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ARTYKUŁ ORYGINALNY / *ORIGINAL ARTICLE*

Factors affecting long-term survival after aortic valve replacement

Ewa Orłowska-Baranowska[1], Elżbieta Abramczuk[1], Maciej Grabowski[1], Dariusz Zakrzewski[1], Małgorzata Miłkowska[1], Anna Galas[1], Katarzyna Czerwińska[1], Tomasz Hryniewiecki[1], Rafał Baranowski[2], Jarosław Piskorski[3, 4]

[1]Department of Valvular Heart Disease, Institute of Cardiology, Warsaw, Poland
[2]Department of Cardiac Rehabilitation and Noninvasive Electrocardiology, Institute of Cardiology, Warsaw, Poland
[3]Institute of Physics, University of Zielona Gora, Zielona Gora, Poland
[4]Department of Cardiology, Intensive Therapy and Internal Diseases, Poznan University of Medical Sciences, Poznan, Poland

Abstract

Background and aim: To evaluate long-term outcomes of surgical aortic valve replacement (AVR) due to significant aortic stenosis (AS) and assess changes in factors affecting survival during a 10-year period in patients referred for surgery from a single centre.

Methods: We evaluated 1143 patients (478 women, 665 men; mean age 61 ± 5 years) treated in the Department of Valvular Heart Disease at the Institute of Cardiology in Warsaw who were referred for AVR due to significant AS in 1998–2008 and survived the surgery and the initial 30-day postoperative period. We assessed long-term survival in relation to preoperative parameters including demographic data (age, gender), clinical variables (New York Heart Association [NYHA] class, presence of a significant coronary artery stenosis, arterial hypertension, reduced left ventricular ejection fraction [LVEF]), and operative parameters (prosthetic valve type: biological vs. mechanical, and the type of the surgery: isolated AVR vs. AVR combined with coronary artery bypass grafting).

Results: Ten-year survival was worse in men compared to women ($p = 0.001$), with the effect of gender gradually decreasing after 3 years of follow-up. Factors affecting long-term survival included age ($p = 0.0001$) and NYHA class ($p = 0.005$) in women, and age ($p = 0.0001$), NYHA class ($p = 0.0001$), arterial hypertension ($p = 0.01$), reduced LVEF ($p = 0.03$), and the presence of significant coronary artery stenoses ($p = 0.0001$) in men. Evaluation of factors affecting 1-, 3-, 5-, and 7-year survival showed their variability mostly in men.

Conclusions: Long-term surgical outcomes in patients with significant AS are very good, with better survival in women compared to men, although these differences attenuated after 3 years. Factors affecting 10-year survival are different in women and men: a significant effect in women was noted only for age and preoperative NYHA class, while in men for age, NYHA class, hypertension, reduced LVEF, and the presence of significant coronary artery stenoses. During 10-year follow-up, longitudinal changes can be noted in factors affecting survival after AVR.

Key words: aortic stenosis, aortic valve replacement, long-term follow-up

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INTRODUCTION

Aortic valve replacement (AVR) is the treatment of choice in significant symptomatic aortic stenosis (AS) [1]. Mechanical and biological valve prostheses have been implanted for several decades now, and both early and long-term outcomes of such treatment are good and well established. Most reports were published by leading cardiac surgical centres and usually involved large patient groups [2–10].

Address for correspondence:
prof. Ewa Orłowska-Baranowska, Department of Valvular Heart Disease, Institute of Cardiology, ul. Alpejska 42, 04–628 Warszawa, Poland, tel: +48 22 343 44 77, e-mail: eorlowska@ikard.pl
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Table 1. Overall characteristics of the study group

	Overall	Women	Men
Patients	1143	478 (42%)	665 (58%)
Mean age (± SD) [years]	61.5 ± 11	64 ± 11	60 ± 11*
Age > 75 years	112 (10%)	72 (15%)	40 (6%)**
Significant coronary artery stenosis	237 (21%)	76 (16%)	161 (24%)**
Coronary artery bypass grafting	183 (16%)	56 (12%)	127 (19%)**
NYHA class:			***
I or II	397 (35%)	143 (30%)	254 (38%)
III	483 (42%)	226 (47%)	257 (39%)
IV	263 (23%)	109 (23%)	154 (23%)
Hypertension	448 (39%)	217 (45%)	231 (35%)**
Left ventricular ejection fraction < 45%	163 (14%)	29 (6%)	134 (20%)**
Prosthesis type:			
Mechanical	889 (78%)	359 (75%)	530 (80%)
Biological	171 (15%)	77 (16%)	94 (14%)
Other	83 (7%)	42 (9%)	41 (6%)

*p = 0.04; **p = 0.001; ***p = 0.005 — difference in the distribution of the New York Heart Association (NYHA) functional class between women and men

In the Polish literature on this subject, no studies have been published that would report surgical outcomes during a long-term follow-up of a large group of patients from a single centre, and assess the dynamics of long-term changes in prognostic factors.

The aim of the present study was to evaluate long-term outcomes of surgical AVR due to significant AS and assess factors affecting long-term survival and their changes in patients referred for surgery from a single centre, including the effect of the type of the surgery on these outcomes.

METHODS

Study group characteristics

We evaluated 1143 patients including 478 (42%) women and 665 (58%) men (mean age 61 ± 5 years) referred for AVR from the Department of Acquired Cardiac Defects at the Institute of Cardiology in Warsaw in 1998–2008 who survived the surgery and the initial 30-day postoperative period. Patient clinical data were collected prospectively and entered into a database at the time of referral for AVR. We excluded patients with concomitant moderate to severe aortic regurgitation or other valvular heart disease. Detailed characteristics of the study group are shown in Table 1.

