Does patient-prosthesis mismatch influence the results of combined aortic valve replacement and coronary bypass grafting?

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Abstract

Background: Combined aortic valve replacement and coronary revascularisation is becoming more frequent. Patient-prosthesis mismatch (PPM) as an additional risk factor may potentially affect the early and late outcome.

Aim: To evaluate the impact of PPM on early and mid-term clinical results including quality of life in patients undergoing combined surgical treatment of coronary artery disease and aortic valve defects.

Methods: Medical records of 309 consecutive patients referred for combined surgery were reviewed. Patients were divided into three groups according to the presence of moderate or severe PPM (defined by aortic valve effective orifice area index in the range 0.85-0.65 cm^2/m^2 and smaller than 0.65 cm^2/m^2, respectively) or absence of PPM. The demographic and perioperative data, and early and late survival, as well as quality of life (SF-36) were analysed.

Results: The presence of severe PPM was found in 51 (16.5%) patients, whereas moderate PPM – in 153 (49.5%) patients. Patients from both PPM groups were significantly older than those without PPM. Subjects with severe PPM had higher weight and body mass index. They frequently had dyslipidaemia and both PPM groups received a biological valve more often than patients without PPM (94.1 and 77.1 vs. 19.1%, $p < 0.0001$). There was no significant difference between all groups regarding early or late mortality. Advanced age, renal insufficiency and arrhythmia were predictors of early death. Late survival was determined only by number of postoperative complications in a Cox regression model. There was no difference in any components of the SF-36 survey between all groups.

Conclusions: PPM is a frequent phenomenon in older patients requiring aortic valve replacement and revascularisation. Severe PPM occurs rarely, predominantly in obese patients. However, its presence does not affect early and late survival or quality of life.

Key words: aortic valve replacement, coronary artery bypass grafts, co-morbidity obesity, quality of life

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Introduction

The impact of patient-prosthesis mismatch (PPM) on early and late outcome of aortic valve replacement (AVR) still remains an unresolved and controversial topic [1, 2]. Different groups of patients were examined in order to reveal the true meaning of a discrepancy between patient and prosthesis size [1-6]. To avoid potentially detrimental effects of PPM, various surgical techniques were advocated to minimise its occurrence [7, 8]. However, in the era of ageing societies most cardiac surgeons encounter patients burdened with combined multiple comorbidities, who are not always appropriate candidates for such risk-increasing procedures. Frequently these patients require coronary revascularisation parallel to aortic surgery. It seems that an additional risk factor, PPM, may potentially jeopardise the postoperative period and follow-up rehabilitation of an ageing and comorbid population.

The presence of PPM has been predominantly studied in selected groups of patients undergoing AVR only. Despite this, patients with accompanying surgical procedures, including coronary artery bypass grafting (CABG), are also

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included in such studies. Thus, reported percentages of combined AVR + CABG procedures vary from 8.7% [8] through 22% [9], 38% [6], 42% [10], 45.3% [11] to 49.6% [2]. The number of these procedures is increasing constantly [12]. However, there are no studies directly addressing the role of effective orifice area (EOA) in combined AVR + CABG surgery in a homogeneous population. Therefore, we studied patients undergoing AVR + CABG as a separate group. More detailed insight into this group of patients is necessary due to continuously increasing accumulation of cardio-surgical risk factors in contemporary societies.

The aim of this study was to evaluate the impact of PPM on early and mid-term clinical results, including quality of life (QoL), in patients undergoing combined surgical treatment of coronary artery disease (CAD) and aortic valve defects.

Methods

Patients

A total of 309 consecutive patients (194 men and 115 women) with CAD requiring CABG and concomitant AVR were operated on from 2 January 1995 to 4 March 2004 in the Department of Cardiovascular Surgery of University Hospital Schleswig-Holstein, Campus Kiel, Germany. Patients were identified using hospital database software. All patients with implanted biological or mechanical valves were enrolled. Patients with homografts or undergoing redo surgery were excluded from the study. The medical records of the cohort were reviewed, including demographics, comorbidities, echocardiographic results, angiographic results and perioperative clinical data.

