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RELATIONSHIP BETWEEN MYOCARDIAL VIABILITY AND IMPROVEMENT IN LEFT VENTRICULAR FUNCTION AND HEART FAILURE SYMPTOMS AFTER CORONARY ARTERY BYPASS SURGERY

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A b s t r a c t: *Background:* The evaluation of myocardial viability is an important preoperative parameter, predictive of improvement in regional and global left ventricular (LV) function after coronary artery bypass surgery (CABG). However, whether the presence of viability is also associated with relief of heart failure symptoms after revascularization is not always certain. The aims of the study were to define the relationship between extent of viable myocardium and improvement in LV function after CABG and to determine whether preoperative viability testing can predict improvement in heart failure symptoms.

Methods: Eighty-five consecutive patients with ischemic cardiomyopathy (mean LVEF 35%) undergoing surgical revascularization were studied with a Tc-99m sestamibi one-day rest/nitrate enhanced myocardial perfusion SPECT imaging (MPI) to assess viability. Regional and global function were measured before and 16 ± 6 months after revascularization. We have used the Bull's eye quantitative analysis of MPI scans and 17 segment model of LV function and perfusion evaluation. Heart failure symptoms were graded according to the New York Heart Association (NYHA) criteria, before and 16 ± 6 months after revascularization.

Results: The number of viable segments per patient was directly related to the improvement in LVEF after revascularization (r 0.79, $P < 0.01$). Patients with > 4 viable segments representing 24% of the left ventricle yielded the sensitivity of 83% and specificity of 79% respectively for predicting improvement in LVEF. Furthermore, the presence of four or more viable segments predicted improvement in heart failure symptoms after revascularization, with positive and negative predictive values of 79% and 74%, respectively.

Conclusion: The presence of substantial viability (four or more viable segments, 24% of the left ventricle) on myocardial perfusion gated SPECT imaging in patients with ischemic heart failure before CABG surgery has significant correlation with the improvement in LVEF and heart failure symptoms postoperatively.

Key words: myocardial perfusion imaging; myocardial viability; heart failure.

Introduction

Treatment of patients with ischemic heart failure and severely depressed left ventricular (LV) function remains challenging. Revascularization may substantially improve heart failure symptoms and prognosis in carefully selected patients with ischemic LV dysfunction. Identification of a viable, jeopardized myocardium helps in selecting patients for whom poor left ventricular (LV) function, secondary to chronic ischemic heart disease, may improve after revascularization [1, 2]. Many studies, using various modalities, have focused on prediction of functional recovery, mainly regional, after revascularization [9–14]. In contrast, studies focusing on predicting improvement in global LV function (which may be more relevant in the clinical setting) are scarce [3–5, 8]. The available evidence suggests that improvement in LV ejection fraction (LVEF) can be expected only when a substantial amount of viable myocardium is present before revascularization. However, the exact relationship between improvement in LVEF and the amount of viable myocardium is unclear, as emphasized recently by Rahimtoola [15]. Bonow [16] recently suggested that, besides improvement in LVEF after revascularization, improvement in heart failure symptoms should be used to assess the clinical benefit of revascularization.

Thus far, mainly patients with relatively preserved LV function presenting with angina pectoris instead of heart failure symptoms have been studied. Hence, we studied a group of patients with severely depressed LV function (mean LVEF 35%) who presented mainly with heart failure symptoms, and we evaluated the relationship between the preoperative extent of viable myocardium and the postoperative improvement in LVEF and improvement in heart failure symptoms. The technique used to evaluate myocardial viability was nitrate – enhanced myocardial perfusion Gated SPECT imaging (MPI).

Materials and Methods

Study Population

Eighty-five consecutive patients with coronary artery disease and ischemic cardiomyopathy (73 men, 12 women; age range 56 ± 15 years; LVEF 38 ± 7%), scheduled for surgical revascularization were enrolled in this prospective clinical study. Clinical characteristics of the patients are shown in table 1. The reasons for revascularization were heart failure symptoms in 55 patients and angina pectoris in 30 patients, all with angiographic indications for coronary artery bypass surgery according to the ACC/AHA coronary artery bypass surgery guidelines. All patients underwent myocardial perfusion Gated SPECT imaging (MPI) for evaluation of myocardial viability before coronary artery bypass surgery (CABG). The decision in favour of revascularization was made independently of the SPECT data. Sixty-two patients had a previous myocardial infarction. All patients had significant coronary artery disease on angiography (> 50% reduction in luminal diameter of at least one major epicardial coronary artery). They had an average of 2.6 stenosed vessels. The patients' clinical characteristics are shown in table 1. *Exclusion criteria* for the study were unstable angina, acute myocardial infarction in the last two months, severe valvular heart disease, primary dilated cardiomyopathy, LVEF > 45%, previous bypass surgery and decompensated heart failure.

