITORIAL

Infectious endocarditis in intensive care medicine[☆]

Endocarditis infecciosa en Medicina Intensiva

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The elegant study published by Miranda-Montero et al.¹ explores a cohort of 102 patients with infectious endocarditis (IE), of which 38 required admission to intensive care (37%).

The article, based on an excellent design, affords essential information on IE, including: (1) the epidemiology of the disease in the intensive care setting; (2) emphasis on the need for admission to intensive care in cases of IE; (3) the management and prognosis of these patients; and (4) the role of the intensivist in endocarditis. While these aspects have been studied and are interesting, they are currently not well known in our setting—a fact that explains the crucial importance of this paper.

In the intensive care setting, many patients are admitted with systemic inflammatory response syndrome (SIRS), with activation of the integrins that bind circulating fibronectin to the endothelial surface, thereby facilitating the development of IE.² The mentioned study comprises 102 patients with IE, registered over a 5-year period. This frequency is consistent with the incidences described in the diagnostic-treatment guidelines of the European Society of Cardiology, according to which the incidence of IE probably has not decreased in recent years—remaining stable at between 3 and 10 cases per 100,000 inhabitants.² Nevertheless, the incidence of the disease may be underestimated due to the

important diagnostic difficulties involved. Such underestimation could even be much more notorious in the intensive care setting, considering that the condition mimics other disorders such as pneumonia, cholangitis or other infections. This idea is supported by studies such as that published by Yamamoto et al.,³ who in an active search for IE detected an incidence of 48.7–84.8 cases per 100,000 patients discharged from hospital.⁴

Although IE is diagnosed on the basis of the clinical findings, echocardiography plays an unquestionable role—offering diagnostic information and moreover contributing to hemodynamic management of the patient, or indicating the need for surgery. Routine echocardiographic exploration in intensive care could detect an increased incidence of IE in our setting, thereby improving the etiological diagnosis of the disease.⁵ In this context, transesophageal echocardiography (TEE), which is more sensitive than transthoracic echocardiography, is particularly useful especially in critical patients, who tend to have a poor transthoracic window. If intensivists were to perform this technique on a routine basis, applying TEE according to the clinical practice guides,² they could not only increase the number of detected cases of IE but also improve the true diagnosis of our patients. This aspect has already been examined in the past, where the routine use of TEE in intensive care was seen to improve the diagnosis and modify ulterior patient management.^{5,6}

The profile of IE has changed. In effect, although once a disease typical of young individuals with pre-existing valve disease (particularly rheumatic valve disease) in which streptococcus was the causal agent, IE now tends to affect

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older patients in the hospital setting.² The etiology of the disease has also changed, and in this sense streptococcus as causal agent has given way to *Staphylococcus aureus* in the so-called “developed countries”,² most particularly in patients admitted to critical care, where the incidence of catheter bacteremia and staphylococcal involvement is greater. These observations are consistent with the results of the presently considered study.^{1,7} The profile of IE is well defined in the European guide²; however, the profile of the patients admitted to the ICU due to IE is not known. The paper published by Miranda-Montero et al.¹ identifies a number of predictors of admission to intensive care: (1) cerebral embolism, and (2) mitral valve involvement. In this context, 65.8% of the patients come directly from the emergency area—this indicating that we only admit highly selected and very ill patients.

On the other hand, patients with IE admitted to the ICU have a much poorer prognosis. The mortality rate recorded in intensive care is 42.1%, which may appear excessive if examined in gross terms. However, after adjusting for the seriousness of the patient condition upon admission to the ICU, this percentage may appear quite reasonable.

In coincidence with other authors, Miranda-Montero et al. identify *S. aureus* infection, heart failure, cerebral embolism and the Simplified Acute Physiology Score II (SAPS II) as predictors of in-hospital mortality. It may be postulated that in addition to underestimating the true incidence of IE, the admission of such patients to intensive care would be delayed—a situation which in turn increases morbidity-mortality. A policy designed to ensure the early detection and admission of IE patients to the ICU could improve survival,⁸ since admission as fast as possible would contribute to avoid irreversible damage.⁹ In this context, both quantitative identification of the level of severity (SAPS II scale) and the systematic use of echocardiography (particularly TEE) in all patients admitted to intensive care could help detect and improve the management of such cases.

