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## Aortic homograft implantation after Ozaki procedure: Case report

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## ABSTRACT

**INTRODUCTION AND IMPORTANCE:** The infective endocarditis incidence data for patients undergoing aortic valve neocuspidization with glutaraldehyde-treated autologous pericardium (Ozaki procedure) are rare, and the optimal surgical treatment strategy remains unclear.

**CASE PRESENTATION:** This is the first case report of surgical treatment of infective endocarditis of aortic valve with cryopreserved homograft in an athlete with previously performed Ozaki procedure.

**CLINICAL DISCUSSION:** The choice of homograft was dictated by the young age of the patient; professional activity as an athlete; refusal of anticoagulants and the need for wide excision of compromised tissues to mitigate potential risk of spread of infection as well as its recurrence.

**CONCLUSION:** The use of the aortic homograft allowed us to radically remove the infected tissues and achieve hemodynamic characteristics similar to the native valve. This is probably the first case report of use of homograft to treat aortic valve endocarditis following Ozaki procedure.

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## 1. Introduction

Active implementation of aortic valve neocuspidization with glutaraldehyde-treated autologous pericardium (AVNeo) procedure into wide clinical practice is explained by acceptable survival, decreasing of valve-connected complications and good neo-valve hemodynamic indicators in immediate and midterm postoperative periods [1]. The problem of native and prosthetic valve infective endocarditis (IE) is well-studied, and specific clinical guidelines and surgical approaches were presented. The IE incidence data for patients undergoing AVNeo procedure are rare, and the optimal surgical treatment strategy remains unclear.

In this report, we present the case of surgical treatment of IE of the aortic valve using a cryopreserved homograft for male after previously performed AVNeo procedure.

This work is reported in line with the SCARE 2020 Guidelines [2].

## 2. Presentation of case

A male patient 40 years old, professional athlete, presents to the hospital complaining of dyspnea and fever persisting for 1 month. The patient with congenital bicuspid aortic valve with post-stenotic aortic dilatation and previous successful AVNeo procedure and replacement of the ascending aorta presented to the hospital 5 months after the surgical procedure. There were no complications in immediate and midterm postoperative periods, the average gradient on the neo valve did not exceed 4 mm Hg, and minimal regurgitation did not exceed 1 stage throughout the observation period. Four months after the surgery there were episodes of fever up to 38.8 °C that were unresponsive to treatment with antibiotics. Transesophageal echocardiography (TEE) revealed vegetation on neocusps of 1.1 × 1.5 cm and 1.2 × 1.6 cm in size with severe aortic regurgitation and involvement of annulus and aortic root up to the sinotubular junction (Fig. 1A). Blood culture revealed streptococcus epidermidis.

Based on the sensitivity of the micro-organism, the patient was given a course of two-component antibacterial therapy with vancomycin and meropenem for 14 days. However, it was clear that surgical treatment of IE of aortic neovalve will be the best strategy to tackle the spreading infection. Taking into account the young age of the patient, type of professional activity, local spread of the infective process, the decision was made to use a cryopreserved aortic homograft.

Surgery was performed through the median sternotomy, using cardiopulmonary bypass with left common femoral vein can-