Study Protocol

All patients underwent coronary angiography before MPI. Coronary stenosis equal to or greater than 70% of luminal diameter was considered significant. Left main coronary artery disease was reported in the presence of stenosis equal to or greater than 50% of the luminal diameter. Gensini angiographic score was calculated for all patients. Angiographic results were reported according to proper standards, by an experienced invasive cardiologist. Patients were followed up prospectively for improvement of LV function and heart failure symptoms after CABG.

Myocardial perfusion SPECT imaging

Primary indication for the MPI was evaluation of myocardial viability before CABG. Fifty-five patients underwent a one-day rest-nitrate enhanced gated SPECT Tc-99m-Sestamibi protocol with 370/925 MBq, after sublingual application of 0.5 mg nitro-glycerin (NTG) and fifty patients underwent one day nitrate/dipyridamole MPI study. Haemodynamic response to the nitrate was monitored in all patients. Image acquisition was performed 60 minutes after injection of Tc-99m-Sestamibi using a single-headed Sopha Medical Vision DS7 SPECT gamma camera. For quantitative analysis of myocardial perfusion, a commercial programme for Bull's eye analysis was used. The MultiDim program was included in the software of the gamma camera for assessment of left ventricular function. MPI studies were read by consensus.

Analysis of Regional Function before and after Revascularization.

Image interpretation was done using a 17-segment model and 5-point scoring system to assess perfusion (0 – normal perfusion; 1 – mild hypoperfusion; 2 – moderate; 3 – severe hypoperfusion and 4 – absent uptake). A segment was predetermined to be viable if the perfusion segment score was < 2 and wall thickening was present. Both wall motion and wall thickening were analyzed. A 5-point scoring system was used to assess wall motion: 0 – normal, 1 – mild hypokinesia, 2 – moderate hypokinesia, 3 – severe hypokinesia, 4 – akinesia and 5 – dyskinesia. A segment was predetermined to be viable by function if the segment score was < 2 (2 – normal perfusion, 1 – moderate-severe hypoperfusion; 0 – absent uptake). A viability index (VI) was calculated as value of the Tc-99m-Sestamibi uptake in each segment, divided by the total number of segments evaluated. A viability index > 0.9 was considered as an indication of a significant degree of viable myocardium. The following criteria for myocardial viability were used: 1. Tc-99m-Sestamibi resting uptake > 50%; 2. nitrate-induced uptake increase > 10% and nitrate activity > 65%, with resting wall motion abnormality (scores 2–4). The segment targets for revascularization were judged either completely viable, partially or totally scarred. Improvement in wall motion by one grade or more was considered the gold standard for viability (on a regional basis). Improvement from dyskinesia to akinesia was not considered an improvement in function. Summed nitrate score (SNS), summed rest score (SRS) and summed different score (SDS) were calculated. MPI study with the same protocols and analyses were done 16 ± 6 months after CABG.

Analysis of Global Function Before and After Revascularization

Left ventricular ejection fraction (LVEF) before and 16 ± 6 months after revascularization was assessed with Tc-99m-Sestamibi myocardial Gated-SPECT. Improvement in global function after revascularization was defined as an increase of at least 5% in LVEF. This cut-off criterion had been used previously (*4*). Thus, the gold standard for viability on a global basis (patient basis) was considered an improvement of at least 5% in LVEF after revascularization.

Assessment of Symptoms before and after Revascularization

Functional status was assessed according to the New York Heart Association (NYHA) criteria (for symptoms of heart failure) and according to the Canadian Cardiovascular Society (CCS) classification (for angina pectoris). For each patient, the functional status before and 16 ± 6 months after revascularization was determined by interviews and physical examinations.

Statistical Analysis

A SPSS 12 packet for statistical analysis was used. Data are expressed as mean ± SD. Group comparisons were performed using *t* tests for continuous, normally distributed data. P value < 0.05 was considered statistically significant. The correlation between the number of dysfunctional and viable (or nonviable) segments and the change in LVEF after revascularization was determined by Pearson's correlation test. The optimal number of segments was defined as that providing the maximal sum of sensitivity and specificity.

