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Does preoperative left heart failure affect outcome and quality of life after mitral valve surgery?

Summary

Objective: In patients scheduled for mitral valve surgery, preoperative left heart failure may reflect the degree of mitral valve disease. We assessed the incidence of left heart failure in patients who underwent mitral valve surgery and analysed the impact on mid-term outcome and quality of life in these patients.

Methods: The data of 204 consecutive patients who underwent mitral valve surgery at our institution were analysed. Seventy (34.3%) had a history of preoperative left heart failure. Patient's characteristics and mid-term outcome were analysed. Quality of life was assessed by using the SF-36 questionnaire.

Results: Patients with a preoperative history of left heart failure were significantly older (67.0 vs 62.5 y; $p < 0.05$), were more symptomatic at the time of surgery (NYHA-class 3.3 vs 2.4; $p < 0.05$), had lower left ventricular ejection fraction (63 vs 52%; $p < 0.05$) and had more enlarged left atria (57.6 vs 52.7 mm; $p < 0.05$). In-hospital mortality (11.4 vs 3.0%; $p < 0.05$) was higher and expected 5 year survival rate (68.9 vs 90.3%; $p < 0.05$) was significantly lower in patients with preoperative left heart failure. After an average follow-up period of 37 ± 18 months no difference in quality of life was found between survivors of the two groups.

Conclusions: A preoperative history of left heart failure adversely affects early and mid-term outcome in patients undergoing mitral valve surgery. However, 36 months after surgery mortality tends to be similar in both groups and quality of life does not differ significantly between patients with or without history of heart failure and is similar to that obtained in a standard population.

Key words: mitral valve surgery; heart failure; outcome; quality of life

Introduction

The standard operative procedure for patients suffering from mitral valve regurgitation should be the repair of the valve (MVr). It is associated with better preservation of left ventricular function [1]. Nevertheless in some patients replacement (MVR) of the valve may be necessary for function when the valve is severely calcified, destroyed by endocarditis or in case of papillary muscle rupture. Although it is associated with a higher early mortality and morbidity and decreased survival, MVR still offers acceptable outcomes. We have recently shown that mid-term outcome and QoL (quality of life) in patients undergoing isolated MVR and MVr is fairly good and comparable with an age- and gender-matched standard population [2]. Moderately to severely decreased preoperative left ventricular (LV) function has sometimes been considered to be a contraindication to surgery in patients with regurgitation in the past [3]. Recently, several studies have shown that surgical correction of regurgitation in patients with impaired left ventricular function should be performed, since it yields better survival and improved left ventricular function and good results can be obtained following surgical repair of the valve [4, 5]. A preservation or improvement of QoL is the main goal of a surgical intervention and therefore of major interest. Preoperative left heart failure (LHF) may reflect the degree of severity and/or the duration of mitral valve disease. In a recent study El-Zaru et al. reported a high mortality following the diagnosis of heart failure [6]. Aim of the actual study was to assess early to mid-term follow-up in

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these patients and to determine QoL, using the SF-36 health survey questionnaire, and to analyse if preoperative LHF influences survival following mitral valve surgery (MVS).

Patients and methods

Early and mid-term results, as well as QoL, were assessed in 204 consecutive patients, with preoperative LHF, following MVS. We defined preoperative LHF as severe left heart insufficiency (pulmonary edema) requiring hospitalisation and modification of medical treatment up to 3 months preoperatively. Applying these criteria LHF was found in 70 patients (34.4%) undergoing MVS at our institution in the time frame of January 1996 until December 2000. 55 patients (78.6%) had MVR and 15 (21.4%) received MVr. Mean age of the patients with LHF was 67.0 ± 9.9 years, significantly higher than that of patients without preoperative LHF (62.5 ± 13.2 years; $p < 0.05$). Overall in-hospital mortality was 5.9% (12 patients) in the collective. In patients with LHF mortality was as high as 11.4% (8 patients). In-hospital mortality of patients without LHF was significantly lower: 3.0% ($p < 0.05$). An additional number of 11 patients (15.7%) with LHF died during a mean follow-up of 37 ± 18 months, compared to 7 without-LHF patients (5.2%; $p < 0.05$). 4 patients (5.7%) were lost to follow-up, all of them were LHF patients. The remaining 47 patients (67.1%) received a SF-36 questionnaire. 41 (87.2%) were answered correctly and 6 (12.8%) were not usable either due to language problems, incomplete information or refused reply. Since the SF-36 questionnaire is validated in German and was sent to the patients in German language only, we could not assess the data of patients who did not speak German. There was no significant difference when the in-hospital data (average NYHA-class and left ventricular function) of the patients who filled out the questionnaire and those who were unable or refused to fill-out the questionnaire were analysed. 7 patients did not survive the follow-up, 3 were lost to follow-up, and finally 124 patients without LHF received the questionnaire. 92 (74.2%) answered it correctly and 32 (25.8%) were incomplete, mainly due to language problems. All patients who did not reply were contacted by phone, in order to determine the reason for not answering the questionnaire and to assume a complete follow-up with regard to mid-term survival.