Methods

Information on patient survival and the date of death in case of those patients who died was obtained from a national database (Centrum Personalizacji Dokumentów MSWiA).

We assessed long-term survival in relation to selected preoperative parameters including demographic data (age, gender), clinical variables (New York Heart Association [NYHA] class, concomitant arterial hypertension (HT), coronary artery disease defined as the presence of significant coronary artery stenoses (CAS) in coronary angiography, reduced left ventricular ejection fraction [LVEF]), and operative parameters (prosthetic valve type: biological vs. mechanical, and the type of the surgery: isolated AVR vs. AVR combined with coronary artery bypass grafting [CABG]). We assessed survival at 10 years and subsequently evaluated changes in factors affecting 1-, 3-, 5-, and 7-year survival after the surgery.

The study was approved by the local ethics committee at the Institute of Cardiology in Warsaw.

Statistical analysis

Statistical analysis of data collected in a spreadsheet was performed using SPSS version 6.0. Homogeneity of variance was determined using the Levene's test. Significance of differences in mean values or proportions was tested using the Student *t* test and the χ^2 test, respectively. Survival was assessed using Kaplan-Meier survival curves (log rank test) and uni- and multivariate Cox analyses. Backward elimination of variables was employed at $p < 0.1$. All results are expressed as mean values ± standard deviation (SD); $p < 0.05$ was considered statistically significant.

RESULTS

Mean duration of follow-up was 7.2 ± 4.1 years (range 40 days to 13 years). We assessed survival during a 10-year follow-up period. During this time, 221 (19.4%) patients died, including 70 (14.6%) women and 151 (22.7%) men (p = 0.001).

Table 2. Survival in the overall study population and separately in women and men

Duration of follow-up	1 year	3 years	5 years	7 years	10 years
Overall study population					
Complete observation	1103	958	785	589	323
Censored observation	4	113	222	375	599
Non-survivors	36 (3.1%)	72 (6.3%)	116 (10.1%)	160 (14%)	221 (19.4%)
Women					
Complete observation	468	410	342	255	132
Censored observation	0	51	106	177	276
Non-survivors	10 (2.1%)	17 (3.5%)	30 (6.3%)	46 (9.6%)	70 (14.6%)
Men					
Complete observation	635	548	443	334	191
Censored observation	4	62	116	198	323
Non-survivors	26 (3.9%)	55 (8.3)*	86 (12.9%)*	114 (17%)**	151 (22.7%)*

Complete observation — patients who survived and completed the follow-up; censored observation — patients who survived but did not complete the follow-up; non-survivors — patients who died during the follow-up;*p = 0.001; **p = 0.0001

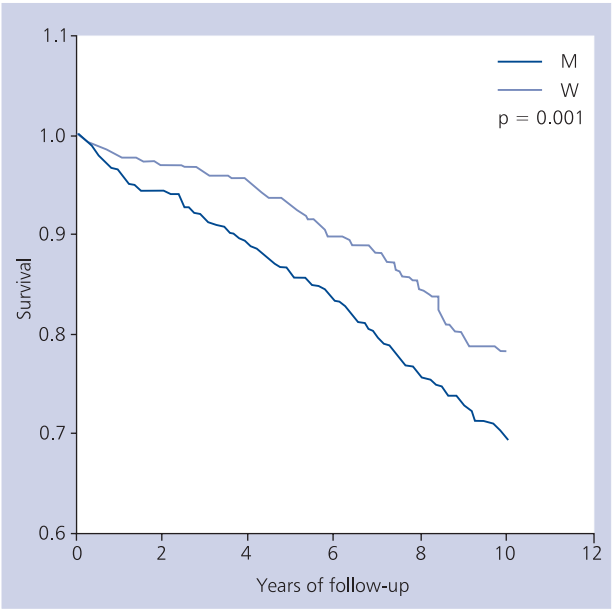

Figure 1. Survival after aortic valve replacement in women (W) and men (M)

Table 2 shows detailed information regarding survival at 1, 3, 5, 7, and 10 years after the surgery in the overall study population and separately in women and men.

As can be noticed, women were characterised by better survival compared to men, which was also illustrated in Figure 1. After the first 3 years, survival curves ran parallel and difference in survival during this period (from 3 to 10 years of follow-up) was not significant (p = 0.08).

Analysis of 10-year survival after AVR — univariate Cox analysis and survival curves. Table 3 shows univariate Cox analysis results for 10-year survival in the overall study population and separately in women and men. In the overall study population, the following variables were shown to have a significant effect on 10-year survival: age, gender, presence of HT, NYHA class, LVEF < 45%, presence of a significant CAS and performing CABG. In univariate Cox analysis, male gender was associated with a 1.6-fold increase in mortality hazard (confidence interval [CI] 1.2–2.1, p = 0.001). Due to a significant gender effect, Figures 2–6 show survival curves for women and men depending on the presence of HT, NYHA class, LVEF < 45%, presence of a significant CAS, and performing CABG. As can be noticed, 10-year survival among women was affected by age and NYHA class, and in men by age, NYHA class, presence of HT, LVEF < 45%, presence of a significant CAS, and performing CABG.

We found no differences in survival depending on the type of valve prosthesis used (biological vs. mechanical).

