

# Will cardiac surgery improve my quality of life?

## *Visual analogue score as a first step in preoperative counselling*

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**Background.** The intention of this study is to analyse the correlation between a visual analogue scale (VAS) and the most common preoperative comorbidity and cardiac variables in patients undergoing elective cardiac surgery. This VAS is simple, easy to register and can be used as a global measurement of quality of life (QOL).

**Methods.** Preoperative assessment of QOL in 1351 patients, 979 men and 372 women, with a mean age of  $64.5 \pm 10.5$  (18-88), undergoing elective cardiac surgery between January 2003 and December 2005. QOL was measured by the EuroQol questionnaire.

**Results.** The mean VAS was  $58.7 \pm 20.9$ , range 3 to 100. Univariate analysis showed a difference for sex ( $p=0.000$ ), and NYHA ( $p=0.009$ ) between patients with an isolated CABG and those with a combined revascularisation ( $p=0.05$ ). Stepwise logistic regression analysis identified female gender ( $p=0.00$ ), NYHA ( $p=0.00$ ) and valve disease ( $p=0.03$ ) as independent variables for a low QOL. The correlation between NYHA and QOL was low ( $r=-0.09$ ,  $p=0.003$ ).

**Conclusion.** The clinical consequence is that using this simple VAS we can identify patients with a good QOL. If these patients present for high-risk surgery, with a better quality of life as primary indication, more extended counselling regarding their QOL is recommended. (*Neth Heart J* 2007; 15:51-4.)

Keywords: myocardial revascularisation, angina pectoris, quality of life, follow-up

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In a previous report, we concluded that preoperative health status was the major determinant of change in quality of life (QOL) following CABG.<sup>1</sup> Patients with a worse preoperative health status are likely to have a QOL benefit; however, patients with a good QOL cannot expect an improvement and may even experience a decline in their QOL. Therefore, certainly in high-risk patients, it is important to balance the operative risk against the expected QOL improvement. The major problem, however, is the complexity of 'QOL' and the lack of a standardised method for counselling.

In the previous study, we used the EuroQol questionnaire for assessing QOL. This questionnaire is a standardised, non-disease-specific instrument for describing and valuing health-related quality of life.<sup>2</sup> The EuroQol instrument measures five domains of quality of life, and patients are also asked to rate their current state of health on a visual analogue scale (VAS), similar to a thermometer. The best state they can imagine is scored as 100 and the worst state as 0. This VAS is simple and easy to register, and can be used as a global measurement of QOL. However, it is important to know what the relation is between the VAS and cardiac and comorbidity factors.

The intention of this study is to analyse the correlation between the VAS and the most common preoperative comorbidity and cardiac-related variables of patients undergoing cardiac surgery.

### Patients and methods

#### Patients

With the aid of our database, the Coronary Surgery Database Radboud Hospital (CORRAD), a registry that stores medical, pre-, peri- and postoperative, and follow-up data as well as data concerning quality of life, on all patients undergoing cardiac surgery, we identified 1351 patients who had had elective surgery between January 2003 and December 2005, for which the preoperative registration of QOL was complete. The registration of QOL was on voluntary basis and approved by the local ethics committee and research council.<sup>3</sup> The group consisted of 979 men (72.5%)

**Table 1.** Variables and definitions.

Variable	Definition
Age (years)	Years
Sex	Male, female
Diabetes	Diet controlled, oral therapy or insulin-dependent diabetes
Vascular disease	Peripheral, abdominal vascular pathology or surgery
Neurological disease	Cerebrovascular accidents and /or transient ischaemic attack
Renal disease	Renal failure (creatinine $\geq 150$ $\mu\text{mol/l}$ ), preoperative dialysis, renal transplantation
Myocardial infarction	History of myocardial infarction before the operation
Left ventricular function	Ejection fraction: good ( $>50\%$ ), poor: ( $>30\%$ , $<50\%$ ), bad ( $<30\%$ )
NYHA	New York Heart Association classification

and 372 women (27.5%) with a mean age of  $64.5 \pm 10.5$  (18–88), median 66 years. Table 1 presents the variables and their definitions that were studied for their correlation with the VAS.

#### Statistic analysis

Characteristics of patients are presented as percentages for dichotomic variables, and as mean  $\pm$  standard deviation for numerical variables. Differences in numerical variables (VAS) were tested with the t-test. In the univariate analysis, age is described as a binary variable (age group younger than or older than 75 years). Multiple linear regression analysis was used to assess the

relationship between the VAS and preoperative cardiac and comorbidity variables. In the regression analysis, all preoperative variables and age in years were included. Independent variables were entered in a step-wise regression analysis to identify their prognostic value for QOL. The relationship between NYHA and QOL was determined using Spearman's correlation. Statistical significance was assumed at  $p \leq 0.05$  ( $p = 0.000$  means  $p < 0.001$ ).

