Infective endocarditis (IE) is a common life-threatening disease with high in-hospital mortality of nearly 20% (1). In the early stage of IE, conservative anti-infective therapy is possible. Advanced untreated IE leads to significant valve destruction. This group of patients requires timely radical surgical treatment that involves the removal of the infected valve, followed by valve prosthesis implantation. Since large floating vegetations on the valve surface have developed, emergent surgical treatment is indicated (2).

Kubota et al. recently reported a successful clinical application of the infrared coagulator “Kyo-co” for treating a patient with aortic valve IE and aortic annular abscess (3). The “Ky-co” coagulator enables the prolonged and repeated application of infrared energy to tissue in order to create deep lesions in the myocardium. The maximum temperature rise to 97.9±2.1 °C for a total of 28 sec was demonstrated, which is higher and longer compared to other available ablation systems, according to the authors.

A 62-year-old male patient was operated on using the “Kyo-co.” After two large abscess orifices were identified, a careful debridement was performed. Thereafter, the infrared ablation was applied to the surrounding tissue of the abscess cavities. Then, replacement of the aortic valve using a mechanical prosthesis and of the ascending aorta (due to aneurysm) was performed. The postoperative course and the follow-up period of 5 years were without complications.

In this editorial, we discuss currently available strategies for the surgical treatment of IE. We describe different surgical options for patients with the advanced aortic and mitral valve, as well as so-called right-sided IE. Special attention is paid to the safety and feasibility of minimally invasive surgery (MIS) in the treatment of IE patients. We also reflect on the possible role of the developing transcatheter approach in the treatment of IE.

Surgical treatment of IE is associated with satisfactory early, midterm, and long-term results (4). In patients with aortic valve IE, valve replacement is often the only option. The choice of valve prosthesis is carried out according to current guidelines (5). We showed that an extensive surgical approach combined with aggressive postoperative antibiotic therapy could reduce high mortality. Sutureless aortic valve replacement was seen as an appropriate alternative for high-risk IE patients, even in degenerated bioroots, with limited postoperative morbidity and satisfied echocardiographic performance (6). In this scenario, the modified Perceval implantation technique—the so-called “snugger method”—can be applied. This technique involves the use of snuggers for proper placement of the prosthesis and eases the implantation process, thus leading to excellent outcomes (7,8). Stentless xenografts are another viable alternative.
for the treatment of valve/root and prosthetic endocarditis with appropriate postoperative performance and low rate of reinfection (Figure 1) (9,10).

In the case of severe annulus destruction without the possibility of valve anchoring, the new technique of off-label implantation of a sutureless valve in the mitral position has been reported (11). This technique allows a shortening of the cross-clamp time and ensures precise and safe implantation of the prosthesis in the destructured mitral ring.

MIS has been increasingly applied for IE in recent years. This approach is feasible for all common IE localizations. The aortic valve replacement for IE could be successfully performed via both upper partial sternotomy (12) and rightsided anterior minithoracotomy in the second intercostal space (13). MIS for mitral valve IE via right lateral minithoracotomy in the fourth intercostal space is also feasible and safe (14,15).

Despite the broad application of transcatheter valve interventions nowadays, this approach could not be used for IE. Treatment of IE requires a radical debridement of infected valves and surrounding tissue, which cannot be achieved due to percutaneous manipulations. On the other hand, IE after transcatheter valve implantation became a new challenge for cardiac surgeons, which can nevertheless be treated surgically and as an MIS approach (Figure 2) (13,16).

In conclusion, there are various options and equipment for the surgical treatment of IE. The new approach described by Kubota and colleagues (3), in combination with the available surgical techniques, should be helpful for further development in this field. Timely decision and careful choice of the appropriate surgical strategy combined with antimicrobial therapy are the keys to success for patients suffering from advanced IE.

Acknowledgments
None.

Footnote
Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References
4. Farag M, Borst T, Sabashnikov A, et al. Surgery for...