In the presently considered study, 45.8% of the patients were subjected to surgery—a percentage consistent with that advised in the European diagnostic-treatment guide (50%). Early surgery (i.e., while the patient is still receiving antibiotic treatment) is indicated as a means to avoid progressive heart failure, in the face of the irreversible structural or anatomical damage caused by serious infection, with a view to preventing systemic embolization, or in situations of uncontrolled infection.²

The surgery survival rate in the different series is estimated to be over 70%.^{2,10} The work of Miranda-Montero et al. reports increased survival among such patients, though it lacks the statistical power needed to suggest that cardiovascular surgery protects against mortality in the multivariate analysis.¹ Despite the clear indication on the part of the diagnostic-treatment guides regarding the need for heart surgery in selected cases, the indication is not fundamental on solid evidence, and is supported by studies that usually exclude critically ill patients. Nevertheless, in the case of a critical patient with IE, the indications might not be so clear. A series of circumstances are usually present, such as heart failure sometimes refractory to treatment, together with severe sepsis possibly in the multiorgan dysfunction phase, and this makes it quite difficult to determine a surgical indication. Another complication

of IE only found in intensive care is systemic embolization, observed in 22–50% of all cases of IE, and often associated with a very dire prognosis.¹¹ Sixty-five percent of all such embolic phenomena affect the nervous system, particularly at middle cerebral artery level.¹¹ Cerebral embolism is a complication that usually delays or discards surgical management, and which is associated to a clear increase in mortality, though its incidence might be greater than previously thought.¹² Neurological events are more common in the presence of *S. aureus* and *Streptococcus viridans*.¹¹ A range of neurological complications are associated with cerebral septic embolism - the most typical being ischemic episodes, seizures, silent cerebral embolia, intracranial hemorrhage, cerebral abscesses, meningitis or encephalopathy. All of these conditions are associated to increased mortality, which can be limited through the early administration of antibiotic treatment.

Most patients with a neurological complication have at least another indication for heart surgery. However, in the event of cerebral embolism, the decision to indicate surgical treatment is even less clear. There appears to be a “conflict” between intensivists and heart surgeons when it comes to establishing the best timing for surgery. On one hand, from the medical perspective, it may seem clear that surgery should be immediate, particularly in the event of persistent sepsis, or even for avoiding new emboligenic foci. However, from the surgical point of view it may be postulated that delaying surgery until the septic process has been delimited can offer better results and avoid major brain complications such as cerebral hemorrhage for example.

Despite the concerns inherent to the application of surgery in the event of such complications (fear of neurological deterioration or of perioperative cerebral hemorrhage), these risks are low after an ischemic episode, or in the case of young patients, and where indicated, surgery could be performed without delay. Surgical intervention should not be delayed when indicated in the face of congestive heart failure, uncontrolled infection, abscesses or a persistent high risk of embolism—provided the existence of cerebral hemorrhage has been discarded from the imaging technique findings and there is no serious or irreversible neurological damage (e.g., coma). Neurophysiological studies including electroencephalography, evoked potentials and magnetic resonance imaging could offer information with a view to discarding irreversible neurological problems. Under these circumstances, heart surgery can be carried out with a relatively low neurological risk (3–6%), and it is more-over believed that the chances for neurological recovery are quite good. The truth is that the “ideal timing” of surgery remains the subject of debate. Classically, the criterion has been to wait about two weeks in ischemic cases and four weeks in cerebral hemorrhagic episodes.¹³ Nevertheless, clear agreement is lacking,¹⁴ and some authors such as Kim et al.¹⁵ are of the opinion that early surgery, despite the presence of cerebral hemorrhage, is the best option.

Probably, we should wait two weeks in ischemic cases and four weeks in cerebral hemorrhagic episodes. Nevertheless, perhaps the best option in the absence of clinical evidence is to adopt an individualized decision, depending on the patient condition. In the same way, in intensive care the indication of surgery should be evaluated on an individualized basis, adequately weighing the clinical and

hemodynamic data, the comorbidity, and anatomical information.

One last issue contemplated in the study of Miranda-Montero¹ is the undeniable role of the intensivist in the management of these patients. This is not usually recognized in the existing guides, though they do make mention of the collaboration of microbiologists, heart surgeons and cardiologists. The role of the intensivist and the anesthetist usually goes unmentioned. Nevertheless, intensivists play a crucial role, since they must detect the cases of severe sepsis and provide adequate management. If early echocardiographic evaluation were carried out, these specialists could diagnose and hemodynamically monitor the patient and help in the decision to indicate cardiovascular surgery. In sum, intensivists play a fundamental role in the prognosis of patients with severe IE.

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