Analysis of a 10-year survival after AVR — multivariate Cox analysis. In the next step, we performed multivariate Cox analysis. In the overall study population, significant independent predictors of 10-year survival included age, gender, NYHA class, presence of HT, and performing CABG (Table 4). In women, the only significant predictors of survival were age and NYHA class, while in men independent negative predictors of 10-year survival included age, NYHA class, presence of HT, and performing CABG, the latter resulting from the presence of significant CAS.

Survival at 1, 3, 5, and 7 years after AVR — multivariate Cox analysis. Due to a long follow-up period, we also assessed the effect of the analysed variables on survival at 1, 3, 5, and 7 years after the surgery. The results of multivariate Cox analyses are shown in Table 5.

Table 3. The effect of selected variables on 10-year survival following aortic valve replacement (univariate Cox analysis)

Variable	Overall study population		Women		Men	
	Hazard ratio (CI)	P	Hazard ratio (CI)	P	Hazard ratio (CI)	P
Gender	1.6 (1.2–2.1)	0.001				
Age	1.039 (1.02–1.05)	0.0001	1.07 (1.04–1.1)	0.0001	1.04 (1.02–1.05)	0.0001
HT	1.4 (1.07–1.8)	0.014	1.4 (0.9–2.3)	NS	1.53 (1.1–2.1)	0.01
NYHA class	1.6 (1.3–1.9)	0.0001	1.6 (1.15–2.3)	0.005	1.6 (1.3–2.0)	0.0001
LVEF < 45%	1.67 (1.2–2.3)	0.002	0.74 (0.3–2.0)	NS	1.7 (1.2–2.4)	0.003
Significant CAS	1.9 (1.4–2.6)	0.0001	1.3 (0.7–2.5)	NS	2.04 (1.4–2.9)	0.0001
CABG	2.1 (1.5–2.8)	0.0001	1.8 (0.95–3.2)	0.08	2.1 (1.4–2.9)	0.0001
BAVR	1.4 (0.9–2.0)	0.1	1.5 (0.8–2.9)	0.2	1.4 (0.86–2.2)	0.2

BAVR — biological aortic valve replacement; CABG — coronary artery bypass grafting; CI — confidence interval; HT — hypertension; LVEF — left ventricular ejection fraction; NYHA — New York Heart Association; CAS — coronary artery stenosis

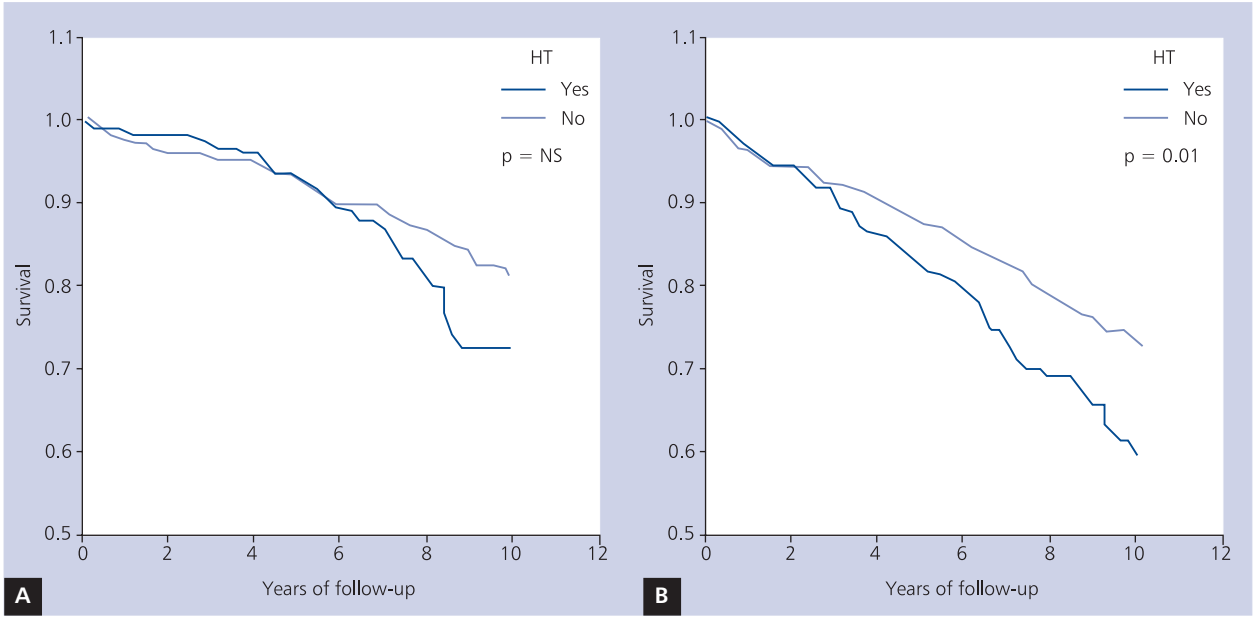

Figure 2. Survival curves in women (**A**) and men (**B**) in relation to the presence of arterial hypertension (HT)

At 1 year after the surgery, we noted no difference in survival between men and women. The only significant predictor of survival in women was the presence of a significant CAS, while predictors in men included age and reduced LVEF.

Three-year survival was significantly affected by gender, with mortality hazard among men increased 3.5-fold compared to women. The only significant predictor of survival in women was NYHA class, and predictors in men included age and NYHA class. At 3 years, the presence of a significant CAS in women and reduced LVEF in men were no longer significant predictors of survival.