Pre-, intra- and postoperative data was retrospectively collected. All patients who survived the in-hospital period received a SF-36 questionnaire. The SF-36 consists of 36 short questions mirroring health and QoL in eight different aspects: bodily pain (BP, 2 items); mental health (MH, 5); vitality (VT, 4); social functioning (SF, 2); general health (GH, 5); physical functioning (PF, 10); and role functioning, both emotional (RE, 3) and physical (RP, 4). Role functioning reflects the impact of emotional and physical disability on work and regular activity (the individual's normal everyday role). Raw points were transformed, generating a score for each dimension ranging from 0 to 100 (best functioning). Swedish normal population (n = 8930) scores were used as a standard population for comparison (range 85 to 115, looking at the age- and sex-matched results) [7]. Results were compared between patients with preoperative LHF or without.

Statistical analysis

The SF-36 questionnaire was analysed in accordance to the SF-36 manual and missing values were replaced using the described algorithm in this manual [7]. Scores were adjusted for age and sex in order to be comparable with the normal standard population. Data was analysed using Stat View 4.1 (SAS Institute, Inc, Cary, N.C.). We used the Cronbach's alpha exceed 0.70 for comparison between groups, the Mann-Whitney U-test and χ^2-test were used for continuous and nominal variables, respectively. A p-value of less than 0.05 was considered as statistically significant. Results are displayed as mean values ± standard deviation.

Results

Outcome

Patients suffering from a preoperative LHF were significantly older (67.0 ± 9.9 *vs* 62.5 ± 13.2 years; $p < 0.05$), were more symptomatic at the time of surgery (average preoperative NYHA-class 3.3 *vs* 2.4; $p < 0.05$), had a lower LV ejection fraction (>50% EF: 74.6 *vs* 90.3%; $p < 0.05$) and had more enlarged left atria (57.6 *vs* 52.7 mm; $p < 0.05$). Coronary artery bypass grafting was required in a significantly higher share in the LHF section: 35.7 *vs* 20.1%; $p < 0.05$. In-hospital mortality (11.4 *vs* 3.0%; $p < 0.05$) was higher and expected 5 year survival rate (68.9 *vs* 90.3%) was significantly lower in patients with preoperative LHF. LHF-patients spent an average of 8.5 ± 15.7 days in the intensive-care-unit, whereas patients without LHF spent 3.3 ± 3.7 days. The percentage of patients having a postoperative LV ejection fraction of over 50% (echocardiography before dismissal) was 51.0% in the LHF-group *vs* 71.9% in patients without LHF. The assessed morbidities were similar in both groups (table 1).

Table 1
Pre-, intra- and postoperative data of patients with (n = 70) and without (n = 134) history of preoperative left heart failure. Results displayed as absolute value or percentage.

Total collective (n = 204)	with LHF		without LHF		p-value
	absolute	%	absolute	%	
Preoperative data					
Demographics					
Number of patients	70	34.3	134	65.7	<0.05
Age at surgery	67.0 ± 9.9		62.5 ± 13.2		<0.05
Male patients	42	60.0	79	59.0	ns
BMI	24.5 ± 3.5		24.8 ± 4.0		ns
Comorbidities/symptoms					
COPD	23	32.9	27	20.1	<0.05
History of CVA	9	12.9	11	8.2	ns
Reoperation	5	7.6	13	10.5	ns
Mean NYHA	3.3 ± 0.7		2.4 ± 0.9		<0.05
History of LHF	70	100	0	0	<0.05
History of myocardial infarction	23	32.9	9	6.7	<0.05
Coronary angiography					
Left ventricular ejection fraction					
>50%	47	74.6	112	90.3	<0.05
30–50%	15	23.8	12	9.7	<0.05
<30%	1	1.6	0	0.0	ns
CAD	33	50.0	35	28.2	<0.05
LVEDP (mm Hg)	17.9 ± 8.1		14.2 ± 6.9		<0.05
Cardiovascular risk factors					
History of smoking	33	47.1	57	42.5	ns
Arterial hypertension	37	52.9	65	48.5	ns
Hyperlipidaemia	28	40.0	60	44.8	ns
Heredity	18	25.7	44	32.8	<0.05
Diabetes mellitus	13	18.6	25	18.7	ns
Intraoperative data					
Etiology of mitral valve disease					
Degenerative	45	64.3	106	79.1	<0.05
Endocarditis	10	14.3	20	14.9	ns
Ischaemic	13	18.6	6	4.5	<0.05
Other	3	4.3	2	1.5	ns
Combination of the above	1	1.4	0	0	ns
Total receiving CABG	25	35.7	27	20.1	<0.05
Ischaemics receiving CABG	11	84.6	5	83.3	ns
IABP	9	12.9	0	0	<0.05
Isolated MVr	7	10.0	46	34.3	<0.05
Combined MVr	8	11.4	16	11.9	ns
Isolated MVR	27	38.6	35	26.1	<0.05
Combined MVR	28	40.0	37	27.6	<0.05
ECC-Time (min)	117.9 ± 45.7		107.8 ± 50.2		ns
ACC-Time (min)	79.2 ± 29.6		75.5 ± 33.2		ns
Postoperative					
Left ventricular ejection fraction					
>50%	25	51.0	82	71.9	
30–50%	22	44.9	30	26.3	
<30%	2	4.1	2	1.8	
Intensive care (days)	8.5 ± 15.7		3.3 ± 3.7		<0.05
Length of stay (days)	21.4 ± 21.8		14.0 ± 8.5		<0.05
Myocardial infarction	4	5.7	1	0.7	<0.05
Postoperative pacemaker	6	8.6	7	5.2	ns
CVA	7	10.0	9	6.7	ns
Reversible CVA	4	57.1	6	66.7	

