

# Right-Sided Infective Endocarditis

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## Abstract

Right-sided infective endocarditis (RSIE) is relatively rare, accounting for only 5 to 14% of all cases of infective endocarditis (IE). Its incidence is increasing due to the growing use of intravascular and intracardiac devices, as well as the rising prevalence of intravenous drug use. What distinguishes RSIE is that it often occurs on previously healthy valves. It can be associated with left-sided involvement (infective endocarditis with interventricular communication or complicated by septal perforation) or be limited to the valvular orifices of the right heart, more commonly affecting the tricuspid valve than the pulmonary valve. The diagnosis is established based on the Duke criteria. The prognosis can be poor, and the treatment primarily relies on antibiotic administration, with surgery reserved for specific indications related to vegetation size, hemodynamic issues, or infectious complications.

**Keywords:** Right endocarditis, tricuspid, echocardiography, prognosis, surgical indication.

## Introduction

Right-sided infective endocarditis (IE) accounts for approximately 5 to 10% of all cases of infective endocarditis. It may be associated with a predominant localization in the left heart (infective endocarditis on interventricular communication or complicated by a perforation of the interventricular septum) or be exclusively localized to the valvular openings of the right heart, with a higher prevalence on the tricuspid valve than on the pulmonary valve. Diagnosing IE can sometimes be challenging and requires an echocardiography, often complemented by a transesophageal echocardiography to more accurately assess valvular involvement and associated lesions. Compared to left-sided infective endocarditis (IE on the left heart), right-sided IE (RSIE) presents specific clinical and echocardiographic characteristics, as well as unique complications, necessitating a different therapeutic approach.

The main objective of this study is to describe the epidemiological and clinical profile, echocardiographic features, and progression patterns of RSIE, based on a retrospective cohort of hospitalized patients.

## Patients and Methods

This is a retrospective analysis conducted at the Cardiology Department of CHU Béni-Messous between January 1996 and June 2022, focusing on a cohort of 235 cases of infective endocarditis (IE). Among these cases, 35 were right-sided infective endocarditis (R-IE). The diagnostic criteria used were those of Duke University.

## Results and discussion

In this section, we present the main findings of our study on right-sided infective endocarditis (RSIE) and provide a comprehensive discussion and interpretation of the results.

### 1. Prevalence of RSIE

Like the literature data, our study revealed that RSIE accounted for approximately 14.9% of all cases of infective endocarditis in our study population (Fig 1) [1]. This prevalence is relatively lower compared to left-sided infective endocarditis (LSIE).

### 2. Patients characteristics

- The mean age of the patients was 34 years +/- 14 years.
- The presence of an underlying heart disease is less common in patients with RSIE compared to LSIE (35.7% vs. 80%).
- In the majority of cases (93%), RSIE developed on a native valve, which is more frequent in RSIE than in LSIE (92.8% vs. 77.2%), but this difference is not statistically significant ( $p = 0.1$ ).
- Dystrophic and congenital valvulopathies are the most frequently observed (66%): six patients had congenital heart disease, including cases of interventricular communication (21%).
- Intravenous drug use is the most common mode of entry for RSIE (38%), followed by the cutaneous route (23%). One patient had an implanted cardiac pacemaker. Four patients had a central dialysis catheter. Infections of dental origin are less frequent.
- Patients with RSIE are generally less symptomatic, classified in NYHA functional class I-II (71.4%), compared to patients with LSIE (NYHA functional class III-IV), with a statistically significant difference ( $p = 0.02$ ).