At 5 years, the effect of gender became attenuated, with mortality hazard among men increased 2.8-fold compared to women. Age and NYHA class remained significant predictors of survival in men, while predictors in women included age, NYHA class, and the type of aortic valve prosthesis (increased risk associated with biological valve prosthesis).

At 7 years, the effect of gender continued to decrease, with mortality hazard among men increased 2.6-fold compared to women. Age and NYHA class remained significant predictors of survival in women, while the presence of HT became a significant predictor of survival in men, along with age and NYHA class.

At 10 years, further attenuation of relatively increased mortality hazard among men could be noticed, with 2.2-fold increase in hazard compared to women.

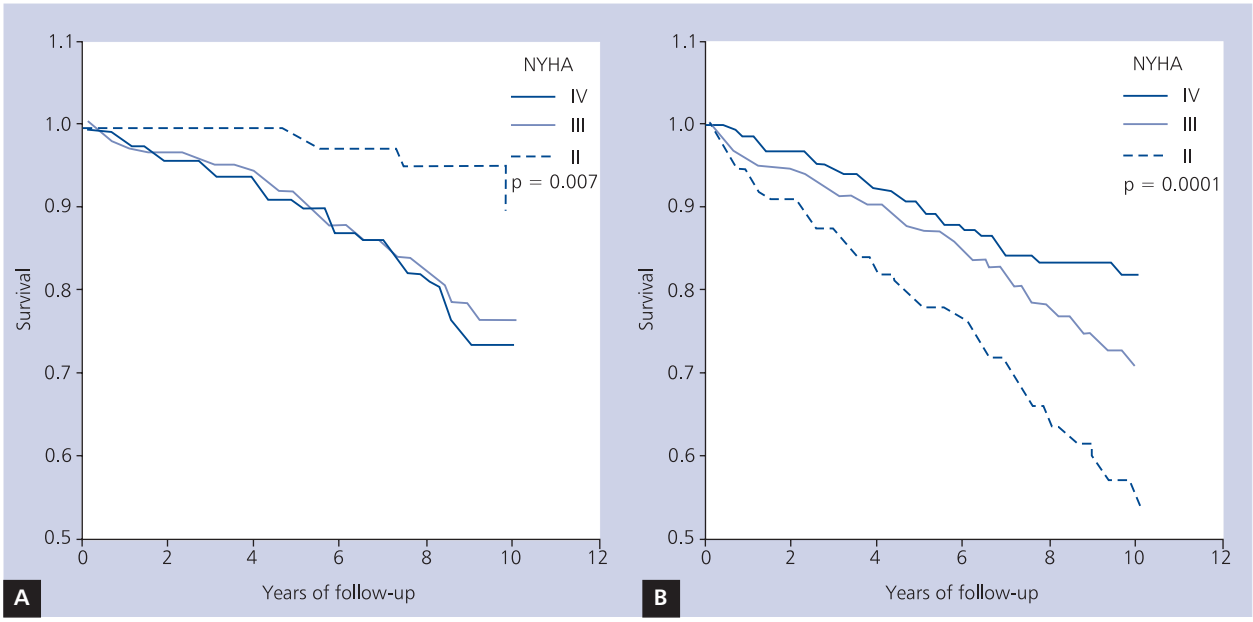

Figure 3. Survival curves in women (**A**) and men (**B**) in relation to the New York Heart Association (NYHA) class

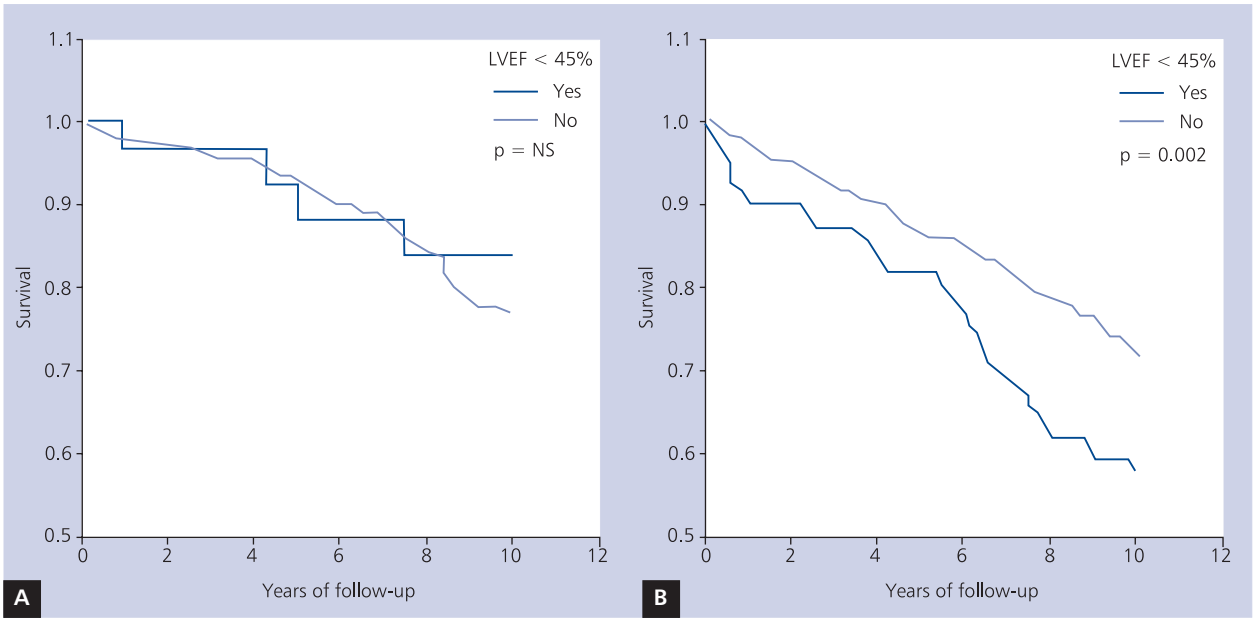

Figure 4. Survival curves in women (**A**) and men (**B**) in relation to left ventricular ejection fraction (LVEF) < 45%