ACC-time = aortic cross clamping time; CABG = coronary artery bypass grafting; CAD = coronary artery disease; CVA = cerebrovascular accident; ECC-time = extracorporeal circulation time; IABP = intra-aortic balloon pump counter pulsation; LVEDP = left ventricular end diastolic pressure; LHF = left heart failure; BMI = Body Mass Index; MVr = mitral valve repair; MVR = mitral valve replacement; ns = non significant.

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SF-36 scores

After an average follow-up period of 37 ± 18 months no major differences in QoL were found between survivors of the two groups. No significant deviating values represent a persisting lack in mid-term QoL for patients who suffered from a preoperative LHF. The study population scores (n = 41, with LHF; n = 92, without LHF) are summarised in figure 1.

Discussion

A preoperative history (up to 3 months preoperative) of LHF is a very common finding in patients undergoing MVS. Preoperative investigations were done in most of the patients after cardiac recompensation, thus the difference of left ventricular end diastolic pressure between the two groups is less distinct, as it would be during LHF. It clearly is a negative predictor for both the in-hospital and short-term recovery of the patient, mainly affecting mortality. Furthermore valve replacements, instead of repair, add their share of negative effects (oral anticoagulation, etc.). This is the reason why in recent years the rate of MVr is increasing at our institution – reconstruction rate is presently around 70% – which may furthermore improve outcome in these patients. In patients undergoing MVR, whenever possible, the subvalvular apparatus was preserved. As we evaluated a relatively large group of LHF patients that received MVR, the results were expected to be even more transparent. However, the higher postoperative risk that is expected in LHF-patients seems to diminish as time passes. 37 months after surgery the risk of late mortality becomes stable and remains even for patients with LHF for the rest of the follow-up period, despite the older age in this group. After that period, the results in both groups seem not to be influenced by the preoperative LHF any longer as the overall mortality rate (fig. 2) becomes similar in both groups. This observation emphasises the potential benefits of the surgical approach even in advanced stages of valve-malfunction and left ventricular decompensation. MVS in patients with impaired left ventricular function offers symptomatic improvement and survival benefit, as stated by Bishay et al. [8]. Proposing a remodelling of the myocardium, it has been seen that the left ventricular ejection fraction and the left ventricular systolic diameter were restored to normal within one year of repair, even in patients with poor left ven-

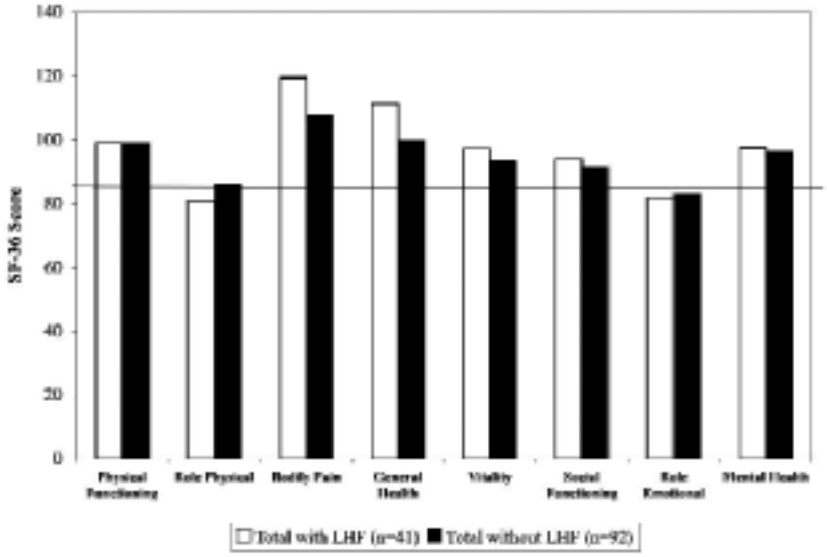

Figure 1
Age- and sex-matched comparison of the results from the SF-36 in patients undergoing mitral valve surgery either with or without a preoperative left heart failure (LHF).

