

## Commentary

# Infective endocarditis: too ill to be operated?

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### Abstract

Infective endocarditis remains a disease associated with high mortality in certain groups of patients, with death resulting primarily from central nervous system complications and congestive heart failure. Combined medical and surgical therapy reduces both early and late mortality in complicated cases, especially in patients with valvular dysfunction related to heart failure. In these patients, heart failure is the strongest indication for valve replacement. There are no consensus indications for surgery, however, in the presence of neurological complications or multiple organ failure. Limited data suggest that such surgery is feasible, even in complicated cases necessitating admission to the intensive care unit, and carries an acceptable risk for in-hospital mortality. It is important that critically ill patients with infective endocarditis are enrolled into multicenter studies, using adequate severity scoring systems to assess the impact of clinical and imaging variables on patients' outcome. Until such data are obtained, clinical judgement is still the best tool in decision-making regarding the individual patient.

**Keywords** decision-making, infective endocarditis, neurological complications, valve replacement

Infective endocarditis (IE) has remained a prevalent disease in general hospitals, with a fairly constant incidence over the past 30 years, accounting for one case per 1000 hospital admissions (range 0.38–1.24 per 1000 admissions) [1]. Despite modern antibiotic and surgical therapy, mortality rates remain as high as 25% for both native- and prosthetic-valve endocarditis, with death resulting primarily from central nervous system (CNS) embolic events and hemodynamic deterioration [2].

### Surgical management

Valve replacement has become an important adjunct to medical therapy in the management of this complex infection that is difficult to treat, and a surgical approach may be required, although the infecting organisms are often exquisitely sensitive to antibiotics *in vitro*. Surgery is now used in at least 25% of cases and several studies suggest that combined medical and surgical therapy can reduce both early and late mortality in patients with a complicated course [2,3].

There are several consensus indications for surgery during active IE: refractory congestive heart failure and

physiologically significant valve dysfunction demonstrated by echocardiography; uncontrolled infection; ineffective antimicrobial therapy and perivalvular extension of infection; most cases of prosthetic valve endocarditis; and resection of mycotic aneurysm [1]. Arguable indications are the presence of more than one serious systemic embolic episode or one embolus with large residual vegetation [4].

Congestive heart failure has remained the strongest indication for surgery in IE. For example, medically-treated patients with moderate-to-severe heart failure due to endocarditis-related valvular dysfunction have a mortality rate of 56–86 %, as compared with 11–35% among patients treated with combined medical and surgical therapy [5–7]. The beneficial effect of surgery persists even in the presence of comorbidities; therefore the occurrence of other complications of IE, such as acute renal failure, is not a contraindication for valve replacement.

### Cerebral complications

There is a significant risk for postoperative neurologic deterioration or death in patients with a recent CNS

complication of IE, therefore such an event is considered a relative contraindication for early cardiac surgery [2].

Since neurologic complications of IE are frequent (20–40% of patients) and their presence can increase the mortality rate up to 58% [1], what can be considered as the appropriate management of a patient with IE complicated by both hemodynamic deterioration and a new onset embolic stroke? Unfortunately, there are currently no satisfactory studies to assist in decision analysis for such a dilemma.

In a retrospective study from Japan [8], 181 patients with cerebral complications were identified among 2523 cases that underwent surgery for IE. Overall mortality in patients with and without CNS complications was similar. Among patients with cerebral infarcts, mortality was related to the interval between the preceding cerebral event and surgery. Death occurred in 66% of patients operated within 24 hours of the event, in 48% of those operated less than a week after cerebral infarction, but in only 19% operated 7–28 days postinfarction. In a multivariate analysis, however, the only risk factor for worsening neurological outcome was the severity of neurological complication. Other studies have reported contradictory results regarding the impact of neurological complications on surgical outcome in patients submitted for valve replacement in the course of active IE [9–11].

Critical analysis of these studies is difficult. Some of these retrospective cohorts consist of surgical patients only (i.e. patients considered too ill to be operated have already been excluded). In other studies, medically-treated patients are compared with those submitted to surgery, but the reasons for choosing one therapeutic approach over another are not well specified. Therefore, the differences in outcome can be attributed to many factors such as the patient's general, neurological condition, and the various indications for valve replacement.

### ICU admission

In this issue of *Critical Care*, Georg Delle Karth and his colleagues [12] describe their experience with a cohort of patients with IE necessitating admittance to the intensive care unit (ICU). These patients represented 0.8% of ICU admissions, which is 10-fold the incidence of IE among all hospital admissions, reflecting the life-threatening potential of this infection. Not surprisingly, 90% of indications for ICU admittance were congestive heart failure, septic shock, and neurological complication – also major risk factors for poor outcome. Among patients treated with combined medical and surgical therapy, mortality was 35%, but increased 2.4-fold (84%) among medically-treated patients.