Results

Functional Outcome and Relationship with SPECT Segments

Of the 1445 segments analyzed by MPI gated SPECT, 567 had normal wall motion and 878 had abnormal wall motion before revascularization. Of the 878 dysfunctional segments, 658 were hypokinetic and 181 were akinetic and 39 dyskinetic. The mean number of hypokinetic segments per patient was 7.6 and akinetic segments 2.1 per patient. Eighty-five dysfunctional segments had normal perfusion, whereas 261 segments had a perfusion defect. According to the viability criteria for SPECT, 282 segments (25%) were viable before CABG and 344 segments non-viable (23%). Of the 878 dysfunctional segments, 278 (31%) improved in function after revascularization, 457 (52%) remained unchanged, and 52 (6%) deteriorated. There was no significant difference in the number of dysfunctional segments and LVEF before CABG in patients with > 4 viable segments (24% of myocardial mass) and patients <4 viable myocardial segments. However, we found more significant improvement in regional and global LV function after CABG in patients with more viable segments (> 4 segments), that linearly correlated with increase of the LVEF (r 0.78, p < 0.01). A significant relationship existed between the number of viable segments on SPECT and the magnitude of improvement in LVEF after revascularization (Fig. 2), suggesting that the extent of viability determined the magnitude of improvement in LVEF after revascularization. In addition, a weak inverse relationship existed between the number of non-viable segments and the magnitude of improvement in LVEF (r 0.45, p 0.05). The distribution of myocardial perfusion patterns is shown in figure 1.

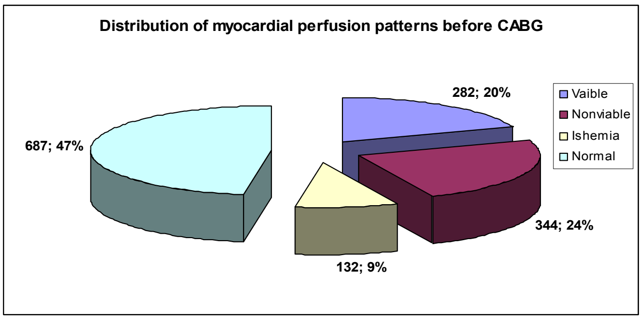
Patients. Fifty-six patients (65%) showed significant improvement in LVEF (>5%) after revascularization. Clinical characteristics of the patients are shown in table 1. Characteristics of the patients who did and did not improve their LV function after revascularization are shown in table 2. Significant differences between the two groups were noted for the number of viable segments on SPECT, the number of non-viable segments on SPECT, the degree of left ventricular remodelling, history of angina and Q-wave myocardial infarctions. A significant increase in LVEF was found in 35 patients with > 4 viable segments (71%) vs. 17 patients (47%) with < 4 viable segments before CABG (p < 0.001). Patients with > 4 viable segments had average summed rest scores

Table 1 – Табела 1

Clinical characteristics of the patients
Клинички карактеристики на рациентите

Variables	**Values**
Age	56 ± 15 (40–70)
Gender	73 male
	12 female
BMI (kg/m^2)	26 (22–34)
Obesity	40 (47%)
DM	34 (40%)
HTA	55 (64%)
HLP	47 (55%)
Smoking	39 (46%)
PAD	16 (18%)
Fam anamn	44 (51%)
CVI	5 (5%)
COPD	5 (5%)
HBI	0
IM	62 (72%)
AP	67 (78%)
CCS	2.4 ± 0.3
NYHA	2.2 ± 0.2
EF (%)	35 ± 10
SVD	8 (9%)
DVD	21 (24%)
TVD	56 (65%)

BMI – body mass index; DM – diabetes mellitus; HTA – Hypertension; HLP – hyperlipidemia; PAD – peripheral arterial disease; CVI – cerebrovascular event; COPD – chronic obstuctive pulmonary disease; IM – myocardial infarction; SVD – single vessel disease; DVD – double vessel disease; TVD – triple vessel disease



CABG – coronary artery bypass surgery

Figure 1 – Distribution of myocardial perfusion patterns before coronary artery bypass surgery

Слика 1 – Дистрибуција на тировите на миокардните рерфузиони наоди рред аорто коронарната бајрас реваскуларизација

