

SUCCESSFUL TREATMENT OF CHALLENGING CASE OF INFECTIVE ENDOCARDITIS

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ABSTRACT

Introduction/aim: We are presenting the case of a patient suffering from fibrous cardiac skeleton damage caused by advanced infective endocarditis after aortic valve replacement surgery, whose cardiac surgery treatment proved to be successful.

Case report: A redo procedure was performed through a median sternotomy using cardiopulmonary bypass. Artificial aortic and native mitral valves were excised and all infected tissue removed. Reconstruction of the fibrotic cardiac skeleton was done using two autologous pericardial patches according to Tyrone-David. Both mechanical valves were implanted.

Conclusion: Successful treatment of one of the most difficult conditions in cardiac surgery can be achieved in our country.

Keywords: endocarditis, fibrous cardiac skeleton, cardiosurgical treatment

INTRODUCTION

The fibrous cardiac skeleton is the central anatomic structure of the heart that supports the aortic, mitral and tricuspid valves. It can be damaged by infectious endocarditis, extensive calcification, or during mitral valve replacement surgery [1]. Infectious endocarditis affecting the fibrous cardiac skeleton in its severe, septic stage has low survival rates, and if patients enter renal failure after cardiac surgery, the mortality rate is 60-80% [2, 3]. Surgical reconstruction of the fibrous cardiac skeleton with mitral and aortic valve replacement represents an extensive and technically extremely demanding procedure [4, 5]. We are presenting the case of a patient with fibrous cardiac skeleton damage caused by advanced endocarditis after aortic valve replacement surgery, who has been successfully treated with cardiac surgery in our tertiary centre.

CASE REPORT

The 59-years-old male patient was operated on at the Dedinje Cardiovascular Institute to treat symptomatic, hemodynamically significant aortic stenosis and concomitant coronary disease. Surgical aortic valve replacement (St. Jude medical Regent N° 21) and a single aortocoronary bypass (the left internal thoracic artery to the left anterior descending coronary artery) were

performed. His postoperative recovery was uneventful and he was discharged seven days after surgery.

A month after the surgery, the patient was admitted to a regional Health Centre with signs and symptoms of systemic infection (sweating, malaise, febricity of 39°C, leukocytosis, tachycardia, tachypnea). *Staphylococcus aureus* was isolated from the hemoculture. After seven days of antibiotic therapy (ceftriaxone), the patient's general condition improved. He was discharged afebrile, with normalized laboratory parameters and adequate transthoracic echocardiography (TTE) findings.

Two weeks later, the patient was admitted to the Dedinje Cardiovascular Institute as a medical emergency. Upon admission, he was highly febrile and anuric. Laboratory analyses indicated a severe septic condition (pronounced leukocytosis 21000×10^9 cells/L, thrombocytosis 530000×10^9 /L, INR>6). *Staphylococcus aureus* was isolated from the hemoculture again. TTE showed severe mitral insufficiency caused by the abruption of the anterior cusp from the annulus. The artificial aortic valve functioned normally. Trans-oesophageal echocardiography (TEE) confirmed the findings of the TTE, revealing a large abscess cavity just below the mechanical aortic valve that involved a large portion of the fibrous heart skeleton and had destroyed the anterior part of the mitral annulus (**Figure 1**).

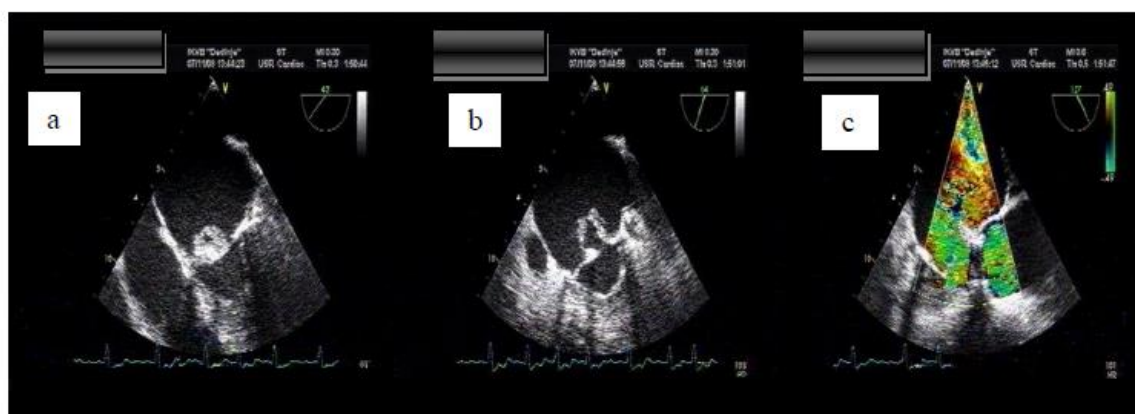


Figure 1. Preoperative transthoracic echocardiography findings

Legend: a: verified abscess of the mitral annulus; b: clearly demarcated abscess cavity leading to anterior mitral cusp abruption; c: anterior mitral cusp abruption causing severe mitral insufficiency