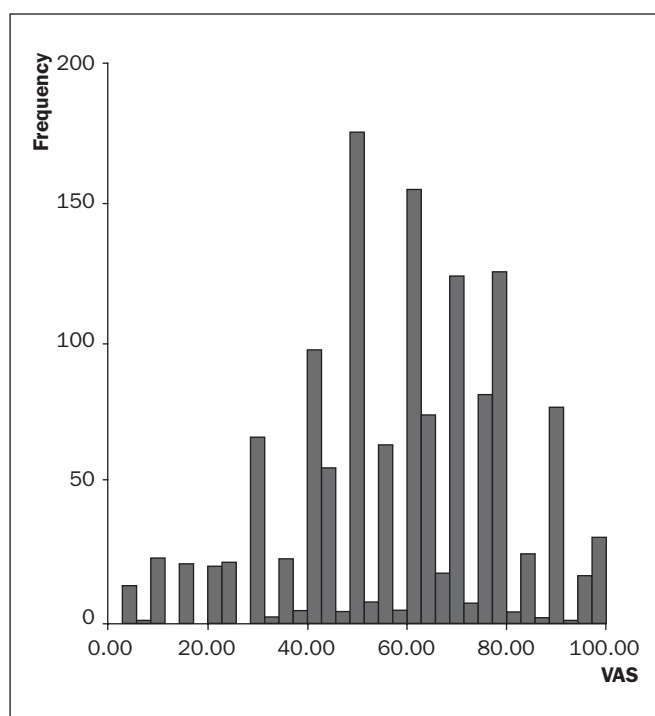
#### Results

The VAS of the total group was  $58.7 \pm 20.9$ , with a median of 60 and a range from 3 to 100 (figure 1). Table 2 shows the results of the univariate analysis. There was only a significant difference in VAS for sex ( $p = 0.000$ ), NYHA ( $p = 0.009$ ), and the patients with isolated coronary artery pathology versus valve or combined valve and coronary pathology ( $p = 0.05$ ).

Table 3 shows the results of the regression analysis. Female gender ( $p = 0.00$ ), NYHA ( $p = 0.00$ ) and patients with valve pathology ( $p = 0.03$ ) are independent variables for VAS registration. The correlation between NYHA and QOL was low ( $r = -0.09$ ,  $p = 0.003$ ).

#### Discussion

Improvement in quality of life is increasingly becoming the first indication for cardiac surgery. Practice guidelines for coronary bypass surgery target improvement of survival and symptomatic relief of angina, with improvement of quality of life as a second expected outcome.<sup>4</sup> Recent guidelines, however, refrain from providing information regarding expectations concerning an improved quality of life.<sup>5</sup> There are several reasons for this paucity. First, the complexity of the term 'quality of life'. QOL represents a broad range of human experiences related to one's overall well-being. It is the result of subjective functioning in relation to personal expectations and is defined by subjective experiences, and perceptions.<sup>6</sup> Second, the mode of measurement. Because QOL is a subjective assessment of the impact of a disease and treatment across different domains of functioning and well-being, some propose



**Figure 1.** Histogram of the distribution of the VAS of the total population ( $n = 1351$ ). Mean  $58.7 \pm 20.9$ , median 60, range 3 to 100, percentile: 10:30, 25:45, 50:60, 75:75, 90:85.

**Table 2.** Results of univariate analysis.

Variable	Category	N (%)	VAS (mean $\pm$ SD)	P value
Sex	Male	979	60.9 $\pm$ 20.6	0.00
	Female	372	53.3 $\pm$ 20.8	
Age group	$\geq 75$	236	55.6 $\pm$ 21.9	0.21
	<75	1115	59.4 $\pm$ 20.6	
Diabetes	Yes	217	56.1 $\pm$ 19.8	0.22
	No	1134	59.1 $\pm$ 21.1	
Vascular disease	Yes	192	58.7 $\pm$ 22.4	0.15
	No	1159	57.6 $\pm$ 20.6	
Renal disease	Yes	41	53.1 $\pm$ 20.3	0.90
	No	1310	58.9 $\pm$ 20.9	
Neurological disease	Yes	130	55.2 $\pm$ 20.1	0.32
	No	1221	59.1 $\pm$ 21.0	
Myocardial infarction	Yes	454	57.6 $\pm$ 20.7	0.67
	No	897	58.3 $\pm$ 21.0	
NYHA class	I	53	68.0 $\pm$ 22.5	0.009
	II	292	58.7 $\pm$ 21.5	
	III	869	59.0 $\pm$ 20.4	
	IV	137	53.8 $\pm$ 20.9	
LV function	Good	1255	58.7 $\pm$ 20.9	0.99
	Moderate or poor	96	58.8 $\pm$ 21.4	
Isolated CABG /valve (+CABG)	CABG	833	60.0 $\pm$ 20.4	0.05
	Valve	518	56.7 $\pm$ 21.6	

NYHA=New York Heart Association, LV=left ventricle, CABG=coronary artery bypass graft.