DISCUSSION

Previously published reports indicate that predictors of mortality risk after AVR due to AS include age, concomitant disease, significant functional impairment (advanced NYHA class), irreversible myocardial damage, ventricular arrhythmia, and coexisting coronary artery disease [2, 11–29]. Reported 5-year survival after AVR is 80–94%, and 10-year survival ranged — 68–89% [2–9, 12].

Until now, no reports on nearly 10-year follow-up after surgical AVR in such a large group of AS patients treated in a single Polish centre have been published that would include the effect of various preoperative factors on surgical outcomes. In general, patients operated in Polish cardiac surgical centres are characterised by a more severe valvular disease and more often present with advanced sequelae such as higher NYHA class and lower LVEF. Thus, the results of our

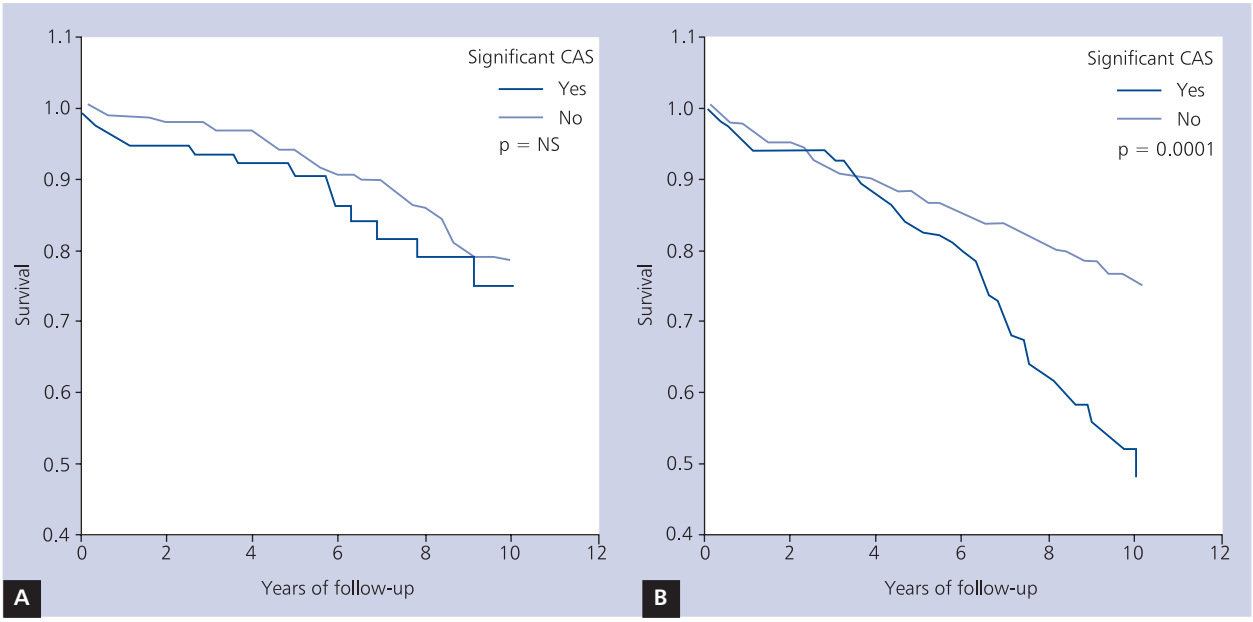

Figure 5. Survival curves in women (**A**) and men (**B**) in relation to the presence of a significant coronary artery stenosis (CAS)

Table 4. The effect of selected variables on 10-year survival following aortic valve replacement (multivariate Cox analysis)

	Overall study population		Women		Men	
Variable	**Hazard ratio (CI)**	**P**	**Hazard ratio (CI)**	**P**	**Hazard ratio (CI)**	**P**
Gender	2.2 (1.6–3.0)	0.0001				
Age	1.04 (1.02–1.05)	0.0001	1.06 (1.03–1.09)	0.0001	1.03 (1.02–1.05)	0.0001
NYHA class	1.57 (1.3–1.9)	0.0001	1.48 (1.03–2.1)	0.03	1.6 (1.3–2.0)	0.0001
CABG	1.45 (1.06–2.0)	0.021			1.6 (1.09–2.3)	0.015
Hypertension	1.3 (0.98–1.7)	0.066			1.4 (1.008–2.0)	0.045

CABG — coronary artery bypass grafting; CI — confidence interval; NYHA — New York Heart Association

study that included over a thousand patients referred from the Department of Valvular Heart Disease at the Institute of Cardiology in Warsaw for surgical treatment of AS in 1998––2008 are all the more interesting. Long-tem surgical outcomes were good, with nearly 90% of patients surviving 5 years and more than 80% of patients surviving 10 years. In our study, we evaluated the effect of simple preoperative parameters on long-term survival after AVR due to significant AS, performed in a single centre, including the effect of the type of implanted valve prosthesis and the type of surgery.