(SRS) before CABG 30.3 vs. SRS 42 in patients with < 4 viable segments (p < 0.001). Improved inotropic reserve after CABG, shown by an increase in LVEF on dypiridamole or NTG application, was found in 61% of patients with >4 viable segments and in 47% in patients with < 4 viable segments. Inotropic reserve after CABG decrease in 18 patients (48%) with < 4 viable segments vs. 14 pts (29%) with > 4 viable segments. There was no improvement or even deterioration in global LV function in patients with absent viable segments and large non-viable myocardial regions before CABG. There was no improvement in wall motion index in patients with revascularized non-viable segments. The wall motion index (WMI) was higher in patients with < 4 viable myocardial segments (WMI 1.69 vs. 1.93; p < 0.05).

Table 2 – Табела 2

Clinical data before CABG in patients with and without improvement in left ventricular ejection fraction

Клинички карактеристики рред аорто коронарна бајрас реваскуларизација кај рациентите со и без родобрување на лево коморната ежекциона фракција

	EF > 5% increase after CABG n=56 (65%)	**EF < 5% increase after CABG n = 23 (27%)**	**p value**
Age	56 ± 15	57 ± 13	NS
Gender	m-48 f- 8	m-20 f-3	NS
IM	41 (73%)	20 (86%)	< 0.05
AP	50 (87%)	13 (55%)	< 0.01
CCS	2,5 ± 0,3	2,7 ± 0.3	NS
NYHA	2,4 ± 0.5	2,5 ± 0,4	NS
Gensini	94,2 ± 5	96,3 ± 4	NS
EF	36%	33%	NS
VS	5/pt 289segm (30%)	3,8/pt 89segm (22%)	< 0.01
VI	1,35	1	< 0.01
NVS	2,5/pt 147segm (15%)	7/pt 161segm (41%)	< 0.0001
ESV (ml)	145 ± 5	180 ± 7	< 0.001
EDV (ml)	242 ± 6	335 ± 4	< 0.001

Prediction of Improvement in LVEF after Revascularization

Sensitivity and specificity of MPI (perfusion and function) for the prediction of improvement of LVEF after CABG was 83% and 79% respectively, a positive predictive value (PPV) of 88% and a negative predictive value (NPV) of 75%, which is shown in table 3. Accordingly, patients were divided into two groups with a similar baseline LVEF. Group 1 consisted of 49 patients with more than 4 viable segments before revascularization (mean 4.8 per patient). Group 2 consisted of 36 patients with minimal or no evidence of viability (less than four viable segments; mean 1.27 per patient). Figure 3 shows the individual changes in LVEF of the patients in the different groups. The largest increase in LVEF was observed in group 1 (from 34% to 47% $p < 0.001$); 35 (71%) of 49 patients from group 1 showed a significant increase in LVEF (mean increase, 11%). Patients in group 2 showed a modest improvement in LVEF (from 36% to 40%, *p 0.04*); 17 (57%) of 36 patients showed a significant improvement in LVEF (mean increase 8.5%, $p < 0.01$), mainly in patients with three viable segments. LVEF decrease in 8 patients (22%) in this group (from 32% to 25% $p < 0.001$). he correlation between the number of viable segments and improvement of LVEF is shown in figure 2.

Table 3 – Табела 3

Accuracy of Myocardial perfusion SPECT in assessing improvement in global LV function

Точност на миокардната рерфузиона томосцинтиграфија во рроцена на родобрувањето на глобалната лево коморна функсија

Index	Global LV function (patients)
Sensitivity	83% (40/48)
Specificity	79% (24/29)
Positive predictive value	88% (40/45)
Negative predictive value	75% (24/32)

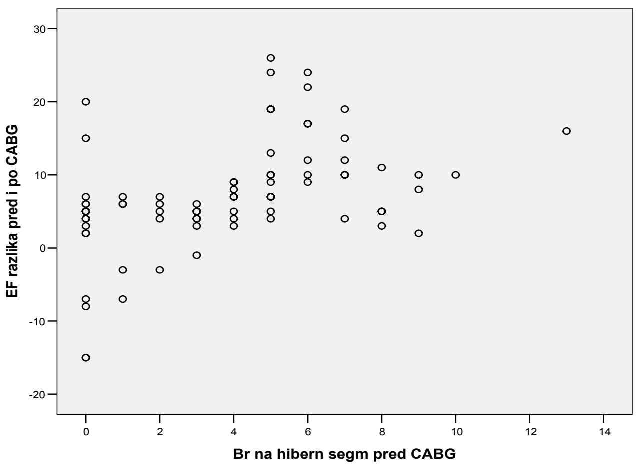


Figure 2 – Correlation between the number of viable segments and changes in left ventricular ejection fraction after revascularization (r = 0.79, p < 0.001)