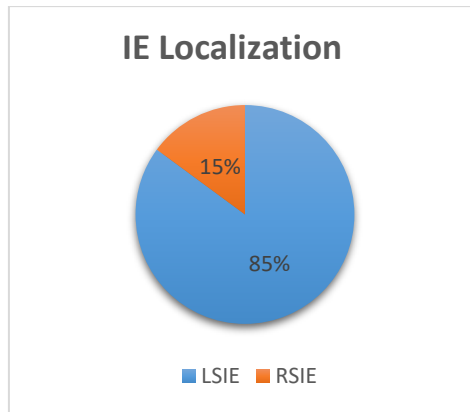
### 3. Clinical Diagnosis

The diagnosis of RSIE can sometimes be challenging and deceptive. Common manifestations of RSIE include persistent fever and bacteremia, with frequent occurrence of multiple septic pulmonary emboli (50% in our study versus 54% in the literature [1-3]). Right-sided heart failure is rare. Positive blood cultures were observed in 33% of cases, with Staphylococcus being the most frequently isolated pathogen (45%), followed by Streptococcus.

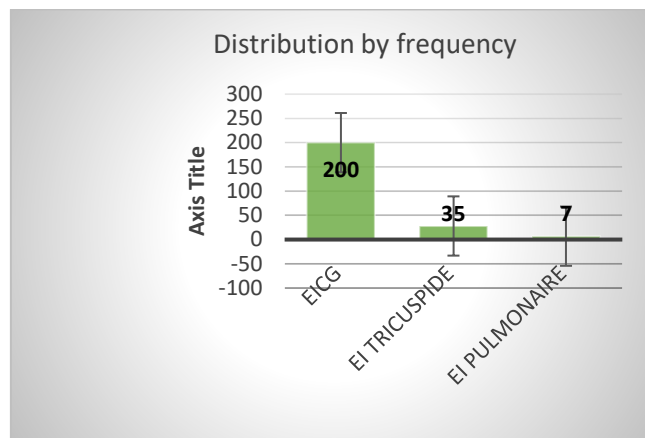
### 4. Echocardiographic Aspects of RSIE

- The study revealed the presence of tricuspid vegetations in 100% of cases, with 48% being large, accompanied by valve tearing and deterioration in 35% of cases (Fig 5,6).
- Severe tricuspid regurgitation was observed in 40% of cases (Fig 7).
- An associated pulmonary localization was found in 7 patients (Fig 2).
- In our study, transesophageal echocardiography was performed in 61% of RSIE cases (Fig 3).
- Left ventricular ejection fraction (LVEF) was preserved in all patients, with an average of 60%.
- Pulmonary pressures were elevated in cases complicated by pulmonary embolism (due to the impact on the pulmonary vasculature: 22%).

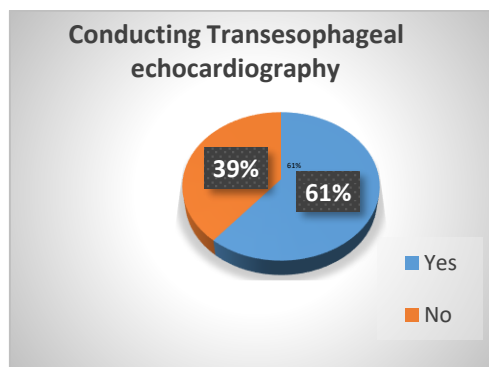
Current recommendations emphasize the importance of transthoracic echocardiography (TTE) when IE is suspected. Transesophageal echocardiography is particularly useful in patients with valvular prostheses, in cases of inconclusive TTE results, or when there is a strong clinical suspicion of IE. TEE allows for the evaluation of valve involvement [2, 3].