Our results do not confirm previous reports indicating worse outcomes of surgical treatment in women compared to men [13–16]. Those studies reported early outcomes after AVR [14–16], although some studies also noted worse long-term survival [2], the difference being more pronounced in younger patients and decreasing with age [15]. Other studies suggested no differences in long-term survival after surgical treatment of AS in women and men. It is believed than gender itself is not a risk factor, as women undergoing surgery are usually older and present more intraoperative technical challenges due to small annulus diameter and relatively more pronounced left ventricular (LV) hypertrophy [1, 14]. Numerous studies highlighted differences between women and men in regard to LV adaptation to the pressure overload of AS. Hyperkinetic LV with smaller chamber dimensions and thicker wall in response to increased afterload (due to HT or AS) is more often observed in women than men despite similar degree of valvular stenosis or severity of HT, which may underlie the observed relative increase in risk. Of note, our study showed that the effect of gender on survival was not significant at 1 year, become maximal at 3 years, and subsequently gradually decreased at 5, 7, and 10 years (3.5-fold increase in hazard at 3 years compared to 2.2-fold increase at 10 years). The first 3 years after surgical AVR are thus a very important period in men.

Table 5. The effect of selected variables on 1-, 3-, 5-, and 7-year survival following aortic valve replacement (multivariate Cox analysis)

Duration of follow-up	Overall study population		Women		Men	
	Hazard ratio (CI)	P	Hazard ratio (CI)	P	Hazard ratio (CI)	P
1 year						
	Age 1.06 (1.02–1.1)	0.004	Significant CAS 3.9 (1.07–14.8)	0.04	Age 1.07 (1.03–1.12)	0.002
	LVEF < 45% 3.8 (1.8–7.8)	0.0001			LVEF < 45% 3.7 (1.7–8.5)	0.001
3 years						
	Age 1.06 (1.03–1.09)	0.0001	NYHA class 2.2 (1.05–4.8)	0.037	Age 1.06 (1.03–1.09)	0.0001
	Gender 3.5 (1.9–6.5)	0.0001			NYHA class 1.46 (1.03–2.1)	0.034
	NYHA class 1.55 (1.1–2.1)	0.007				
5 years						
	Age 1.06 (1.03–1.08)	0.0001	Age 1.06 (1.002–1.1)	0.042	Age 1.05 (1.03–1.08)	0.0001
	Gender 2.8 (1.8–4.4)	0.0001	NYHA class 1.9 (1.1–3.4)	0.02	NYHA class 1.46 (1.1–1.9)	0.008
	NYHA class 1.52 (1.2–1.96)	0.0001	BAVR 2.3 (0.96–5.3)	0.06		
7 years						
	Age 1.06 (1.04–1.08)	0.0001	Age 1.07 (1.03–1.1)	0.002	Age 1.05 (1.03–1.07)	0.0001
	Gender 2.6 (1.8–3.7)	0.0001	NYHA class 1.45 (0.94–2.3)	0.09	NYHA class 1.42 (1.1–1.8)	0.006
	NYHA class 1.4 (1.1–1.8)	0.002			HT 1.5 (1.01–2.2)	0.042

BAVR — biological aortic valve replacement; CABG — coronary artery bypass grafting; CI — confidence interval; HT — hypertension; LVEF — left ventricular ejection fraction; NYHA — New York Heart Association; CAS — coronary artery stenosis

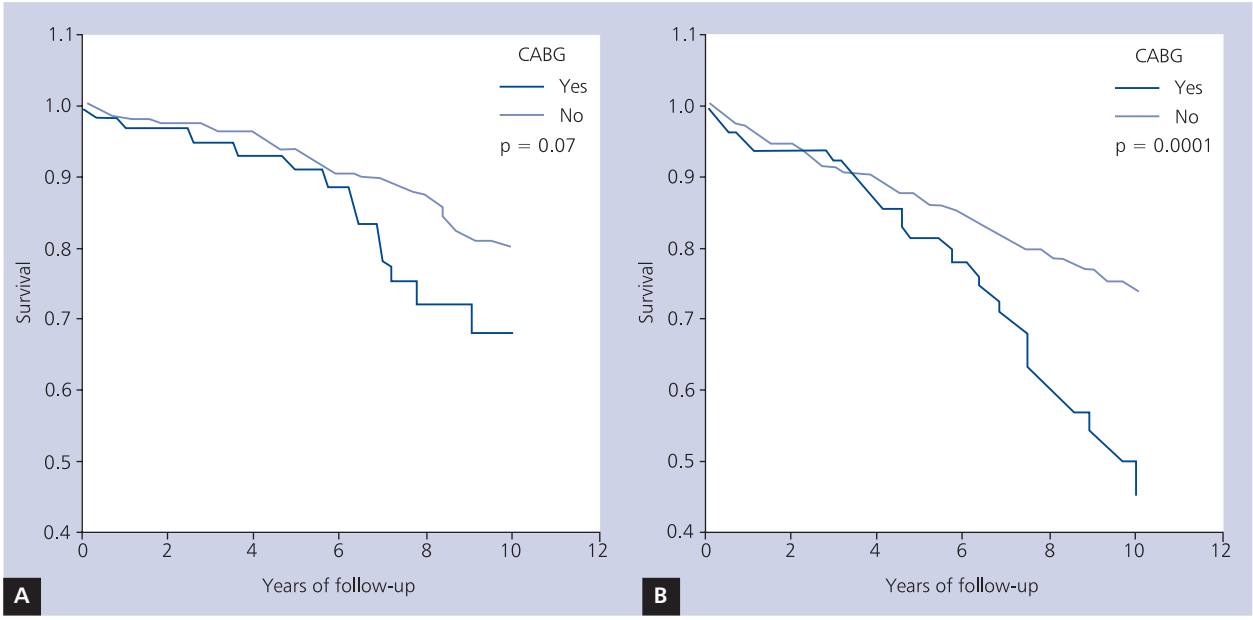

Figure 6. Survival curves in women (**A**) and men (**B**) in relation to performance of coronary artery bypass grafting (CABG) during aortic valve replacement