The mean age in the cohort was 71.6 ± 7.9 years. One hundred and eighty-six patients (60.2%) were more than 70 years old and 42 (13.6%) exceeded 80 years of age. Patients with dyslipidaemia were more obese (BMI: 27.8 ± 4.6 vs. 25.5 ± 3; $p < 0.001$) than patients without.

The mid-term follow-up comprised 271 (92.9%) of 297 late survivors. Twenty-one patients were lost to follow-up. The median follow-up time was 2.79 years (3 days – 11.56 years). The total observation time was 1040.5 patient-years.

Patients surviving surgery were individually contacted by sending questionnaires or by direct telephone call. Family physicians were contacted when there was no patient response. The patients' questionnaire included simple preliminary questions concerning the actual health status as well as a standard Medical Outcomes Trust Short Form 36 (SF-36) to assess QoL.

Table I. Implanted valves

Valve / diameter	19 [mm]	21 [mm]	23 [mm]	25 [mm]	27 [mm]	29 [mm]	Total
HC II		39	75	9	1		124
SJMS	6	16	46	21	6	3	98
CE	7	11	1	16	1		36
ATS	1	3	3	5	1	1	14
MM	13						13
SJMT		1	5	2	2	1	11
CMS			2	2	1	1	6
SO			4				4
MF			1	1			2
SJMR		1					1
Total	27	71	137	56	12	6	309

Abbreviations: HC II – Medtronic Hancook II, SJS – St Jude Medical standard, CE – Baxter Carpentier-Edwards porcine, ATS – ATS standard, MM – Medtronic Mosaic, SJMT – St Jude Medical Toronto, CMS – Carbomedics standard, SO – Sorin Bicarbon, MF – Medtronic Freestyle, SJR – St Jude Medical Regent

Surgical technique

Standard anaesthesia was applied. Patients were operated on with the use of cardio-pulmonary bypass and cooled down to 28°C. Antegrade and/or retrograde intermittent cold blood cardioplegia were the means of myocardial protection. CABG was performed in a standard fashion: the first graft of choice was the left internal mammary artery (IMA), followed by the right IMA and saphenous veins. The choice of valve type depended on an institutional approach: patients aged more than 70 years received biological valves except when they were already being treated with anticoagulants. Younger patients received mostly mechanical valves unless there were contraindications. The choice of the specific valve model depended mainly on the literature-evidenced longevity. The implanted valves are presented in Table I. No root-enlargement techniques were used.

Definitions

Effective orifice area values of implanted artificial valves were obtained from the available literature [1, 2, 4]. Moderate PPM was present when EOA for the given valve type indexed to body surface area (BSA) was between 0.85 cm^2/m^2 and 0.65 cm^2/m^2, whereas severe PPM was recognised as EOA smaller than 0.65 cm^2/m^2 [2]. These criteria were chosen in order to enable statistical comparison between three groups with a sufficient number of patients, and to adhere to previously published studies. Thus, patients with moderate PPM (values 0.65-0.85 cm^2/m^2 [2]) constituted nearly half of our population (49.8%). This finding is similar to EOA index distributions from other sources [1].

All forms of diabetes mellitus were registered and taken into account during the analysis as diabetes presence. Pulmonary disease was defined either as chronic obstructive pulmonary disease (COPD) or as chronic bronchitis, asthma and emphysema. Lipid metabolism disturbances were defined by hyperlipidaemias documented by laboratory examination. Systemic hypertension was defined as the requirement of continuous medication in order to maintain the target levels of arterial blood pressure.

Pre- and postoperative renal insufficiency was diagnosed when creatinine level was higher than 1.4 mg/dl. Postoperative myocardial infarction was defined as CK-MB level higher than 60 U/ml. Postoperative neurological complications included stroke, transient ischaemic attacks, consciousness disorders and focal neurological deficits. Early mortality included all deaths up to 30 days after surgery. Early and late mortality were the main endpoints in this study.

Statistical analysis

The normality of variable distribution was assessed by the Kolmogorov-Smirnov test. Numerical variables were expressed as the mean and standard deviation or as the median and range (or quartiles) according to the normality of distributions. Categorical variables were shown as percentages. The ANOVA test was used to compare variables between the 3 groups of patients provided that the condition of distribution normality and equality of variances verified by F-Levene test was fulfilled; otherwise Kruskal-Wallis nonparametric method was used. Post hoc comparisons were made using the Sheffé test and Mann-Whitney U test, respectively. Pearson's χ^2 test and Fisher's exact test were used for comparison of categorical variables.