Emergency surgery was indicated. Before surgery, the patient was intubated and connected to a mechanical ventilator, and hemodynamically stabilized by applying small doses of inotropic drugs. A cardiopulmonary bypass was established by using the artery and vein femoral cannulation. A median sternotomy was performed, although it was severely hampered by pericardial adhesions. There were no local signs of mediastinal infection.

Upon aortotomy, a normally positioned and functional prosthetic valve appeared. The left atrium was opened and it was confirmed that the anterior cusp of the mitral valve had completely separated from its base on the annulus. The posterior cusp was morphologically preserved. The entire fibrous skeleton was destroyed and converted into a large ruptured abscess cavity. Aortotomy

was extended to the mitral annulus and the roof of the left atrium. The artificial aortic valve was extracted, the anterior cusp of the mitral valve and the abscess as a whole were excised. The entire cavity was radically cleansed and all infected tissue removed.

The reconstruction was done using the technique of two pericardial patches according to Tyrone-David [6]. An autologous pericardium (treated in 1% glutaraldehyde) was applied for patching. With two patches, the fibrotic cardiac skeleton was reconstructed, creating the base for mechanical valve implantation. Both mechanical valves (aortic – St. Jude Medical Regent N° 21 and mitral – On-X N° 27/29) were implanted using single braided 2-0 sutures with pledgets. The left ventricular outflow tract and the left atrium roof were reconstructed and the aortotomy was closed (**Figure 2**).

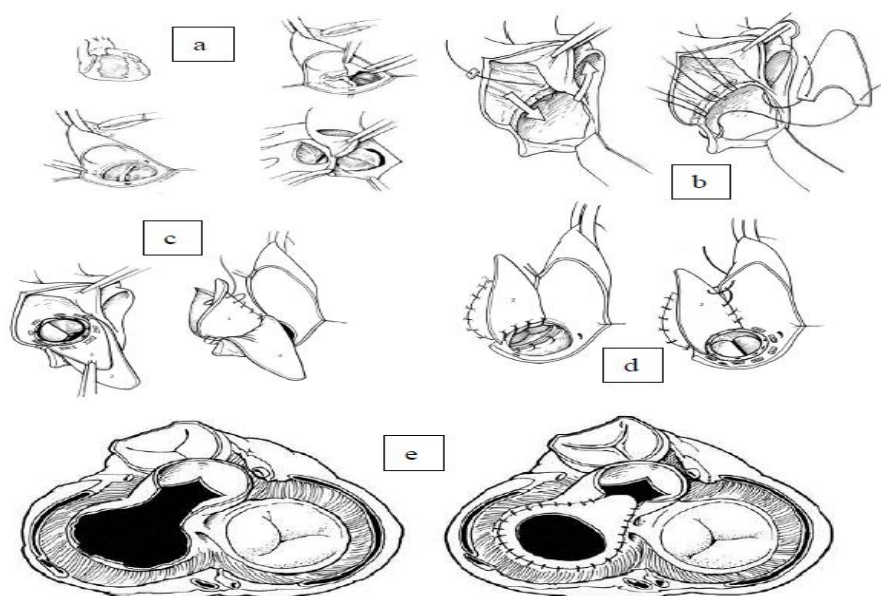


Figure 2. Schematic representation of performed surgery

Legend: a: the aortotomy extended to the mitral annulus and over the roof of the left atrium. The aortic and mitral valves were excised.; b: reconstruction of the fibrous skeleton at the level of the anterior mitral cusp with a well-cut pericardial patch 1.; c: implantation of mitral prosthesis; posterior - on the preserved part of the mitral annulus, and anterior on the sutured patch. Patch 1 is also used to close the left atrium.; d: aortic valve implantation. Patch 2 was used to close the aortotomy.; e: final reconstruction of the heart skeleton.

The weaning from cardiopulmonary bypass was uneventful. Despite the administration of blood products and local hemostatic measures, hemostasis could not be established on a satisfactory level. Therefore, a Mikulitz tamponade was performed and the patient was transferred to the Intensive Care Unit. Only after multiple administrations of blood products together with the recombinant factor VII, the bleeding subsided. It took 72 hours for the patient to fully stabilize and that was when his chest was closed.