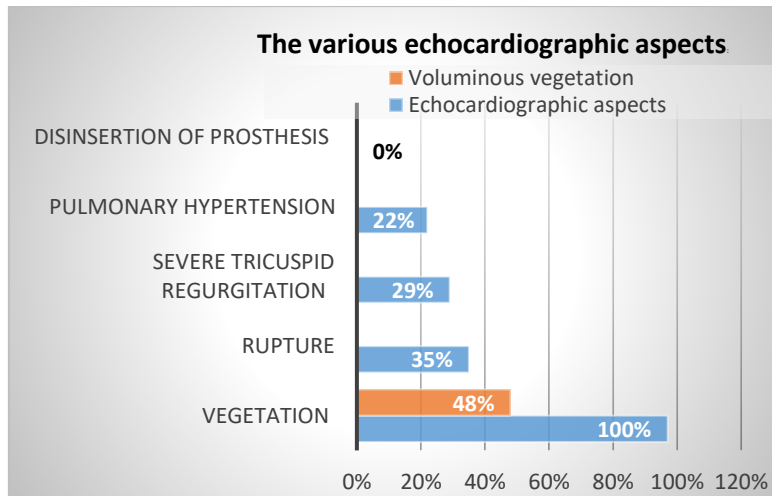
**Fig 1. Prevalence of RSIE**



**Fig 2. Distribution according to the right or left side of the heart**



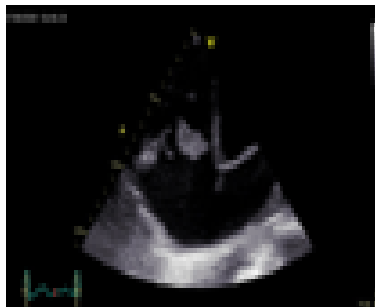
**Fig3. Conducting Transesophageal echocardiography**



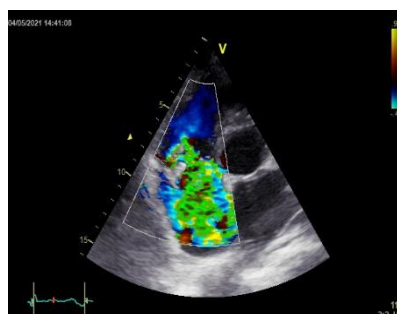
**Fig 4. Distribution according to the echocardiographic aspect**



**Fig 5. Long-axis view of the right heart chambers shows vegetation on the anterior tricuspid valve.**



**Fig 6. Apical four-chamber view of the right heart shows vegetation on the anterior tricuspid valve.**

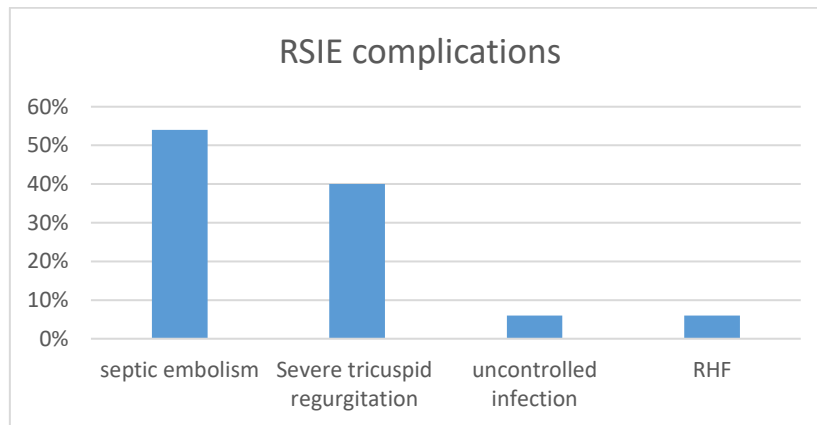


**Fig 7. Apical four-chamber view, in color Doppler, shows severe tricuspid regurgitation.**

### 5. Prognosis and Complications

Twenty-three complications occurred during the course of these RSIE cases (65%): septic pulmonary embolisms (54%); two pulmonary infarctions (6%); severe tricuspid regurgitation (40%); rarely right heart failure and uncontrolled infection (6%); one case of splenic infarction. (Fig 8).

The prognosis of RSIE is relatively favorable, with in-hospital mortality below 10%, compared to LSIE (35%). Factors associated with a less favorable prognosis include the presence of very large vegetations (> 20 mm), fungal infection, and in HIV-infected patients.