The influence of demographic, haemodynamic and perioperative variables on mortality was verified by means of univariate tests in early and late survivors and non-survivors (Student's t-test, Mann-Whitney U-test, Pearson's χ^2 test and Fisher's exact test).

The Kaplan-Meier method was used to assess the survival rate. The χ^2 test was applied to compare survival in all subgroups.

Cox proportional hazard regression was used to assess the influence of studied variables on mid-term survival in early survivors. Variables for the Cox model were selected by backward stepwise elimination of independent variables (with statistically significant influence on late death in univariate analyses) to obtain the best model. The influence of predictive variables on the infection risk was expressed in terms of OR and 95% CI.

A two-tailed p value < 0.05 was considered significant in all tests.

Results

Demographic characteristics and the presence of PPM

The distribution of EOA indexes is presented in Figure 1. The presence of severe PPM was found in 51 (16.5%) patients. Moderate PPM occurred in 153 (49.5%) patients. Demographic preoperative and operative data of all three groups of patients are shown in Table II.

Patients with moderate or severe PPM were significantly older than patients without PPM. Individuals with severe PPM had higher weight and body mass index (BMI) in comparison to no-PPM and moderate PPM groups.

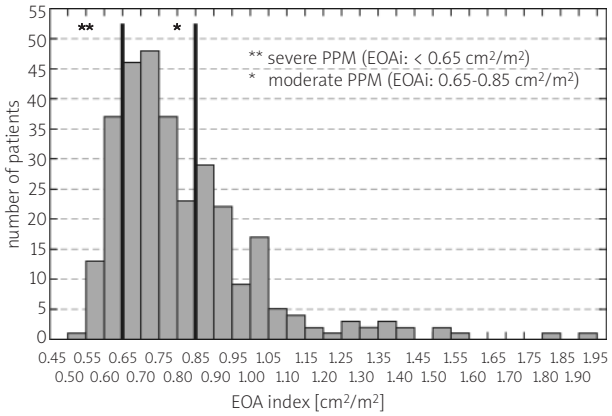

Figure 1. EOA index histogram

EOA – effective orifice area, EOAi – effective orifice area index, PPM – patient-prosthesis mismatch

Patients with moderate or severe PPM presented more accompanying morbidities; however, only the percentage of lipid metabolism disturbances was significantly higher in the severe PPM group compared to the rest of patients.

All three groups of patients did not differ significantly in mean pressure gradients through the aortic valve, aortic valve orifice area and degree of aortic valve regurgitation.

Treatment, morbidity and early mortality

The majority of patients in all groups underwent elective surgery. A significantly higher percentage of urgent operations was found in patients without PPM. The severe PPM group had significantly longer operation time in comparison to the remaining groups. There were no inter-group differences in extracorporeal circulation (ECC) and aortic cross-clamp times. One hundred and eighty-six (60.2%) patients received a biological valve prosthesis. This type of prosthesis was the most common in the severe PPM group (Table II).

Postoperative data are presented in Table III. Percentages of postoperative complications were similar in all three groups. In the severe PPM group, neurological complications occurred significantly more often than in other patients with a preponderance of consciousness disturbances.

A total of 12 (3.9%) patients died within 30 days postoperatively. There was no significant difference in early mortality between all groups of patients (Table III). Early non-survivors were significantly older than patients who survived (76.2 ± 8.2 vs. 71.5 ± 7.8 years; p = 0.04), and had significantly more frequently renal failure (41.7 vs. 8.1%; p < 0.01) and arrhythmias (83.3 vs. 55.2%, p = 0.02). The remaining variables were not significantly different.