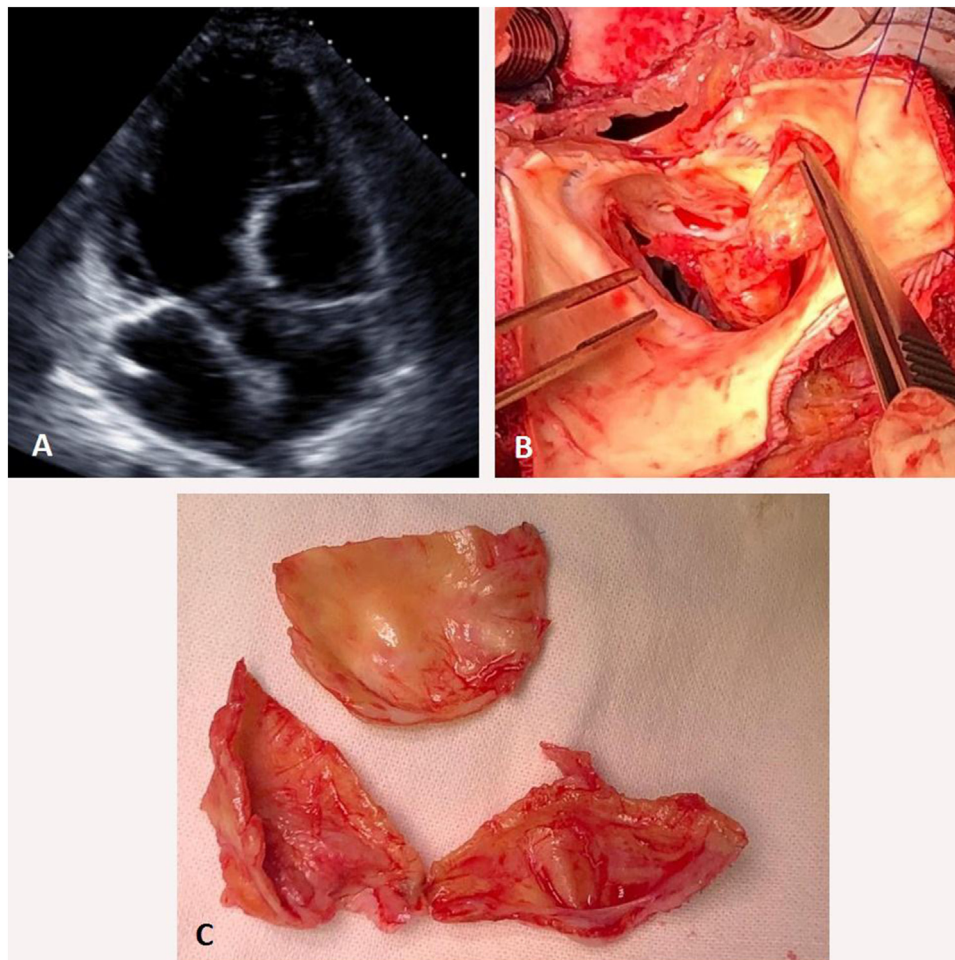
**Abbreviations:** AVNeo, aortic valve neocuspidization with glutaraldehyde-treated autologous pericardium; IE, infective endocarditis; TEE, transesophageal echocardiography; CPB, cardio pulmonary bypass; NYHA, New York Heart Association Functional Classification.

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**Fig. 1.** A – AVNeo infective endocarditis by preoperative transesophageal echocardiography. B – Intraoperative view of infected neocusps. C – Infected autologous pericardium neocusps after resection.

nulation and cardioplegia. Deep mobilization of the aortic root was performed. During inspection of autopericardial neocusps, no adhesion was noted along the commissures but a massive degeneration of left and right coronary cusps was revealed which had been caused by vegetations up to 1.5 cm in size (Fig. 1B, C). Moreover, advancement of the infective process to the walls of ascending aorta to sinotubular junction was noted. The autopericardial neocusps and aortic root were dissected, left main coronary artery mouth edge was stitched with the holder-thread. Right coronary artery was also involved in the adhesive process, therefore we performed the repair with autovenous graft.

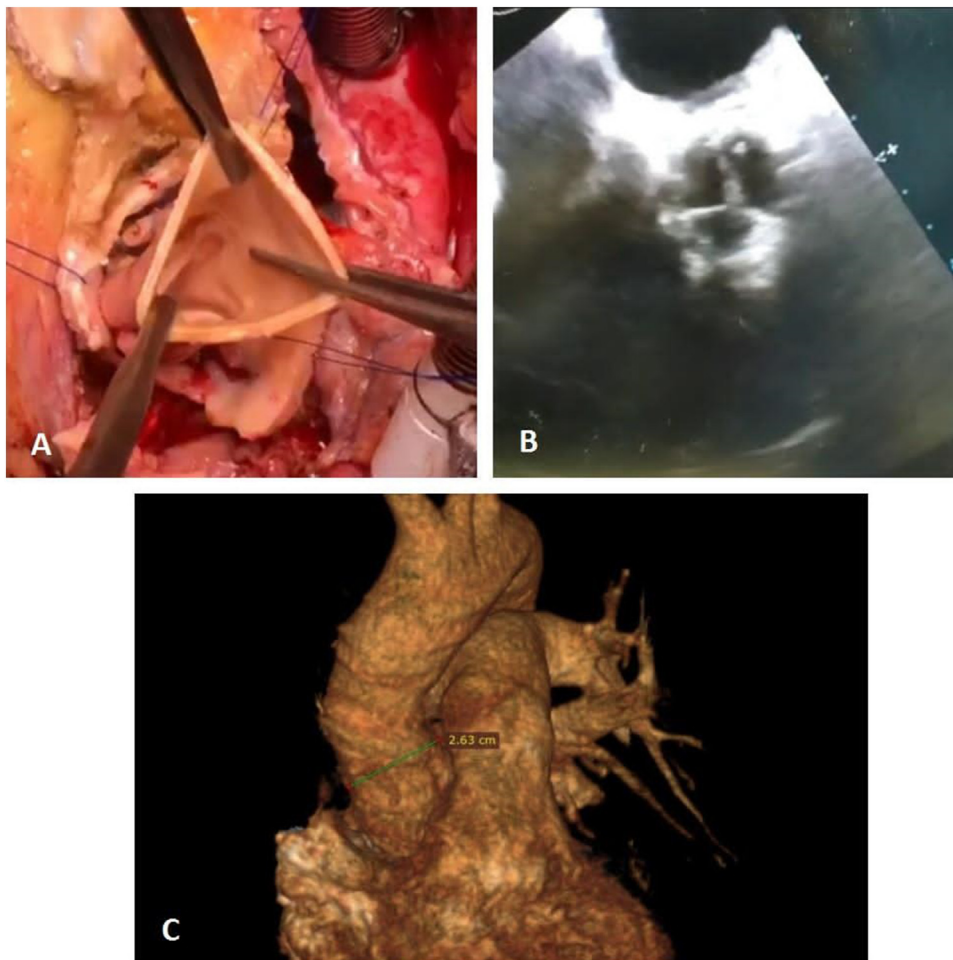
A cryopreserved valve-containing homograft No. 24 fixed with 3 continuous prolene stitches was implanted into the aortic position using Hegar's dilator No. 21 (Fig. 2A). According to the intraoperative TEE, homograft performance was satisfactory, average gradient on aortic valve was 5 mm Hg, with minimal regurgitation 0–1. Aortic cross-clamping time was 110 min with cardiopulmonary bypass time of 149 min and length of intensive care unit stay of 20 h.