Слика 2 – Корелација ромеѓу бројот на вијабилни сегменти и рромените на лево коморната ежекциона фракција ро реваскуларизација (r = 0.79, p < 0.001)

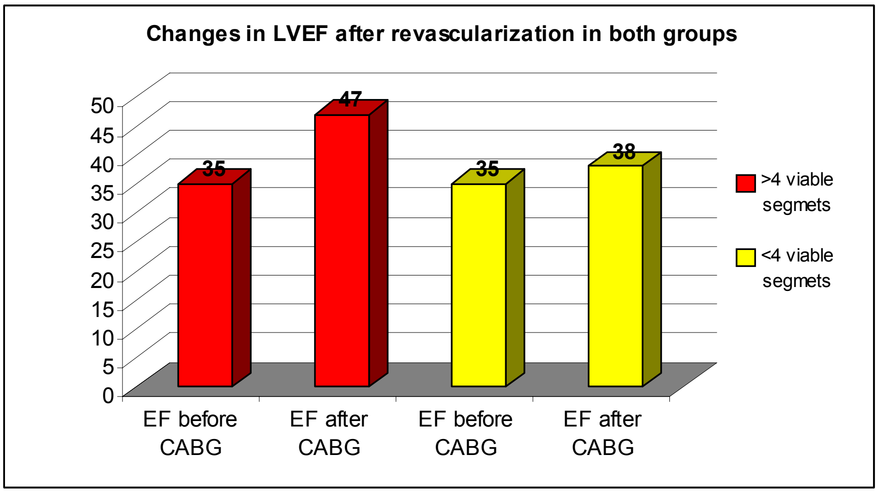


Figure 3 – Changes in left ventricular ejection fraction in both groups of patients after revascularization
Слика 3 – Промени во лево коморнаta ежекциона фракција кај двеte групи рациенtи ро реваскуларизацијаta

Improvement in Symptoms versus Viability

Angina Pectoris. Sixty-0seven patients (78%) presented with primarily angina pectoris. Thirty-eight of them (45%) had four or more viable segments on SPECT and in all 35 patients (92%) the CCS score improved by one or more grades. The mean CCS score decreased from 2.6 to 1.2 ($p < 0.01$) after revascularization.

Heart Failure Symptoms. Sixty-nine patients (81%) presented with primarily heart failure symptoms; 7 were in class 3. The patients were again divided into two groups, with a comparable NYHA score before revascularization (2.4 [group 1], 2.5 [group 2], p NS). Group 1 consisted of 49 patients with more than 4 viable segments. Group 2 consisted of 36 patients with less that 4 viable segments or no evidence of viability before revascularization. Table 4 shows the individual changes in the NYHA score of the patients in the two groups. The larger improvement in NYHA score was observed in group 1 (from 2.4 to 1.5, $p < 0.001$) in 42 patients (85%). A total of 58 (70%) of 85 patients included in the study showed an improvement in NYHA classification. No increase in NYHA score was observed in patients without viable myocardium before CABG. Still, 8 (22%) of 36 patients showed a significant improvement in NYHA classification. Twenty-five patients (71%) from the group with less than 4 viable segments had no improvement in NYHA functional class. Importantly, the mean changes in NYHA classification were significantly different between the two groups ($p < 0.05$). With four or more viable segments on SPECT imaging considered predictive of improvement in heart failure symptoms, we found a positive predictive value of 79% and a negative predictive value of 74%.

Table 4 – Табела 4

Relationship between viability and improvement in NYHA score after revascularization

Однос ромеѓу миокардниот вијабилитет и NYHA скорот ро реваскуларизацијата

No. of viable segments	**Improvement in NYHA score**	**No improvement in NYHA score**
> 4	42 (85%)	4 (8%)
< 4	8 (22%)	25 (71%)
x^2 6.92, $p < 0.01$		

Relationship to Improvement in Heart Failure.