Long-term follow-up

There were 75 (25.3%) late deaths with an unknown death date of 6 (8%) patients and unknown cause of death of 35 patients (46.7% of late deaths). Cardiac death

Table II. Demographics and operative data according to PPM presence

Variable	No-PPM	Moderate PPM	Severe PPM	p
Demographic and clinical variables				
Number of patients	105	153	51	–
Females [%]	34.0	49.5	16.5	0.06
Patient age [years]	67.5 ± 7.2[ab]	73.7 ± 7.8[a]	73.9 ± 6.0[b]	< 0.001*
BSA [m^2]	1.9 (1.5-2.3)	1.9 (1.4-2.3)	1.9 (1.6-2.4)	0.06
Height [m]	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1	0.49
Weight [kg]	74.5 ± 13.6[b]	74.4 ± 12.9[c]	83.0 ± 14.3[bc]	0.0004*
BMI [kg/m^2]	25.8 (18.4-37.1)[b]	25.6 (14.7-38.0)[c]	28.7 (18.1-37.9)[bc]	0.002*
NYHA class [I-IV]	2.5 (1-4)	3 (1-4)	3 (1-4)	0.9
CCS class [I-IV]	2 (1-4)	2 (1-4)	3 (1-4)	0.09
Coexisting comorbidities	2 (0-5)[ab]	2 (0-7)[a]	3 (0-6)[b]	0.01*
Systemic hypertension [%]	50.5	58.8	58.8	0.38
Lipid metabolism disturbance [%]	28.6[b]	36.6 [c]	60.8[bc]	0.0005*
Diabetes [%]	20.0	26.1	31.4	0.27
Previous myocardial infarction [%]	14.3	16.3	17.7	0.84
Peripheral vascular arterial disease [%]	8.6	13.7	19.6	0.14
Pulmonary disease [%]	11.5	9.8	7.8	0.76
Hyperuricaemia [%]	3.8	3.3	0	0.39
Renal insufficiency [%]	6.7	8.5	15.7	0.17
Nicotine addiction [%]	7.6	7.2	7.8	0.98
Previous stroke [%]	4.8	6.5	9.8	0.49
Angiography				
Max PG AoV [mmHg]	48 ± 37	51 ± 25	51 ± 24	0.84
Mean PG AoV [mmHg]	47 ± 22	47 ± 17	51 ± 18	0.5
Echocardiography				
Max PG AoV [mmHg]	66 ± 30	69 ± 26	66 ± 30	0.91
Mean PG AoV [mmHg]	46 ± 16	46 ± 18	43 ± 17	0.67
Ejection fraction [%]	62 (25-79)	63 (21-65)	64 (40-69)	0.35
AoV orifice area [cm^2]	0.6 (0.3-2.0)	0.6 (0.2-1.4)	0.6 (0.4-1.0)	0.92
AI > II degree [%]	16.2	13.7	11.8	0.73
Surgical data				
Elective [%]	72.4	86.9	94.1	
Urgent [%]	25.7	11.8	5.9	0.04*
Emergent [%]	1.9	1.3	0	
Operation time [min]	240 (150-815)[b]	240 (140-532)[c]	270 (164-405)[bc]	0.02*
ECC time [min]	137 (73-446)	136 (87-351)	151 (99-220)	0.11
Aortic cross-clamp time [min]	95 (47-180)	93 (59-189)	98 (64-144)	0.76
Number of CAB	2 (1-5)	2 (1-5)	2 (1-4)	0.79
Valve calcification scale [I-III]	2 (0-3)	3 (0-3)	3 (0-3)	0.99
Biological valve implanted [%]	19.1[ab]	77.1[ac]	94.1[bc]	< 0.0001*
EOA of replaced valve [cm^2]	1.7 (1.2-3.2)[ab]	1.3 (1.0-1.7)[ac]	1.2 (1.0-1.5)[bc]	< 0.0001*

Abbreviations: BSA – body surface area, BMI – body mass index, NYHA – New York Heart Association scale, CCS – Canadian Cardiovascular Society, AoV – aortic valve, AI – aortic insufficiency, PG AoV – pressure gradient through the aortic valve, ECC – extracorporeal circulation, CAB – coronary artery bypass, EOA – effective orifice area, ICU – intensive care unit, LOS – length of stay, AF – atrial fibrillation, AV – atrioventricular

