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EDITORIAL

Percutaneous treatment of infective right-sided endocarditis—an alternative in high-risk surgical patients?

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The diagnosis of right-sided endocarditis makes up approximately 5–10% of all cases with infective endocarditis (IE).[1] Currently, there is a trend describing increasing numbers of right-sided endocarditis which is mainly associated with injection drug use (IDU)[2] and further the more common placement of intracardiac devices or intravenous catheters.[1,3]

Epidemiology and current treatment recommendations

In patients with right-sided endocarditis, treatment with antibiotics is most commonly the applied treatment; however 5–40% of all patients have an indication for surgical treatment with most commonly one of the following causes: persistent bacteraemia for >7 days, persisting vegetations with a size >20 mm, and right heart failure due to severe tricuspid regurgitation.[1,3] In general, the clinical manifestation of right-sided endocarditis is persistent fever, bacteraemia, and multiple septic pulmonary emboli manifesting as chest pain, cough, and haemoptysis.[1] The most prevalent pathogen causing endocarditis of the right-sided heart valves are *Staphylococcus aureus* with 60–90% of the cases but as well coagulase-negative *Staphylococcus*, especially *Streptococcus pneumoniae* and an increasing incidence of *Pseudomonas aeruginosa* and fungi due to the fact of an aging population and presence of risk factors like congenital heart disease, intracardiac devices, and most importantly IDU.[1–3] If the criteria for surgical treatment are present, removal of the vegetations and repair of the valve should be the primary aim as patients with tricuspid valve replacement, especially IDU, have a high risk of reinfections.[4,5]

Case presentations in the editorial

Regarding the outcome, the patient condition is the most important factor to consider not the predisposing factors associated with the onset of right-sided endocarditis.[5] In the recent years and due to the Severe acute respiratory syndrome Coronavirus 2 pandemic, the use of veno-venous extracorporeal membrane oxygenation (VV-ECMO) therapy did increase and offered a chance of improvement for patients with therapy refractory respiratory failure.[6] The cases reported show that in patients with a high surgical risk with severe sepsis and combined pneumonia, meningitis, and endocarditis[7] or patients with complicated endocarditis following VV-ECMO therapy in the setting of coronavirus disease 2019,[8] percutaneous debulking of vegetations is an additional therapeutic option to avoid complex, high-risk surgery.[1,3–5] Both case reports[7,8] present patients with an otherwise prohibitive risk of surgical intervention which could otherwise only be treated with the use of antibiotics.[1,3] However, the presence of large vegetations itself is an important risk factor for a poor outcome and can result in septic embolization into the lung with the risk of further progression of sepsis.[1,3] Indeed the patients in both case reports had a clear indication for surgical therapy due to large vegetations but were in a poor condition. Therefore, the authors decided to perform a percutaneous removal of the vegetations using vacuum-assisted veno-venous circulation.[9]

Percutaneous treatment of right-sided endocarditis

The aim of the intervention is to reduce the bacterial load from the infected cardiac structures and avoid further septic embolization into the lung. A definite and complete debridement of the infected valve tissue cannot be achieved by using this technique. Therefore, additional post-procedural antibiotic treatment is of paramount importance and represents a substantial part of the therapy.[1,3,9] Although this approach as described by the authors[7,8] further improves the treatment of patients with right heart IE, the procedure is not without risk and can result in mobilization and subsequent embolization of the vegetation to the pulmonary circulation, cardiac tamponade, and access side bleeding. In the cases presented, the authors describe a resolution of the sepsis, improvement of the patients clinical condition, and discharge from the hospital.[3,7,8] There are therapeutic indications for vacuum-assisted debulking of the vegetations in patients on IDU, cardiac device-related

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Table 1 Indications regarding choice of treatment including the potential alternative of the percutaneous approach

Indications for surgical in right-sided endocarditis	Guideline-directed antibiotic regime	Need of surgery	Percutaneous approach
Microorganisms difficult to eradicate	Indicated	Discussion in endocarditis team considering patient status	No indication
Large, persistent tricuspid valve vegetations (>20 mm)	Indicated	Discussion in endocarditis team considering patient status	Alternative to surgery—discussion in endocarditis team
Right heart failure secondary to severe tricuspid regurgitation	Indicated	Discussion in endocarditis team considering patient status	No indication
Persistent bacteraemia for >7 days despite adequate antimicrobial therapy	Indicated	Discussion in endocarditis team considering patient status	No indication
Recurrent pulmonary emboli with or without concomitant right heart failure	Indicated	Discussion in endocarditis team considering patient status	No indication
Abscess (more common in the setting of prosthetic valve)	Indicated	Indicated	No indication

The green colour highlights treatment options which are recommended by the guidelines, orange treatment options are advisable but are according to the patient status, red treatment options should be avoided.

endocarditis (mainly implantable electronic devices but also prosthetic valves and rings) as well as patients on long-term ECMO therapy with vegetations or thrombi located at the cannulae. The technique can be used for combined therapeutic and diagnostic indications in cases in which the differentiation between thrombus, vegetation or even cardiac tumour by imaging is not possible.[10] Similarly, the removal of left sided intracavitary masses related to thrombus or vegetations has also been reported. Such procedures bare the risk of systemic embolization and are performed under cerebral protection in bail-out situations.[11]

Potential implications regarding the clinical practice

Thus, although only case series are currently reporting the potential treatment benefit of the percutaneous debulking of vegetations in the setting of right-sided endocarditis, it is an option which has to be considered in a population with prohibitive or extremely high risk for surgery and following discussion regarding the best suitable treatment in the heart team. While guideline directed antibiotic treatment is always indicated, surgery and the potential treatment alternative of percutaneous debulking of vegetations have to be considered in the interdisciplinary endocarditis team (*Table 1*).

Lead author biography

Christoph Sinning is senior physician at the Department of Cardiology at the University Heart & Vascular Center Hamburg, Germany. His main areas of work are cardiovascular imaging with a focus on echocardiography, treatment of adults with congenital heart disease and cardiac devices like pacemaker and ICD. The current scientific work is focussing on the use of echocardiography in detecting outcome of patients undergoing EP procedures and improving detection of candidates for cardiac resynchronisation therapy. In addition an area of scientific work is outcome of advanced heart failure in adults with congenital heart disease.

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Data availability

The shown data in the manuscript is available from the publications cited in the manuscript.

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