Symptoms and Improvement in LVEF

Of the 44 patients with an improvement in LVEF, 30 presented with heart failure symptoms, and 22 (74%) of them improved their NYHA class by one grade or more. Their mean grade improved from NYHA class II to NYHA class one ($p < 0.01$). In contrast, of the 26 patients without an improvement in LVEF, 22 (85%) presented with heart failure symptoms, and only 8 (31%) of these 26 improved their NYHA score.

Discussion

The detection of viable myocardium has become of great clinical importance, due to the major prognostic role and therapeutic implications of myocardial viability [1]. Clinically it is very important to perform proper preoperative patient selection, aimed at achieving postoperative benefits, left ventricular functional and clinical improvements [2, 3]. The functional assessment of hibernation myocardium and the presence of viability are clinically challenging and have paramount importance for the selection of the most appropriate individual treatment for patients with chronic severe LV dysfunction [4]. Hibernated myocardium needs to be revascularized soon after its evaluation, and it needs time to recover. It is estimated that there is a need of 25% of viable jeopardized myocardium before revascularization in order to achieve post-revascularization left ventricular functional recovery. The need for viability studies is growing because of the increasing number of patients presenting with symptoms of heart failure. Our study results are in close concordance with the literature data in this field, showing that patients with more that four viable segments before revascularization show the greatest improvements of LV functional recovery.

There are many studies in the literature dealing with myocardial viability assessment and postoperative recovery of LV function as well us follow up of the cardiac events [5]. The Allman's meta-analysis showed that in patients with predominant viability revascularization was associated with 80% reduction in the annual mortality rate [6]. The decision to revascularize must balance the risk of myocardial damage and the benefit of revascularizing hibernated segments [7, 8]. Although now we have the opportunity to detect viable myocardium with reasonable accuracy, controlled studies of the effects of revascularization of patients with viable myocardium are still a clinical challenge and are quite rare.

Prediction of improvement in regional function after revascularization has been shown previously [9–14]. Most previous studies, however, included patients with a relatively preserved LV function and did not systematically study patients who had severely depressed LVEF and presented with heart failure symptoms [11, 17]. In this study, focusing on the patient's severe LV function and heart failure symptoms, we showed a high sensitivity (83%) and specificity (79%) for predicting improvement in global LV function after revascularization. These results are in line with the literature on MPI SPECT [17]. Clinically, prediction of improvement in global LV function is very important issue.

Our results showed that three features were predictive of improvement in LVEF: the number of viable segments on SPECT, the number of non-viable segments on SPECT, and the history of a Q-wave myocardial infarction. Our finding underscores that a substantial amount of viable myocardium (24% of the left ventricle) needs to be present to result in improvement in LVEF and hence to justify a revascularization procedure in patients with a relatively high risk of procedural or periprocedural complications (*19*). The results agree with the work of Bax *et al.* on a different patient population (with comparable baseline characteristics) using dobutamine echocardiography (*20*). Accurate identification of patients whose LVEF can improve also has important prognostic consequences, because LVEF is directly related to long-term prognosis [21]. However, it is important to bear in mind that on clinical grounds things are not always simple. Myocardial viability is only one, but a very important, factor affecting recovery of LV function after coronary bypass surgery. The amount of non-viable tissue, degree of LV remodelling and LV volumes also have an influence on functional recovery.

In this study, improvement in heart failure symptoms was observed not only in patients in whom LVEF improved, although those patients were a smaller percentage. This observation suggests that an improvement in LVEF by 5% or more is clinically relevant, because alleviation of heart failure symptoms may result. Moreover, this study showed that the presence of substantial viability was highly predictive of improvement in heart failure symptoms after revascularization: patients with a small extent of viable tissue on SPECT exhibited no improvement or insignificant improvements in heart failure symptoms, whereas patients with an intermediate and a large extent showed a significant improvement. These data are in line with previous findings [22, 23]. Eitzman *et al.* [22], in a retrospective analysis, showed that heart failure symptoms did improve in patients for whom FDG PET showed viability and who underwent revascularization. In addition, Di Carli *et al.* [23] found, similarly to us, that the magnitude of improvement in heart failure symptoms after revascularization was related to the preoperative extent of viability (assessed by FDG PET).