** significant*

[a] significant difference between no-PPM group and moderate PPM group, p < 0.05

[b] significant difference between no-PPM group and severe PPM group, p < 0.05

[c] significant difference between moderate PPM group and severe PPM group, p < 0.05

Table III. Postoperative data according to PPM presence

Variable	No-PPM	Moderate PPM	Severe PPM	p
Postoperative data				
ICU stay time [h]	39 (14-326)	26.5 (12-1216)	44 (13-620)	0.44
LOS [days]	9 (1-90)	9 (1-89)	10 (1-39)	0.62
Postoperative complications				
1 complication [%]	48.6	52.3	54.9	
2 complications [%]	12.4	9.8	21.6	0.11
3 complications [%]	2.9	5.9	5.9	
4 complications [%]	1.0	2.0	3.9	
Postoperative bleeding [%]	5.7	5.9	7.8	0.86
Wound infection [%]	0.0	3.9	5.9	0.07
Sternum dehiscence [%]	0.0	2.6	3.9	0.17
Postoperative myocardial infarction [%]	0.0	2.0	2.0	0.35
Renal insufficiency [%]	5.7	10.5	13.4	0.22
Neurological complication [%]	20.0[b]	16.3[c]	37.3[bc]	0.006*
Stroke [%]	5.7	2.0	3.9	
Consciousness disturbances [%]	13.3	10.5	27.5	0.017*
Focal neurological deficit [%]	1.0	3.9	5.9	
Arrhythmia [%]	54.3	56.2	60.8	0.74
Atrial fibrillation [%]	36.2	43.8	47.16	
Ventricular tachyarrhythmia [%]	11.4	6.5	7.8	0.74
III° AV block [%]	6.7	5.9	5.9	
Early mortality [%]	1.9 (2 p.)	4.6 (7 p.)	5.9 (3 p.)	0.34

Abbreviations: ICU – Intensive Care Unit, LOS – length of stay, AV – atrioventricular
** significant*
[a] significant difference between no-PPM group and moderate PPM group, p < 0.05
[b] significant difference between no-PPM group and severe PPM group, p < 0.05
[c] significant difference between moderate PPM group and severe PPM group, p < 0.05

occurred in 17 of 75 non-survivors (22.7%). Only one patient from the severe PPM group died due to documented cardiac cause.

There was no redo cardiac operation in the whole study group. The history of myocardial infarction, percutaneous coronary angioplasty, stroke and bleeding was not different among all three groups (Table IV).

There was no significant difference in late mortality among patients from all three groups (Table IV). Late non-survivors had significantly higher median NYHA class (69.23 vs. 50% of patients with NYHA class > 3; p = 0.02), higher number of postoperative complications (25.3 vs. 16.2% of patients with more than one complication; p = 0.04), as well as higher median EOA index (0.81; range: 0.56-1.57 vs. 0.74; range: 0.54-1.94; p = 0.008). There were no significant differences in the remaining variables between late survivors and non-survivors.

There was no difference in survival according to the PPM presence for up to 5 years (Figure 2). The number of postoperative complications per patient was the only however, rather weak predictor of late death in a Cox proportional hazard regression model (p = 0.0004; OR 1.6; 95% CI 1.3-2.1; p = 0.0002).

Quality of life

One hundred and eighty-four (82.9%) of 222 late survivors answered the simple questionnaire. There was no difference between all groups in the percentage of patients without relief of symptoms of disease and postoperative physical efficiency (Table IV). Oral anticoagulant therapy was significantly more frequent in patients without PPM and among patients with moderate PPM due to a higher percentage of mechanical valves in those groups.

The SF-36 questionnaires were sent back by 142 (64%) of 222 late survivors. Inter-group comparison revealed no differences in all SF-36 components (Table V).