### Lessons to be learned

What can we learn from these data? Since this study was not designed to evaluate risk factors for mortality, we cannot conclude that surgery decreases mortality in critically-ill

patients with complicated IE. As in other similar series, the surgical intervention was based on clinical judgement and not on strict predetermined criteria. For instance, 5/13 medically-treated patients were deferred from surgery due to a doubtful neurological outcome or severe comorbidities. An additional 6/13 died before surgery could be performed. Consequently, the medically-treated group consisted of only two patients in whom surgery was deemed to be not indicated – both survived! These data do not provide meaningful evidence regarding medically-treated patients with complicated IE. Most importantly, the results of this study suggest that even in critically ill patients with complicated IE, prompt valve replacement may be life-saving, carrying an acceptable risk for mortality, comparable to the rate of in-hospital mortality in patients with severe sepsis.

### Decision-making

Can we improve our decision process regarding early surgery in critically ill patients with IE in view of the current data? The only way to obtain meaningful data regarding this issue would be through well-designed prospective studies, using adequate severity scoring systems to assess the impact of clinical and imaging variables on patients' outcome. It is important that critically ill patients with IE are enrolled into multicenter studies addressing these questions. Until such data are obtained, clinical judgement is still the best tool in making decisions regarding the individual patient. Data from studies such as the one by Delle Karth *et al.* [12], though not perfect, provide valuable information regarding the feasibility and outcomes of various approaches in different clinical situations, and contribute to making the 'intuitive' decision-making process somewhat better.

### Competing interests

None declared.

### References

1. Francioli PB: **Complications of infective endocarditis.** In *Infections of the Central Nervous System.* Edited by Scheld WM, Whitley RJ, Durak DT. Philadelphia: Lippincott-Raven; 1997:523-553.
2. Mylonakis E, Calderwood SB: **Infective endocarditis in adults.** *N Engl J Med* 2001, **345**:1318-1330.
3. Bayer AS, Scheld WA: **Endocarditis and intravascular infections.** In *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases.* Edited by Mandell GA, Bennett JE, Dolin R. Philadelphia: Churchill Livingstone; 2000:857-902.
4. Bayer AS, Bolger AF, Taubert KA, Wilson W, Steckelberg J, Karchmer AW, Levison M, Chambers HF, Dajani AS, Gewitz MH, Newberger JW, Gerber MA, Shulman ST, Pallash T, Gage TW, Ferrieri P: **Diagnosis and management of infective endocarditis and its complications.** *Circulation* 1998, **98**:2936-2948.
5. Griffin FM Jr, Jones G, Cobbs CC: **Aortic insufficiency in bacterial endocarditis.** *Ann Intern Med* 1972, **76**:23-28.
6. Richardson JV, Karp RB, Kirklin JW, Dismukes WE: **Treatment of infective endocarditis: a 10-year comparative analysis.** *Circulation* 1978, **58**:589-597.
7. Croft CH, Woodward W, Elliott A, Commerford PJ, Barnard CN, Beck W: **Analysis of surgical versus medical therapy in active complicated native valve infective endocarditis.** *Am J Cardiol* 1983, **51**:1650-1655.
8. Eishi K, Kawazoe K, Kuriyama Y, Kitoh Y, Kawashima Y, Omae T: **Surgical management of infective endocarditis associated**

- with cerebral complications: multi-center retrospective study in Japan.** *J Thorac Cardiovasc Surg* 1995, **110**:1745-1755.
9. Ting W, Silverman N, Levitsky S: **Valve replacement in patients with endocarditis and cerebral septic emboli.** *Ann Thorac Surg* 1991, **51**:18-21.
  10. Parrino PE, Kron IL, Ross SD, Shockey KS, Kron AM, Towler MA, Tribble CG: **Does a focal neurologic deficit contraindicate operation in a patient with endocarditis?** *Ann Thorac Surg* 1999, **67**:59-64.
  11. Heiro M, Nikoskelainen J, Engblom E, Kotilainen E, Marttila R, Kotilainen P: **Neurologic manifestations of infective endocarditis: a 17-year experience in a teaching hospital in Finland.** *Arch Intern Med* 2000, **160**:2781-2787.
  12. Delle Karth G, Koreny M, Binder T, Knapp S, Zauner C, Valentin A, Honninger R, Heinz G, Siostrzonek P: **Complicated infective endocarditis necessitating ICU admission: clinical course and prognosis.** *Critical Care* 2002, **6**:149-154.