Limitations

Several limitations of this study need to be addressed. First, no control angiography was performed after revascularization. Therefore, vessel or graft patency remains uncertain. Second, overestimation of myocardial viability by perfusion scintigraphy could not be excluded. It relates to several factors: first, scintigraphy may detect islands of vital myocardial cells of inadequate size to reveal left ventricular dysfunction despite successful revascularization, or second, functional recovery sometimes takes a longer time if the degree of structural myocardial changes is very advanced. Observers were not blind to the angiographic and myocardial perfusion results. But there was not any inter-observer disagreement with regard to perfusion image interpretation and between the cath lab operator and the supervisor of the lab. Third, long-term prognosis was not addressed in this study. It will be of interest to evaluate the long-term outcome of the patients with viable myocardium who did not improve in LVEF or heart failure symptoms.

Conclusions

The most important findings of this study can be summarized as follows. First, the magnitude of improvement in LVEF is directly related to the extent of dysfunctional but viable tissue. Second, using the cut -ff value of four dysfunctional but viable segments, an accurate prediction of improvement in LVEF after revascularization is possible. Third, the presence and extent of viability is significantly related to the improvement in heart failure symptoms after revascularization. The number of viable segments per patient was directly related to the improvement in LVEF after revascularization (r 0.79, $p < 0.01$). Furthermore, the presence of at least four viable segments predicted improvement in heart failure symptoms after revascularization, with positive and negative predictive values of 88% and 75%, respectively.

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Резиме

КОРЕЛАЦИЈА ПОМЕЃУ МИОКАРДНИОТ ВИЈАБИЛИТЕТ И ПОДОБРУВАЊЕТО НА ЛЕВО КОМОРНАТА ФУНКЦИЈА И СИМПТОМИТЕ НА СРЦЕВА СЛАБОСТ ПО АОРТОКОРОНАРНА БАЈПАС РЕВАСКУЛАРИЗАЦИЈА

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Цели: Евалуацијата на миокардниот вијабилитет е важен параметар во предоперативната процена и предикцијата на подобрувањето на регионалната и глобална лево коморна (ЛК) функција по аорто коронарна бајпас реваскуларизација (ЦАБГ). Не е секогаш сигурно дали присуството на вијабилно миокардно ткиво е асоцирано и со подобрување на симптомите на срцева слабост по реваскуларизацијата. Целта на студијата е корелација помеѓу екстензитетот на вијабилниот миокард и подобрувањето на ЛК функција по ЦАБГ како и процена дали предоперативната детекција на миокарден вијабилитет може да го предвиди подобрувањето на симптомите на срцевата слабост.

Материјал и методи: Иследени се 85 пациенти со исхемична срцева слабост (средна лево коморна ежекциона фракција – ЛВЕФ-35%) кај кои е индицирана аортокоронарна бајпас реваскуларизација. Кај сите пациенти изведена е еднодневна студија на миокардна перфузиона томосцинтиграфија (МПС) со помош на Tc-99m сестамиби gated SPECT (протокол во мирување и по апликација на нитроглицерин) за процена на миокарден вијабилитет. Регионалната и глобална лево коморна функција е проценувана пред и 16 ± 6 месеци по реваскуларизацијата. Користена е Bull's квантитативна анализа на миокардните перфузиони скенови и 17 сегментен модел на евалуација на лево коморната функција. Симптомите на срцева слабост се проценувани преку класификацијата на Њујоршката срцева асоцијација (NYHA) пред и 16 ± 6 месеци по аорто коронарната бајпас реваскуларизација.

Резултати: Бројот на вијабилни сегменти на еден пациент директно корелираше со подобрувањето на ЛВЕФ по реваскуларизацијата (r 0.79, p < 0.01). Пациентите со повеќе од 4 вијабилни сегменти, што претставува 24% од миокардот на левата комора, имаа сензитивност од 83% и специфичност од 79% за предикција на подобрување на ЛВЕФ. Присуството на повеќе од 4 вијабилни сегменти беше поврзано со предикција на подобрување на симптомите на срцева слабост по реваскуларизацијата, и тоа со позитивна предиктивна вредност од 79% и негативна предиктивна вредност од 74%.

Заклучок: Присуството на повеќе од четири вијабилни сегменти (над 24% од миокардот на левата комора) проценети со миокардна перфузиона томосцинтиграфија SPECT кај пациенти со исхемична срцева слабост пред аорто коронарна бајпас реваскуларизација сигнификантно корелира со постоперативно подобрување на лево коморната функција и симптомите на срцева слабост.

Клучни зборови: миокардна перфузиона томосцинтиграфија, миокарден вијабилитет, срцева слабост.

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