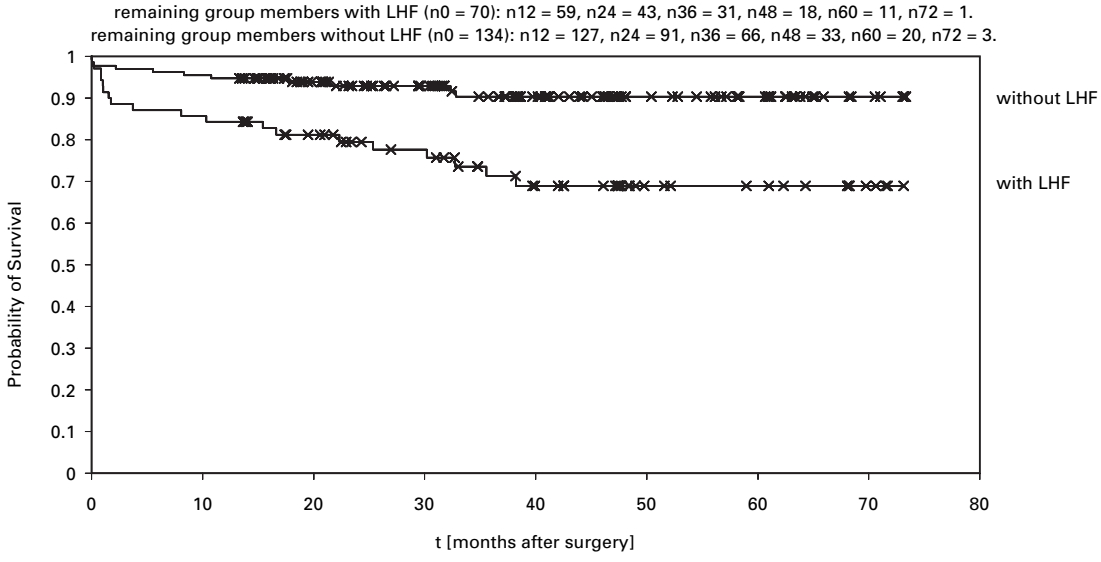

Figure 2
Kaplan-Meier survival analysis for patients with and without left heart failure (LHF) undergoing mitral valve surgery (MVS).

tricular function [9–12]. As we only assessed the in-hospital postoperative left ventricular function, our results do not point towards this benefit. An additional control echocardiography would be vital to collect this data. Since surgery may positively affect hearts with an impaired function, we hypothesise that surgery may influence the patient's QoL, too. This functional cardiac improvement is expressed by the equal levels of QoL of patients with different preoperative settings compared to the data of a standard population after an average follow-up period of 37 ± 18 months. Comparing the age- and sex-matched results obtained with the SF-36 (fig. 1), a slight impairment in relation to the standard population (range 85–115) was found in 1 of 8 aspects for patients without LHF (RE 82.5) and in 2 of 8 aspects in patients with LHF (RE 81.8, RP 80.6). These results are very encouraging, as they signify that after a mean follow-up of 37 ± 18 months the patient's QoL is virtually back at normal. Beta-blockers were prescribed for at least 6 months in order to prevent cardiac arrhythmias in over 90% of the patients at discharge in both groups. Furthermore, over 50% of the patients were discharged on ACE-inhibitors, a medication that probably helps to improve remodelling. This combined medication might have contributed to the positive consequence of the surgical approach on the QoL.

We are aware that the percentage of patients who had MVR is, comparing to the literature, rather high, which may be due to the higher incidence of complex cases at a University hospital. Nevertheless, the rate of reconstruction increased in the last few years and is currently around 70%. Furthermore it is rather difficult to clearly identify patients with acute LHF – but the definition, used in the present study, clearly allowed us to compare two groups of patients with different preoperative characteristics.

From the present analysis we conclude, that a preoperative history of LHF negatively affects early and mid-term outcome in patients undergoing MVS. However, three years after surgery mortality tends to be similar in both groups and QoL does not differ significantly between patients with or without history of LHF and is quite similar to that obtained in a standard population.

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