**Fig 8. Distribution according to complications**

### 6. Therapeutic Management of RSIE

All patients received appropriate antibiotic therapy. Surgical intervention was indicated in 27 patients (77% of cases) for the following reasons:

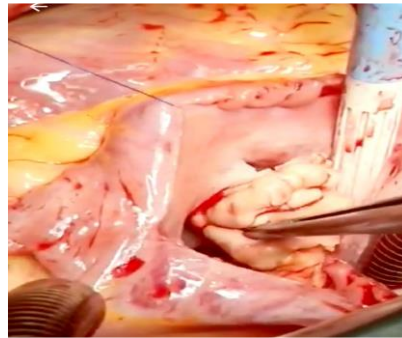
- Persistently large vegetations despite antibiotic treatment (48%)
- Hemodynamic reasons: severe tricuspid regurgitation (40%)
- Infectious reasons: 6% of cases presented uncontrolled infection.

Among these patients, 20 (74%) underwent surgical intervention with good postoperative outcomes. Tricuspid valve repair was performed in all cases. Due to differences in clinical and echocardiographic characteristics between right-sided infective endocarditis (IE) and left-sided infective endocarditis (IE), therapeutic management should be tailored accordingly. Specific approaches for treating right-sided IE are necessary to ensure better clinical outcomes. According to the literature, in the majority of right-sided IE cases, non-surgical antibiotic therapy can eliminate bacteremia in 70 to 85% of cases. The initial choice of antibiotic therapy depends on the suspected microorganism and should be adjusted once the responsible microorganism has been identified [3, 4].

Staphylococcus aureus is the most frequently implicated pathogen, accounting for over 50% of cases. Surgical intervention is generally not immediately considered, except in certain situations, such as [3, 4]:

- Difficult-to-eradicate microorganisms (e.g., persistent fungi) or persistent bacteremia for more than 7 days (e.g., *S. aureus*, *P. aeruginosa*) despite appropriate antimicrobial therapy.
- Persistent tricuspid vegetations larger than 20 mm after recurrent episodes of pulmonary embolism, with or without concurrent right heart failure.
- Right heart failure due to severe tricuspid regurgitation with a poor response to diuretic therapy.

Surgical treatment should include the excision of all infected tissues and restoration of valvular function. This procedure allows for complete elimination of infected tissues and preservation of valve function. Tricuspid valve repair, rather than replacement, is indicated in cases of right-sided endocarditis with involvement of a single tricuspid leaflet [5]. It allows for eradication of the infection without the implantation of prosthetic material. Patients who undergo repair have better survival without additional risk of reoperation compared to those undergoing replacement.



**Fig 9. Intraoperative view of a tricuspid vegetation.**



**Fig 10. Apical four-chamber view, in color Doppler, shows a residual grade 1 tricuspid regurgitation after a successful tricuspid valve repair.**

## 7. Study Limitations

It is important to acknowledge certain limitations of our study, such as its retrospective nature and being conducted at a single hospital center. This may impact the generalizability of our results to other populations.

## 8. Conclusion

Infective endocarditis of the right heart is a specific clinical entity, less common, mainly affecting young individuals, and has a favorable prognosis compared to infective endocarditis of the left heart, with a low mortality rate (15%). It primarily develops on native valves and is characterized by septic pulmonary embolisms and often large vegetations detected by transthoracic echocardiography. It responds well to medical treatment. However, surgery may be indicated, with good postoperative outcomes.

In conclusion, our study highlights the differences between RSIE and LSIE in terms of prevalence, clinical and echocardiographic characteristics, and therapeutic management. These findings underscore the importance of a tailored approach for the diagnosis and treatment of R-IE to improve clinical outcomes in

affected patients. Further studies will be necessary to deepen our understanding of this condition and develop optimal therapeutic strategies.

### Divuligation

- No conflict of interest.

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