Discussion

No significant effects of the PPM on early mortality was found in our study. Several reports are in agreement with this finding. Hanayama et al. reported a low frequency

Table IV. Follow-up data of early survivors according to PPM presence (simple questionnaire)

Variable	No-PPM	Moderate PPM	Severe PPM	p
Number of contacted patients	59	96	29	
No relief of symptoms [%]	23.7	11.7	24.1	0.1
Postoperative physical efficiency				
Better [%]	58.6	59.4	67.9	0.11
Without change [%]	25.9	32.3	10.7	
Worse [%]	15.5	8.3	21.4	
Postoperative MI [%]	1.7	2.1	0.0	0.74
PTCA [%]	5.1	2.1	3.6	0.6
Oral anticoagulant therapy [%]	91.4[ab]	39.2[a]	24.1[b]	< 0.0001*
Regular INR control [%]	64.2	73.7	71.4	0.62
History of bleeding [%]	12.1	8.3	6.9	0.69
Stroke [%]	8.8	1.1	3.6	0.56
Late mortality [%]	32.0 (33 p.)	24.0 (35 p.)	14.6 (7 p.)	0.06

Abbreviations: PTCA – percutaneous coronary angioplasty, INR – international normalised ratio, MI – myocardial infarction
** significant*
[a] significant difference between no-PPM group and moderate PPM group, p < 0.05
[b] significant difference between no-PPM group and severe PPM group, p < 0.05
[c] significant difference between moderate PPM group and severe PPM group, p < 0.05

of PPM and no impact of PPM on postoperative mortality rate [13]. Similarly, Howell and associates did not find any influence of EOAi (effective orifice area index) and GOAi (geometric orifice area index) on postoperative mortality [1]. Medalion et al. found that factors other than PPM influenced early outcome [14]. A retrospective multi-centre study showed only a minimal increase of early mortality due to severe PPM in a large population [6]. And finally, the presence of PPM was not found to be important in older patients – similarly to our report [15].

Walther et al. reported that both PPM presence and the need of bypass grafting were independent risk factors for adverse outcome [2]. A negative impact of PPM on outcome was found also by Blais et al. [11]. Two factors can possibly explain the discrepancies between the results reported by Walther et al., Blais et al. and our results: first, age-related comorbidities and complications can mask the influence of PPM; and second, there is a non-homogeneous population and lack of risk adjustment in these studies. One of the preoperative risk factors of early mortality among our patients was older age, which is in accordance with other reports concerning combined procedures [12]. The early mortality rate of AVR + CABG among our patients was 3.9%, which is comparable to the results of the German National Database (6.5%) [16].

The presence of PPM did not affect late mortality in our study. Similarly, other investigators did not find such an effect [1, 6, 17]. Ruel et al. showed that PPM did not affect overall long-term survival after AVR [17]. Similarly, Blackstone and associates reported that PPM did not affect the intermediate and long-term outcome [6]. In the Howell et al. study, PPM did not predetermine mid-term survival either [1]. Sawant et al. showed no increase of late mortality following AVR with 19 mm valves. The only risk factors were advanced age and anticoagulation therapy [9].

Other reports showed that severe PPM was a strong predictor of long-term mortality among patients with a small diameter aortic valve prosthesis [3]. The PPM has been shown to affect the mid-term survival in pure aortic stenosis [18] and has been reported to be a significant predictor of valve related mortality [19]. Differences between the above-mentioned studies and our investigation can be explained by possible postoperative haemodynamic improvements despite PPM. This phenomenon was recognised during studies on small diameter valves. Freed and associates revealed the possibility of myocardial remodelling of the left ventricle in patients with 19 mm valves [10]. On the other hand, the absence of left ventricular mass regression after the implantation of smaller valves is not always associated with worsening of physical capacity [20]. Secondly, there is a possibility that EOA calculation in patients with high BMI is underestimated, since a potential relationship between cardiac output and BMI may not be linear. Finally, the performance of artificial valves in the elderly can vary due to age-related structural and functional changes of the heart in comparison to a younger population, because body activity as well as cardiac output in elderly individuals is diminished. Therefore, satisfactory physical capacity is possible even in the presence of PPM. This phenomenon was likely to occur in our group of patients since, surprisingly, late survivors had smaller median EOA indexes than non-survivors.

In our study patients with severe PPM were characterised by a significantly larger BMI than no-PPM patients. All severe PPM patients were overweight (BMI: 24--30 kg/m^2) and more than one third (37.3%) were severely obese (BMI: 30-40 kg/m^2). Tasca et al. observed a similar phenomenon in patients with pure aortic stenosis [18]. Of note, the obesity did not influence the early mortality in the severe PPM group – this is in accordance with our previous experiences in obese CABG patients [21]. However, obesity certainly was the cause of prolonged operation time.

