Triple Björk-Shiley valve – more than 30 years of asymptomatic functioning: to the memory of late Academic Prof. Isidor Papo and the 45th anniversary of the first valve implantation in Yugoslavia

Istovremena implantacija trostruke Björk-Shiley valvule – više od 30 godina uspešnog funkcionisanja: u znak sećanja na akademika prof. Isidora Papa i 45. godišnjicu prve implantacije mehaničke veštačke valvule u Jugoslaviji

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Abstract

Introduction. The Björk-Shiley Delrin (BSD) tilting disc heart valve was first clinically used in 1969. A triple BSD valve replacement has not been quite common, because of high postoperative risk and complications, but there have been several cases with different postoperative course. The first implantation of artificial valve in Yugoslavia was done by Prof. Isidor Papo, in 1965. Case report. We presented patient with more than 30 years of successful triple (aortic, mitral and tricuspid) BSD valve functioning. This is a rare case of a triple BSD valve long-term functioning and, as far as we know, the case of the longest period of successful functioning of the triple BSD valves. In March 1977, a 34-year-old female with severe congestive heart failure of the New York Heart Association (NYHA) functional class IV was admitted to the Military Medical Academy, Belgrade, for triple valve (aortic, mitral and tricuspid) surgery with BSD mechanical valves. Complicated surgery was done well. Sixteen months later the patient was diagnosed with infective endocarditis caused by Enterobacter spp. that was isolated from blood cultures. The patient was successfully cured. After that the patient had no cardiovascular symptoms and regular physical and echocardiographic examinations used to reveal satisfactory cardiovascular function. The patient died more than 30 years after the surgery due to a terminal phase of uterine carcinoma.

Conclusion. Although BSD valves were withdrawn from clinical use long time ago, there are still some rare cases of their successful functioning, mostly due to the precise surgical technique and regular follow-up by the cardiologists.

Key words: rheumatic fever; heart valve diseases; cardiac surgical procedures; treatment outcome; survival.

Apstrakt

Uvod. Istovremena ugradnja tri veštačke valvule ne preseće se često u kliničkoj praksi, pre svega zbog kompleksnosti hirurškog zahvata i mogućih postoperativnih komplikacija. Profesor Isidor Papa ubraja se u kardiohirurgu svetskoga rešenja koji je istovremenu implantaciju tri veštačke valvule uspešno uradio kod velikog broja bolesnika, po čemu je i danas poznat u kardiohirurškim krugovima širom sveta.

Prikaz bolesnika. U radu je prikazana bolesnica sa dugo-godišnjim (preko 30 godina) uspešnim funkcionisanjem tri istovremeno implantirane veštačke Björk-Shiley Delrin (BSD) valvule (na mitralnoj, aortnoj i trikuspidnoj poziciji). Ovo je redak slučaj, a po našim saznanjima ujedno i slučaj najdužeg funkcionisanja tri veštačke BSD valvule opisan u literaturi. Marta 1977. godine, u Vojnomedicinsku akademiju primljena je 34-godišnja bolesnica sa znakovima teške kongestivne srčane insuficijencije New York Heart Association (NYHA) klase IV radi planirane implantacije tri veštačke valvule (na aortnoj, mitralnoj i trikuspidnoj poziciji). Kardiohirurška intervencija protekla je bez komplikacija. Nakon 16 meseci bolesnica je lečena zbog infektivnog endokarditisa, uz izolaciju Enterobacter spp. u hemokulturi. Nakon uspešnog izlečenja bolesnica je otpuštena. U daljem periodu bolesnica nije imala nikakvih kardioloških tegoba, a na kardiološkim kontrolama, koje su radene dva puta godišnje, nalazi su bili uređeni. Umrla je u terminalnoj fazi karcinoma endometrijuma sa metastazama, posle više od 30 godina od operacije. Zaključak. Iako su BSD valvule povučene iz upotrebe i zamenjene modernijim mehaničkim valvulama, prikazana bolesnica pokazuje da su odlična hirurška tehnika implantacije valvula i redovno kardiološko praćenje bolesnički omogućili vrlo dugačak period funkcionisanja tri mehaničke BSD valvule bez kardioloških komplikacija.

Ključne reči: reumatska groznička; zalisci srca, bolesti; hirurgija, kardijalna, procedure; lečenje, ishod; preživljavanje.

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Introduction

The Björk-Shiley Delrin (BSD) tilting disc heart valve was first used clinically in 1969. Triple BSD valve replacement was not quite common, because of high postoperative risk and complications, but there have been several cases with different postoperative course. Although BSD valve provided a low-profile, quiet prosthesis with excellent hemodynamics, complications such as embolism, valve thrombosis, reoperations and deaths with the highest incidences during the first postoperative year led to its replacement with convexo-concaved Björk-Shiley valve and to final market withdrawal of Björk-Shiley valve in 1987.

The first implantation of artificial valve in Yugoslavia was done by Prof. Isidor Papo, in 1965, 45 years ago. A surgical team led by Prof. Papo, did implantation of artificial valves in more than 2800 patients within the nexty 15 years. Triple valve surgery (aortic, mitral and tricuspid position) with implantation of artificial valves was done in 100 patients. Simultaneous implantation of artificial valves on aortic, mitral and tricuspid position was done in 36 patients. This is an impressive number of surgical procedures, as tricuspid position is not suitable for artificial valve implantation.