The postoperative course was unremarkable except for low grade pyrexia for 4 days. The patient was discharged after 10 days in NYHA Class 1, with satisfactory laboratory test values and with recommendations to continue two-component antibacterial therapy for another 21 days. Reassuring haemodynamic data for the homograft was obtained TEE and multi-slice computed tomography (Fig. 2B, C) at two years follow-up.

### 3. Discussion

Aortic valve damage accounts for about 40–67% of all cases of infective endocarditis and requires surgical treatment in acute phase in 60–70% of patients [3]. Despite the advances in surgical technique and postoperative therapy, immediate mortality in this cohort still remains high and ranges from 6% to 33% [4]. According to major studies, mechanical replacement in case of infective endocarditis of aortic valve shows 19% of 5-year mortality while biological prosthetics – 34.8% [5]. Regarding choice of prosthesis for the treatment of this cohort of patients, there is consensus that whereas in a limited number of cases mechanical valve replacement is possible, but allografts of aortic root are more preferable because of the frequent concealed spread of infection outside the valve and annulus (evidence level IIA) [6].

The issue of infective endocarditis after AVNeo procedure is understudied. Duran and colleagues report 2 cases of IE after AVNeo procedures out of 76 patients at 5 and 31 months respectively [7]. The authors point out to negative bacterial culture (test) of resected neocusps; both patients underwent mechanical prosthetics. Reuthebuch and colleagues point to 1 case of endocarditis out of 30 patients after Ozaki's procedure, which developed 5 months after surgery, and was reoperated using ordinary bioprosthesis [8]. In a major study of Ozaki and colleagues, which included an analysis of the midterm postoperative period of 850 patients after AVNeo procedure, 13 cases of infective endocarditis were shown, which



**Fig. 2.** A – Aortic root homograft after implantation. B – TEE imaging after two postoperative years – there is no regurgitation. C – 3D computed tomography modeling of the aortic root after two postoperative years.

underwent re-reconstruction with equine ( $n = 1$ ) and bovine pericardium ( $n = 12$ ) [9].

In case of our patient, the choice of homograft was dictated by the spread of infection, the high risk of recurrence without wide excision of compromised tissues, young age, professional activity as athlete and refusal of anticoagulants.

#### 4. Conclusion

The use of the aortic homograft allowed us to radically remove the infected tissues and reach excellent hemodynamic characteristics similar to the native valve. Our case is probably the first reported experience of homograft use to treat endocarditis after Ozaki procedure in the world.

#### Declaration of Competing Interest

None of the authors have any conflict of interest to declare.

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#### Ethical approval

The study is exempt from ethical approval

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contribution

Roman Komarov and Nikolay Kurasov performed surgery, analyzed the literature and interpreted the patient's data regarding it. Alisher Ismailbaev, Boris Tlisov, Alexander Danachev, performed surgery and edited publication. Ivan Ivashov participated to the manuscript editing to its final version, supervised the report and revised it critically. All authors read and approved the final manuscript to be published.

#### Registration of research studies

Not Applicable.

#### Guarantor

Ivan Ivashov and Alisher Ismailbaev are the guarantors of submission and accepts full responsibility.

## Provenance and peer review

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