In our study population, not unexpectedly and similarly to other reports, age was a significant factor affecting long-term survival after AVR throughout the follow-up period [11]. In our study, this effect was particularly evident in men in whom age significantly affected survival as early as at 1 year, while a significant effect in women could be first noticed at 3 years following the surgery.

Similarly to other authors, we confirmed a relation between NYHA functional class and survival after AVR due to AS both in the overall study population and in women and men

separately [2–10]. Of note, survival in women in our study was significantly better in NYHA class I–II, while no difference between genders was seen in NYHA class III–IV. It seems that in women the III heart failure NYHA class is already associated with significantly worse outcomes after surgical AVR. This effect is absent in men.

Outcomes were also worse with reduced LVEF, with significantly increased mortality hazard in the overall study group and among men in whom the increase in hazard was noted already at 1 year. In our study, reduced LVEF was more frequently noted in men than in women (18% vs. 6%). Generally lower LVEF in men compared to women was also reported by other authors but no explanation for this phenomenon has been offered. Literature data indicate increased early mortality after AVR in patients with significant LV dysfunction, with even 2-fold increase in risk reported in some studies [2–11, 17]. All authors have noted a significant improvement in NYHA class, reduction of LV size, and increase in LVEF during the follow-up period. In patients with significantly reduced pressure gradient with decreased LVEF, long-term increase in mortality hazard remains significant [17, 18]. No studies examined this group of patients during such a long-term follow-up period.

In the overall study group, concomitant HT had a significant adverse effect on 10-year survival after AVR. When gender-related differences were taken into account, the effect of HT was only seen in men and became significant at 7 years after the surgery. Concomitant HT had no effect on survival in women. There are no reports on the effect of HT accompanying AS on long-term outcomes after valve replacement. Hypertension is a relatively frequent coexisting condition in patients with AS (up to 40%), affecting the degree of LV hypertrophy [19], and in our study it was more common in women than in men. It also poses diagnostic and therapeutic dilemmas, as concomitant HT aggravates irreversible LV fibrosis, necessitating effective therapy, but antihypertensive drugs may increase transvalvular gradient or result in an inability to increase cardiac output [1, 19].

We did not find differences in long-term outcomes between patients with biological and mechanical valve prostheses, both among women and men. Only in women, survival at 5 years was slightly worse in patients with a biological valve, likely due to the degeneration of valve prosthesis. According to American and European guidelines, the use of bioprostheses for AVR is recommended in patients above 70 years of age. Some cardiac surgeons, however, would lower this age limit due to improved quality and longer durability of biological valves, as well no requirement for long-term anticoagulation that eliminates the risk of complications of such treatment [3, 4, 20]. On the other hand, no evidence for superiority of such an approach led some surgeons to advocate the use of mechanical valve prostheses in even older patients, i.e. above 70 years of age, due to increasing life expectancy in the general population and higher risk of reoperation [9, 21] but similar quality of life and mortality as compared to the use of biological valves. Recent studies including more than 3000 elderly patients indicate that degenerative dysfunction of biological valve bioprosthesis is uncommon in the elderly, and usually there is no need for reoperation. In addition, the overall survival after AVR largely depends on age and concomitant risk factors, while the type of bioprosthesis (mechanical vs. biological) seems to have no effect on survival [21].

Our findings indicate worse long-term outcomes in patients with significant CAS found in coronary angiography. In multivariate analysis, concomitant coronary revascularisation had a negative effect on long-term outcomes but this effect was found only in men, as the presence of a significant CAS and performing CABG did not affect long-term survival after successful AVR in women. Outcomes in patients with AS and significant CAS are worse compared to isolated AS [11, 22, 23]. This can be explained by older age of patients requiring concomitant coronary revascularisation, as differences in survival are no longer significant when age is taken into account [11].

Our study showed that the most important factors affecting long-term survival after AVR are age, gender, and NYHA class. We are the first to evaluate the effect of these factors separately in women and men and at various time points. We showed gender-related differences in factors affecting survival at 1 year after the surgery (presence of a significant CAS in women, age and reduced LVEF in men), and a negative effect of coronary artery disease (likely due to coronary bypass graft occlusion) and HT in men at 10 years of follow-up. Such analyses have not yet been published in the literature.

It is believed that long-term survival after successful AVR is similar to that in the general population [11]. This is probably not true, as prosthetic valve implantation does not result in curing and reversal of the adverse effects of valvular disease. Rather, the risk associated with valvular stenosis is replaced by the risk associated with the presence of prosthetic valve and its possible complications, including those related to anticoagulant treatment, the risk of infective endocarditis, and patient-prosthesis mismatch [29].

