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Médecine et maladies infectieuses

Médecine et maladies infectieuses 46 (2016) 44–48

Short communication

# Infective endocarditis: Clinical presentation, etiology, and early predictors of in-hospital case fatality

## *Endocardites infectieuses : présentation clinique, diagnostic microbiologique et facteurs prédictifs de mortalité précoce*

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Received 3 September 2015; received in revised form 4 December 2015; accepted 29 December 2015
Available online 22 January 2016

**Abstract**

*Objective.* – We aimed to assess the clinical presentation, microbial etiology and outcome of patients presenting with infective endocarditis (IE).
*Patients and methods.* – We conducted a four-year retrospective study including all patients presenting with IE.
*Results.* – We included 121 patients in the study. The median age was 74.8 years. Most patients had native valve IE (57%). *Staphylococcus aureus* accounted for 24.8% of all IE. Surgery was indicated for 70 patients (57.9%) but actually performed in only 55 (44.7%). Factors associated with surgery were younger age ($P = 0.002$) and prosthetic valve IE ($P = 0.001$). Risk factors associated with in-hospital mortality were diabetes mellitus (OR = 3.17), chronic renal insufficiency (OR = 6.62), and surgical indication (OR = 3.49). Mortality of patients who underwent surgery was one sixth of that of patients with surgical indication who did not have the surgery ($P < 0.001$).


*Keywords:* Infective endocarditis; Epidemiology

**Résumé**

*Objectif.* – Définir la présentation clinique, la microbiologie et le pronostic des patients atteints d'endocardite infectieuse (EI).
*Patients et méthodes.* – Étude rétrospective sur quatre ans incluant tous les cas d'EI.
*Résultats.* – Au total, 121 patients (âge médian de 74,8 ans) ont été inclus dans l'étude. Parmi eux, 57 % présentaient une EI sur valve native. *Staphylococcus aureus* représentait 24,8 % des microorganismes isolés. Une indication opératoire (IO) était présente chez 70 patients (57,9 %) mais réalisée que chez 55 (44,7 %). Les facteurs associés à la réalisation d'une chirurgie étaient le jeune âge des patients ($p = 0{,}002$) et la présence d'une prothèse valvulaire ($p = 0{,}001$). Le diabète (OR = 3,17), l'insuffisance rénale chronique (OR = 6,62) et l'IO (OR = 3,49) semblaient associés à la mortalité. La mortalité des patients avec une chirurgie cardiaque était six fois inférieure à celle des patients avec indication de chirurgie mais non réalisée ($p < 0{,}001$).


*Mots clés :* Endocardite infectieuse ; Épidémiologie

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http://dx.doi.org/10.1016/j.medmal.2015.12.012
0399-077X/

## 1. Background

Infective endocarditis (IE) is associated with high morbidity and mortality. The epidemiology of IE has changed since the first evaluation of 209 case patients by Sir William Osler in 1885 [1]. However, prevention strategies did not manage to reduce the incidence of this life-threatening disease currently reaching 33.8 case patients/million patient-years in France [2]. In-hospital case fatality for patients presenting with IE reaches 20% [3] with a one-year case fatality of 25% [4]. Although aggressive therapy has become essential to saving lives and eradicating infection in many patients, reported rates of surgery remain heterogeneous and the benefit of surgery on mortality is arguable. Nevertheless, recent study results support an early surgical management of patients presenting with complicated IE [5].

## 2. Methods

### 2.1. Study design

We performed a retrospective study in a 537-bed teaching hospital in Paris, France, from January 2009 to December 2013.

### 2.2. Patient selection

All patients aged 18 years or older presenting with IE, as defined by modified Duke criteria, were included in the study using data from the hospital record database [6]. All medical files were reviewed and classified according to Duke classification. Prosthetic valve endocarditis was considered early-onset if it occurred within a year from valve implantation and late-onset if it occurred thereafter. Data was retrospectively collected.

### 2.3. Definition

"Stroke" was defined as an acute neurological deficit of vascular etiology lasting > 24 hours and was further characterized as ischemic or hemorrhagic using neuroimaging results.

Antimicrobial therapy initiation was defined as the first day of appropriate antibiotic therapy according to antimicrobial results.

Cardiac surgery during hospitalization was indicated on the basis of the 2009 European Society of Cardiology (ESC) guidelines [7] and the final decision was made in agreement with the cardiologists and cardiac surgeons. Time to surgery was defined as the interval between IE diagnosis and the date of surgery.

### 2.4. Statistical analysis

Continuous variables were reported as medians with 25th and 75th percentiles. Categorical variables were reported as frequencies and percentages of the specified group. Univariate comparisons were made using $Chi^2$ test or Kruskal Wallis test as appropriate. A difference was considered significant at a level of 5% (alpha risk). All analyses were performed using the Epi Info software, version 7.0 (CDC, Atlanta).

Table 1
Baseline characteristics, predisposing conditions, clinical and microbiological findings, and in-hospital outcome in 121 patients presenting with infective endocarditis.
*Caractéristiques démographiques, cliniques, microbiologiques et pronostic de 121 patients présentant une endocardite infectieuse.*

| | Total cohort (%) |
|---|---|
| *Baseline characteristics* | |
| Age, years (median (IQR)) | 74.8 (62.3–81.2) |
| Male | 81 (66.9) |
| Chronic renal insufficiency | 54 (44.6) |
| Diabetes | 18 (14.8) |
| Chronic liver disease | 14 (11.5) |
| IE type | |
| Native valve | 69 (57) |
| Prosthetic valve | 37 (30.6) |
| Pacemaker/ICD | 15 (12.4) |
| *Clinical manifestation at admission and microbiological findings* | |
| Fever | 88 (72.7) |
| *In-hospital outcome* | |
| Embolisms (total) | 50 (41.3) |
| Splenic embolisms | 13 (10.7) |
| Central nervous system embolisms | 11 (9) |
| Renal embolisms | 9 (7.4) |
| Indication for cardiac surgery | 70 (57.8) |
| Surgery actually performed | 53 (43.8) |
| In-hospital mortality | 20 (16.5) |

ICD: implantable cardioverter defibrillator.

## 3. Results

### 3.1. Epidemiology

A total of 121 patients were included in the study: 87 presented with definite IE and 34 with possible IE according to modified Duke criteria [6]. The median age was 74.8 years (mean 71.1 years; IQR 62.3–81.2 years). Most patients (57%) had native valve IE. Predisposing conditions were common in patients presenting with IE. Patients characteristics are presented in Table 1. The most common underlying condition was diabetes mellitus (14.4%). Fever was only observed in 72.7% of patients.

The most common predisposing conditions were related to prior cardiac surgery (45.4%) for valve replacement (28%) or pacemaker (PM)/implantable cardioverter defibrillator (ICD) implantation (11.5%).

### 3.2. Microbiology

Blood cultures were performed for all patients to determine the disease-causing agent. A total of 15 patients (12.4%) had negative blood cultures. Among them eight had a molecular diagnosis performed by 16S rRNA gene PCR assay on valve: five were positive for *Streptococcus mitis*, *Streptococcus gallolyticus*, coagulase-negative *Staphylococcus*, and *Pantoea agglomerans*. Of those patients, 10 (66.7%) received