Based on the hemoculture findings, prolonged antibiotic therapy was prescribed (Vancomycin, Gentamicin, Rifampicin). A few weeks later, the patient became afebrile. He had to be treated with hemodialysis for acute renal failure for the next two months. A tracheostomy had to be performed as well and a drain was placed in his right pleural space to treat recurring effusions. He was given Durabolin on three occasions to treat general weakness, which accelerated the recovery, enabled the separation from mechanical ventilation and the transition to oral nutrition. After several months of treatment, the patient was discharged and transferred to a regional rehabilitation centre.

DISCUSSION

Despite modern diagnostic and therapeutic possibilities, infective endocarditis continues to have a high mortality rate (13-30% in hospital and up to 66% during the first year). The rates are higher for patients with prosthetic valves, even if recognized early and treated properly [7, 8]. The endocarditis of prosthetic valves complicated by abscess formation and fibrous heart skeleton destruction carries the highest perioperative and postoperative risk [3, 5]. These operations are technically very demanding. Full resection of the infected tissue frequently requires the removal of the entire fibrous heart skeleton [9, 10]. This is followed by skeleton reconstruction and artificial valve implantation. The largest series of these interventions included 76 patients with a mortality rate of 34% (10% operative and 24% of late mortality) [6]. Our microbiological findings align with literature data. The most common microorganisms causing infective endocarditis are *Streptococcus* and *Staphylococcus* spp. (both responsible for about 30% of cases) [2, 3].

The diagnosis of infective endocarditis can sometimes be challenging especially in subacute cases. Therefore, the use of modern imaging technologies is recommended to confirm the diagnosis [1, 11]. In our patient's case, TTE and TEE were both performed to establish the final diagnosis.

The treatment of infective endocarditis should be adequate antimicrobial therapy based on susceptibility tests for the identified microbial agent from the blood culture until the causative agent is eradicated [2, 3]. Nevertheless, cardiac surgery is necessary for up to 50% of acute endocarditis cases. Surgery is always indicated in patients with endocarditis-related moderate to severe heart failure or life-threatening complications, such as the ones we presented [8, 12].

Choosing a pericardial patch as reconstructive material was somewhat extravagant. Namely, a large number of surgeons think that an aortic homograft is the first choice material for such cases, taking into account its resistance to infection [10]. However, in our case, a homograft was unavailable. Nonetheless, other authors think that radical resection of infected tissue is more important than the choice of material used as a patch or of the choice of the valve implant [4, 6]. The most important factor is to restore a durable three-dimensional spatial geometry that allows for proper localization of prosthetic valves and the aortic root and avoids left ventricular outflow obstruction and coronary torsion [11, 5]. Our patient's achieved positive outcome proves this point of view.

Bleeding is one of the more serious problems of this type of surgery [9, 10]. Given the septic condition of our patient and the length of the surgical procedure, satisfactory hemostasis was impossible to achieve. However, by administering the Mikulitz tamponade and adequate fluid and blood replacement, as well as blood hemostatics, antifibrinolytics and recombinant factor VII, we were able to stabilize the patient.

Acute renal failure is an expected complication after such severe surgery on a patient with refractory sepsis. Hemodialysis is usually an effective treatment [6, 7] and was therefore administered to our patient as well.

Treatment of patients with severe endocarditis affecting the fibrous heart skeleton is long-lasting, difficult and requires a multidisciplinary approach [8, 12].

CONCLUSION

An acute endocarditis case of severity such as this had never been reported in our country before. Although this was an isolated case, it served to prove that our centres for cardiac surgery have enough experience and adequate guidelines to successfully treat one of the most difficult conditions in cardiac surgery, right here in our country.

Informed consent: An informed consent has been provided by the patients for publishing this article.

Conflict of interest: None declared.

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PRIKAZ BOLESNIKA

USPEŠAN TRETMAN ZAHTEVNOG SLUČAJA INFEKTIVNOG ENDOKARDITISA

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SAŽETAK

Uvod/cilj Prikazujemo slučaj uspešnog kardiohirurškog lečenja pacijenta sa oštećenjem fibroznog srčanog skeleta izazvanog uznapredovalim infektivnim endokarditisom nakon zamene aortne valvule.

Prikaz bolesnika Ponovna procedura je urađena kroz srednju sternotomiju uz korišćenje kardiopulmonalnog bajpasa. Ekscidirane su veštačka aortna i nativna mitralna valvula i uklonjena sva zaražena tkiva. Rekonstrukcija fibroznog srčanog skeleta urađena je pomoću dva autologna perikardijalna režnja prema Tirone-David-u. Ugrađene su obe mehaničke valvule.

Zaključak U našoj zemlji je moguće sprovesti uspešno lečenje jednog od najtežih stanja u kardiohirurgiji.

Ključne reči: endokarditis, fibrozni srčani skelet, kardiohirurško lečenje