Case report

In March 1977, a 34-year-old female, social worker in a school for retarded children, was admitted to the Military Medical Academy in Belgrade for triple valve (aortic, mitral and tricuspid) surgery with BSD mechanical valves. The patient had a history of acute rheumatic fever at the age of five followed by its recurrences at the age of 15 and 17 years. At that time mitral and aortic valve disease had already been formed and transitory atrial fibrillation was present. A year and a half before the hospitalization the patient got symptoms and signs of heart failure with shorter breath, dyspnea on effort and fatigue and two months before the hospitalization she got edema of the legs and stomach. Preoperative physical examination with phonocardiography and heart catheterization revealed aortic and mitral stenosis and insufficiency and tricuspid stenosis with adhesive pericarditis. She had severe congestive heart failure, the New York Heart Association (NYHA) functional class IV. Electrocardiographic examination revealed permanent atrial fibrillation and right bundle branch block with ST depression in V4 to V6 followed by biphasic T waves. A cardiosurgical board proposed triple valve surgery and the patient gave her informed consent.

In April 1977, after cardiological preoperative preparation, triple BSD valve surgery was done at aortic (No 23), mitral (No 31) and tricuspid (No 31) position with concomitant pericardectomy. It was the first case of triple valve surgery in the region of Balkan, done by the most experienced cardi surgeon in this region, Prof. Isidor Papo. During postoperative course the patient had transient heart failure, which was successfully treated and the patient left hospital asymptomatic with anticoagulant therapy.

Sixteen months later the patient got elevated body temperature with clinical signs of infective endocarditis. The patient was admitted to the hospital. Enterobacter spp. was isolated in the specimens of blood and urine, approving the diagnosis of endocarditis. The patient got a prolonged combined antibiotic therapy, with good clinical reaction and left the hospital 6 weeks later, completely cured. After that the patient had regular twice a year cardiological examination with echocardiography, always considered satisfying. The patient went back to work and normal life activities. By the end of 2004 the patient was again admitted to the hospital for elective extensive operation of cancer of the uterus. The patient had no cardiovascular symptoms, physical examination revealed satisfactory cardiovascular function. Transesophageal echocardiography revealed no pathological changes on all the three BSD valves.

Fig. 1 – Björk-Shiley valves in the mitral and tricuspid position – transthoracal echocardiography apical four-chamber view

Fig. 2 – Björk-Shiley valves in the aortic position – transoesophageal echocardiography

The patient successfully passed through this surgery, with no cardiovascular complications and after that the patient received radiotherapy. She died at the end of 2007 in the terminal stage of malignant disease with pulmonary carcinomatosis. Within more than 30 years of postoperative period there were no symptoms or clinical and echocardiographic signs of BSD valves malfunction.
Discussion

We presented patient with more than 30 years of successful triple (aortic, mitral and tricuspid) BSD valve functioning. This is a rare case of a triple BSD valve long-term functioning and, as far as we know, the case of the longest period of successful functioning of the triple BSD valves.

The BSD prosthetic heart valve was widely used from 1969 through 1981. Delrin, the disk material used for early valves, was highly resistant to wear and with a predicted durability of more than 50 years. Unfortunately, several reports of shrinkage and deformation of Delrin disc, embolism and valve thrombosis were reported, which resulted in failure of the Björk-Shiley prosthesis. On the other hand, there have also been several case reports on patients with a long-lasting and successful functioning of BSD prosthetic valves, for more than 20 years, but only a few cases of triple BSD valve functioning without complications for a long time.

The presented patient had a triple BSD valves with a life of approximately one billion and 122 million cycles for each valve during 30 years, assuming the patient’s average heart rate of 70 beats/min. This is much longer than the estimated optimal time - 140 millions cycles.

The anticoagulant-related hemorrhage has been reported to be the single most common valve-related complication (1.4/100 patient-years) and the most common valve-related cause of death (0.3/100 patient-years). Fortunately, this was not the case with the presented patient, who successfully used anticoagulants for more than 30 years and passed through difficult surgery and radiotherapy treatment for malignant disease. There have been only two reports of mechanical failure due to inlet strut fracture in the literature and in a large study of more than 3,300 patients no mechanical failures among the standard BSD valve were described. Disc wear could appear during the time, but it is usually not related to abnormal valve opening or closing although increased regurgitation might occur. Larger prostheses, in general, showed greater disc wear than smaller ones, but in our case BSD valves size was not quite small. Another important life-threatening complication of BSD valve at tricuspid position is related to the obstruction of tricuspid prosthesis by tissue ingrowth and several studies have not recommended the use of these valves in tricuspid position or even suggested prophylactic removal of BSD valves. A long postoperative period without complication in our patient could be explained by an excellent surgical technique performed by one of the most famous surgeons in this region of Europe, Prof. Isidor Papo, as well as minuscious clinical follow-up by the cardiologists and optimal INR regulation.

Conclusion

Although BSD valves were withdrawn from clinical use long time ago, there are still some rare cases of their successful functioning, mostly due to a precise surgical technique and regular follow-up by the cardiologists.

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