All three groups of patients had a similar number of postoperative complications. However, patients with severe PPM showed a significantly higher frequency of neurological problems. This can be attributed to obesity and age rather than to the effect of the PPM. For example, patients from the severe PPM group presented nearly all risk factors for neurological complications: older age, combined surgery, and prolonged ECC time, as reported by Svedjeholm and associates [22].

The risk of late death after AVR depends on various comorbidities [23]: diabetes, chronic pulmonary disease, peripheral vascular disease, chronic renal disease and congestive heart failure [15]. Finally, the effects of concomitant CABG and CAD progression on the long-term survival after AVR cannot be neglected. Higher preoperative NYHA class and quantity of postoperative complications were identified as risk factors of late death in our study and may reflect to a certain degree the influence of present comorbidities. It has been shown that patients undergoing combined procedures have lower survival rates in comparison to those with simple AVR only [24]. Similarly, event-free life expectancy is reduced. All these factors could have potentially affected the late health status of our patients. Late side effects of PPM might have not developed due to the limited life span of our aged patients.

We observed no significant impact of PPM on the late QoL. Also Koch et al. showed no influence of PPM on QoL after AVR either [25]. It seems that age and preoperative physical capacity have the highest influence on postoperative QoL [25].

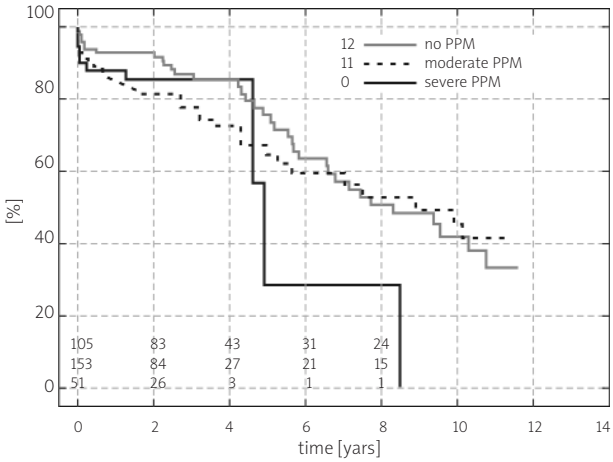

Figure 2. Kaplan-Meier survival curves

PPM – patient-prosthesis mismatch
Numbers over the x-axis show patients entering the given period: upper row – patients without PPM, middle row – patients with moderate PPM, lower row – patients with severe PPM

Xenogeneic stent mounted valves usually have smaller EOA than their mechanical counterparts of the same external diameter [2, 4, 18]. Thus, the more frequent the use of these valves, the more probable is the low average EOA index. In our study population biological valves were implanted in more than half of the patients, and almost all patients with PPM had this type of prosthesis. In our study the prevalence of bioprostheses was undoubtedly associated with the treatment policy presented above.

Study limitations

This study is certainly biased by various factors including its retrospective character and relatively small

Table V. SF-36 in PPM groups

Parameter	No-PPM	Moderate PPM	Severe PPM	p
Number of patients	37	77	28	-
Physical functioning	75 (35-90)	62 (32.5-90)	40 (20-75)	0.2
Physical role	75 (0-100)	50 (0-100)	25 (0-75)	0.22
Bodily pain	100 (52-100)	82 (51.5-100)	74 (41-100)	0.27
General health	57 (42-82)	62 (42-72)	52 (40-67)	0.52
Vitality	55 (40-75)	55 (40-70)	45 (30-60)	0.4
Social functioning	100 (62.5-100)	87 (62.5-100)	75 (50-100)	0.35
Emotional role	100 (0-100)	100 (33.3-100)	100 (33.3-100)	0.88
Mental health	72 (60-84)	76 (60-88)	76 (56-80)	0.71
Physical component summary	65.8 (42.8-86.4)	57.4 (38.6-81.9)	44.6 (33.2-68.2)	0.14
Mental component summary	74 (49.6-83.4)	68.3 (47.8-82.5)	58.7 (50.1-75.8)	0.62

Abbreviations: PPM – patient-prosthesis mismatch. Values of each parameter are presented as medians and quartiles (in parentheses)

number of patients compared to other reports [6]. We also assumed that every valve type has exactly the same EOA in every patient. This may not be necessarily true taking into account the influence of implantation technique and ischaemic heart disease per se. More accurate EOA assessment could have been performed using echocardiography.