Transcatheter aortic valve implantation (TAVI), which has been used for several years in patients at high risk of surgical treatment, offers new hope for patients considered unsuitable candidates for conventional surgical AVR [1]. This approach is considered less invasive and thus it is used in patients at high operative risk but it may also lead to complications that occur with the conventional approach [10]. During the last 10 years, TAVI has dominated the literature on invasive AS treatment, prompting proponents of surgical treatment to re-examine outcomes after surgical AVR [9, 18, 22, 23, 25–29]. Recent studies summarising the experience AVR in a very large population of patients with AS (more than 100,000 subjects) have shown that surgical AVR is characterised by a very low mortality and excellent long-term outcomes even in the elderly and remains the treatment of choice whenever the operative risk is acceptable, also among older patients [16, 23, 26, 29].

Limitations of the study

In our analysis, we were unable to consider causes of death, as the data regarding patient outcomes during a long-term follow-up obtained from the national database (Centrum Personalizacji Dokumentów MSWiA) included only information on the living status and the date of death if a patient died. However, we were able to evaluate a very large patient group during a long period of follow-up. Information regarding survival after AVR was obtained in 98% of queries sent to the database administrator.

CONCLUSIONS

Long-term surgical outcomes in patients with significant AS are very good, with better survival in women compared to men, although these differences attenuated after 3 years. Factors affecting long-term survival are different in women and men: a significant effect in women was noted only for age and preoperative NYHA class, while age, NYHA class, HT, reduced LVEF, and the presence of a significant CAS had a significant effect in men. During 10-year follow-up, longitudinal changes can be noted in factors affecting survival after AVR.

Conflict of interest: *none declared*

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Analiza zmian czynników wpływających na odległe przeżycie po operacji wymiany zastawki aortalnej

Ewa Orłowska-Baranowska[1], Elżbieta Abramczuk[1], Maciej Grabowski[1], Dariusz Zakrzewski[1], Małgorzata Miłkowska[1], Anna Galas[1], Katarzyna Czerwińska[1], Tomasz Hryniewiecki[1], Rafał Baranowski[2], Jarosław Piskorski[3, 4]

[1]Klinika Wad Nabytych Serca, Instytut Kardiologii, Warszawa

[2]Klinka Rehabilitacji Kardiologicznej i Elektrokardiologii Nieinwazyjnej, Instytut Kardiologii, Warszawa

[3]Instytut Fizyki, Uniwersytet Zielonogórski, Zielona Góra

[4]Katedra i Klinika Intensywnej Opieki Kardiologicznej i Chorób Wewnętrznych, Uniwersytet Medyczny w Poznaniu, Poznań

Streszczenie

Wstęp i cel: Celem pracy była ocena odległych wyników leczenia operacyjnego wymiany zastawki aortalnej (AVR) z powodu istotnego zwężenia zastawki (AS) oraz ocena zmian czynników wpływających na przeżycie w okresie 10 lat u osób skierowanych na operację z jednego ośrodka.

Metody: Analizą objęto 1143 chorych (478 kobiet, 665 mężczyzn; średni wiek 61 ± 5 lat) z Kliniki Wad Nabytych Serca skierowanych na operację AVR z powodu istotnego AS w latach 1998–2008, którzy przeżyli zabieg i 30-dniowy okres pooperacyjny. Oceniano wpływ na przeżywalność odległą parametrów przedoperacyjnych: demograficznych (wiek, płeć), klinicznych [klasa wg NYHA, obecność istotnych zmian w tętnicach wieńcowych, nadciśnienie tętnicze, obniżona frakcja wyrzutowa lewej komory (LVEF)] i operacyjnych: rodzaj zastawki (biologiczna, mechaniczna), zakres operacji (AVR, AVR i pomostowanie aortalno-wieńcowe).

Wyniki: Odległe 10-letnie przeżycie było gorsze w grupie mężczyzn niż kobiet ($p = 0{,}001$); po 3 latach obserwacji wpływ płci ulegał stopniowemu zmniejszeniu. W grupie kobiet na przeżycie odległe wpływały wiek ($p = 0{,}0001$) i klasa wg NYHA ($p = 0{,}005$), natomiast w grupie mężczyzn — wiek ($p = 0{,}0001$), klasa wg NYHA ($p = 0{,}0001$), nadciśnienie tętnicze ($p = 0{,}01$), obniżona LVEF ($p = 0{,}03$) i obecność istotnych zmian w tętnicach wieńcowych ($p = 0{,}0001$). Ocena czynników wpływających na przeżycie w okresie roku oraz 3, 5 i 7 lat po operacji wykazała ich zmienność, głównie w grupie mężczyzn.

Wnioski: Odległe wyniki leczenia operacyjnego u chorych z istotnym AS są bardzo dobre; przeżycie w grupie kobiet jest lepsze niż wśród mężczyzn; różnice te zmniejszają się po 3 latach od operacji. Czynniki wpływające na 10-letnie przeżycie są różne w grupie kobiet i mężczyzn; istotny wpływ u kobiet ma jedynie wiek i klasa wg NYHA przed operacją, a w grupie mężczyzn — wiek, klasa wg NYHA, nadciśnienie tętnicze, obniżona LVEF oraz obecność istotnych zmian w tętnicach wieńcowych. W obserwacji 10-letniej stwierdza się zmianę czynników wpływających na przeżycie chorych po wymianie zastawki aortalnej.

Słowa kluczowe: zwężenie zastawki aortalnej, wszczepienie zastawki aortalnej, obserwacje odległe

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Adres do korespondencji:
prof. Ewa Orłowska-Baranowska, Klinika Wad Nabytych Serca, Instytut Kardiologii, ul. Alpejska 42, 04–628 Warszawa, tel: +48 22 343 44 77, e-mail: eorlowska@ikard.pl

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