**Table 3.** Relation of VAS and preoperative variables.

Variable	Coefficient $\beta_1$ (SE)	P value	95% CI
Sex (female gender)	- 6.05 (1.3)	0.000	-8.6 – -3.4
Age group	- 0.40 (1.82)	0.82	-3.98 – 3.16
Diabetes	- 1.32 (1.5)	0.39	-4.37 – 1.71
Vascular disease	1.43 (1.6)	0.38	-1.77 – 4.63
Renal disease	- 4.2 (3.2)	0.19	-10.7 – 2.23
Neurological disease	- 2.9 (1.9)	0.12	- 6.76 – 0.80
Myocardial infarction	0.35 (1.2)	0.77	-2.11 – 2.8
NYHA class	- 2.89 (0.9)	0.002	-4.70 – -1.08
LV function	- 0.48 (0.8)	0.55	-2.1 – 1.13
Valve (+CABG)	- 2.75 (1.3)	0.03	-5.32 – -0.18
Age in years	- 0.11 (0.06)	0.08	-0.243 – 0.01

NYHA=New York Heart Association, LV=left ventricle, CABG=coronary artery bypass graft.

using summary scores, combining multiple QOL domains, as physical, psychological and social domains.<sup>7</sup> Others propose the use of global measurements, 'how would you describe your quality of life'.<sup>8</sup> The advantage of global measurements is that they capture the impact of specific aspects of treatment and disease that were not specifically identified in the assessment instrument. Also, they allow the patient to weigh the different domains according to their values, and are very easy in use. A limitation is, however, that when differences are observed in global QOL measurements, it is not always clear why these differences exist.<sup>9</sup>

The VAS of the EuroQOL can be used as a global QOL measurement. It is, however, important to know whether this VAS is in fact related to the cardiac or comorbidity variables of our patient population. The results of our univariate analysis show that patients with diabetes, vascular, renal and neurological pathology, a preoperative myocardial infarction and a moderate or poor left ventricular function have a lower VAS score, although this is not statistically significant. Also our patients aged  $\geq 75$  years have a lower, but not significantly lower, QOL than the younger patients. However, patient selection, thus only the 'good' old patients, is probably the reason for this result.

There is a significant difference between the scores of men and women on the VAS ( $p=0.00$ ); the negative impact of female gender on QOL registration has been described by several authors using several QOL measurements.<sup>10,11</sup> For patients undergoing valve surgery the VAS registration was just significantly lower ( $p=0.05$ ) versus patients undergoing isolated CABG. It is suggested that patients undergoing CABG have lower scores, probably as a result of more limitations due to anginal symptoms but others have shown that the initial disease (coronary or valve) did not influence the QOL scores.<sup>12</sup> For the different NYHA classes there is a significant difference in VAS registration ( $p=0.009$ ). It is known that anginal pain and fear of new attacks limit daily activities, and QOL and the relation between severity of angina and reduced QOL has been clearly confirmed.<sup>13,14</sup>

Our multifactor risk analysis (table 3) indicates that sex ( $p=0.000$ ), NYHA ( $p=0.002$ ), and CABG/valve ( $p=0.036$ ) have a significant correlation with VAS registration. What is surprising is that age in itself ( $p=0.08$ ) has no correlation with the registered VAS, but again this is probably related to the selection of older patients. The strong relation between gender and QOL has already been discussed and is only confirmed here. Despite the fact that in our univariate analysis there was only a trend to significance for valve surgery, our multivariate analysis identified valve surgery as having a significant correlation with the VAS. Probably the high percentage of women, 40% (207/518) in the valve group versus 19.8% (165/8333) in the isolated CABG group, is a reason for this correlation.

NYHA also has a significant association with the QOL. However the correlation is low ( $r=-0.09$ ). Also

Rumsfeld described this moderate impact of anginal class. Using the Short-Form 36 he distinguished a low correlation of the anginal class with the mental component summary and a low to moderate correlation with the physical component summary.<sup>15</sup> There is no doubt that angina affects QOL; however, QOL is much more than the translation of only physical and mental complaints due to angina.

## Conclusion

This study shows that in patients undergoing cardiac surgery there is a correlation between the registered VAS, patient gender, type of the operation and the NYHA class. The clinical consequence is that by using this simple VAS we can identify patients with a 'good' QOL. If these patients present for high-risk surgery with as primary indication a better quality of life, more extended counselling regarding their QOL is recommended. ■

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