Our study suffers from the absence of baseline QoL measurements. However, for the comparison of three PPM groups, one postoperative QoL measurement is sufficient.

Conclusions

PPM is a frequent phenomenon in older patients requiring aortic valve replacement and revascularisation. Severe PPM occurs rarely, predominantly in obese patients. PPM is not associated with the type of biological valve prosthesis in a selected group of patients, especially aged patients with multiple comorbidities. However, presence of PPM of any degree does not significantly influence early and late survival and does not preclude satisfactory quality of life in patients with aortic stenosis and CAD.

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Czy „niedopasowanie pacjent-proteza” wpływa na wyniki operacji jednoczesnej wymiany zastawki aortalnej i pomostowania aortalno-wieńcowego?

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Streszczenie

Wstęp: Konieczność wykonania zabiegu wymiany zastawki aortalnej połączonego z jednoczesną rewaskularyzacją wieńcową jest zjawiskiem występującym coraz częściej we współczesnej populacji europejskiej, obciążonej wieloma chorobami dodatkowymi. „Niedopasowanie pacjent-proteza” (ang. *patient-prosthesis mismatch*, PPM) w takiej sytuacji może być dodatkowym czynnikiem ryzyka wpływającym niekorzystnie na wczesne i późne wyniki leczenia.

Cel: Retrospektywna ocena wpływu PPM na wczesne i średnioterminowe wyniki kliniczne oraz na jakość życia (QoL) u chorych poddanych złożonemu zabiegowi na naczyniach wieńcowych oraz zastawce aortalnej.

Metody: Do badania włączono 309 kolejnych pacjentów leczonych z powodu choroby wieńcowej oraz wady zastawki aortalnej. Przeanalizowano ich dokumentację medyczną. Chorzy zostali podzieleni na 3 grupy w zależności od braku lub obecności umiarkowanego lub ciężkiego PPM (zdefiniowanego poprzez wskaźnik efektywnej powierzchni ujścia zastawki aortalnej w granicach 0,85–0,65 cm^2/m^2 i < 0,65 cm^2/m^2). Analizowano dane demograficzne, okołooperacyjne, a także wczesne i późne przeżycie oraz QoL (określoną za pomocą formularza SF-36).

Wyniki: Obecność ciężkiego PPM obserwowano u 51 (16,5%) chorych, umiarkowanego u 153 (49,5%) chorych. Pacjenci z obydwu grup PPM byli znacząco starsi. Chorzy z ciężkim PPM charakteryzowali się większą masą ciała oraz wyższym indeksem masy ciała, częściej stwierdzano u nich dyslipidemię. U chorych z obydwu grup PPM znacznie częściej implantowano zastawki biologiczne w porównaniu z pozostałymi chorymi (94,1 i 77,1 *vs* 19,1%, p < 0,0001). Nie obserwowano istotnych statystycznie różnic między grupami we wczesnej i późnej śmiertelności. Zaawansowany wiek, niewydolność nerek oraz zaburzenia rytmu były czynnikami ryzyka wczesnej śmiertelności. Przeżycie późne było zdeterminowane tylko przez liczbę komplikacji pooperacyjnych (model regresji Coksa). Nie obserwowano istotnych statystycznie różnic między grupami w zakresie wszystkich komponentów oceny SF-36.

Wnioski: „Niedopasowanie pacjent-proteza” jest częstym zjawiskiem wśród starszych chorych wymagających wymiany zastawki aortalnej połączonej z jednoczesnym pomostowaniem aortalno-wieńcowym. Ciężkie PPM pojawia się rzadko i dotyczy chorych otyłych. Jego obecność nie wpływa jednak znacząco na wczesne i późne przeżycie oraz nie wyklucza zadowalającej QoL.

Słowa kluczowe: wymiana zastawki aortalnej, CABG, otyłość, jakość życia

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