ORIGINAL ARTICLE

doi: 10.5455/medarh.2014.68.332-334

Published online: 15/10/2014
Published print: 10/2014

Med Arh. 2014 Oct; 68(5): 332-334
Received: July 30th 2014 | Accepted: September 15th 2014
© AVICENA 2014

Improvement of Ejection Fraction After Coronary Artery Bypass Grafting Surgery in Patients with Impaired Left Ventricular Function

Ilirijana Haxhibeqiri-Karabdic[1], Aida Hasanovic[2], Emir Kabil[3], Slavenka Straus[1]

Heart Center, Clinical Center of Sarajevo University, Sarajevo, Bosnia and Herzegovina[1]
Department of Anatomy, Faculty of medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina[2]
Heart Center, University Clinical Center Tuzla, Tuzla, Bosnia and Herzegovina[3]

Corresponding author: Ilirijana Haxhibeqiri-Karabdic, MD, PhD. Heart Center, Clinical Center of Sarajevo University, Sarajevo, Bosnia and Herzegovina. Phone:+ 387 61 156 956. E-mail: ilirijanahk@yahoo.com

ABSTRACT

Objectives: The present study evaluates our experience with aorto-coronary bypass grafting in patients with severe dysfunction of left ventricle (LV) and low ejection fraction-EF(<35%) . Revascularization of myocardium in this settings remains contraversial because of concerns over morbidity , mortality and quality of life. **Material and Methodes** : Forty patients with severe coronary artery disease and dysfunction of LV (low ejection fraction <35%) underwent coronary artery bypass grafting in period of 3 years. Preoperative diagnostic of 40 patients was consisted of anamnesis, clinical exam, non-invasive methods EHO, MR and invasive diagnostic methods- cateterization. The major indication for surgery was severe anginal pain, heart failure symptoms and low ejection fraction. Internal mammary artery was used in all operated patients . **Results:** Average age of patients who have been operated was 59,8. In the present study, 81,3% were male and 18,8% female. We found one-vessel disease present in 2,5% (1/40) of patients, two -vessel disease in 40% (16/40), three-vessel disease in 42,5% (17/40) and four -vessel disease in 15% (6/40) of patients. One bypass grafting we implanted in 2,5% patients, two bypasses in 42,5% , three bypasses in 45 5%, and four bypasses in 10% of patients. Left ventricular ejection fraction assessed preoperativly was 18%-27% and postoperatively was improved to 31, 08% in period of 30 days. **Conclusion**: In patients with left ventricular dysfunction, coronary artery bypass grafting can be performed safely with improvement in quality of life and in left ventricular ejection fraction.
Key words: disfunction of LV; low ejection fraction, coronary artery bypass-grafting.

1. INTRODUCTION

Traditionally impaired ventricular function has been a risk factor for mortality associated with coronary artery bypass grafting (1). Left ventricular function is important predictor of hospital mortality following coronary artery bypass grafting. Despite improvement in surgical technique, myocardial protection and postoperative care, surgical risk remains high (2, 3, 4). Many studies show that patients have better quality of life and ejection fraction after coronary surgery than with continuous medical therapy (5, 6, 7, 8). Patients with coronary artery disease and poor left ventricular function have a poor outlook despite maximum medical therapy with a two year survival rate of only 20-30% (9). Numerous controlled trials of coronary artery bypass grafting in patients with depressed left ventricular ejection fraction, have shown that these are the patients that benefit most from revascularization, especially if symptoms of angina or ischemia are present (10). This benefit is not only for symptoms, but in this selected patient group also on longevity. It is important to determine first if any condition exist that may preclude intervention or that could raise the risk of revascularization above any potential benefit (11). This study evaluates short-term results after aortocoronary bypass grafting in patients with ejection fraction lower than 35%.

2. MATERIALS AND METHODS

During the years 2010 - 2013, 40 patients whose preoperative ejection fraction EF was less than or equal to 35% (18%-27%) underwent aortocoronary bypass grafting. Preoperative and postoperative estimate of ejection fraction of all patients was performed. Research is performed based by medical evidence and observation of patients in intensive care of Heart Center of Clinical Center University of Sarajevo. Transthoracal or transesophagal ehocardioFigurey was applied in all of 40 patients. Diagnosis of w ischemic disease was set by ultrasound overview. Most of the patients (30) were refered in hospital with done catheterization, and 10 of them are admitted as urgent cases and catheterization was done in admission. Heart scinti-

Figurey was performed in 27 patients, which was essential to show myocardial viability. Operative technique of surgery revascularization included sternotomy, the use of a. thoracica interna, venous grafts and extracorporal circulation (ECC). Evaluation of patients was one month after aortocoronary bypass grafting. Statistical analysis of the results was performed using x2 test. For comparison of variables was used parametric test (Student's test). When the distribution of continuous variables was unsymmetrical, for showing average value and a measures of dispersion were used median and interquantile range, and for their comparison nonparametric tests (Mann - Whitney test). For the statistical analysis of obtained data was used statistical package IBM statistics SPPS v 19.0.

3. RESULTS

Results of our research are presented on tables and Figureics. Mean age of patients who have been operated was 59,8+7,7. In the present study, 81,3% of our 40 patients were male and 18,8% female. In our study we found one-vessel disease present in 2,5% (1/40) of patients, two-vessel disease in 40% (16/40), three-vessel disease in 42,5% (17/40) and four-vessel disease in 15% (6/40) of patients (Figure 1). Preoperative clinical data included in this group of patients were: examined patients mostly belonged to New York Heart Association-NYHA III 65% or (26/40), NYHAIII/IV were 17,5% or (7/40), and to NYHA IV belonged 10% or (4/40) (Table 1).

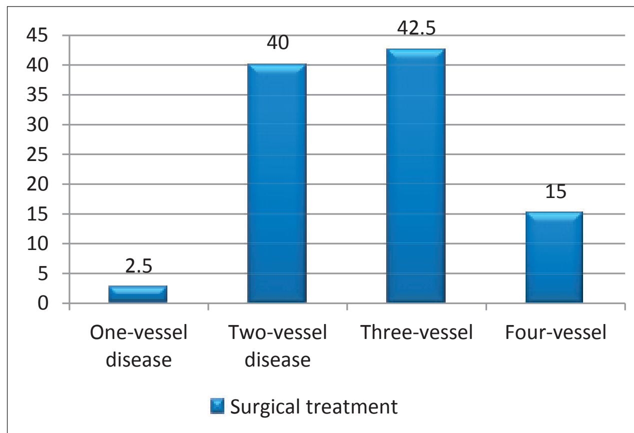

Figure 1. Number of vessel disease present in patients preoperatively

NYHA * Group			Surgical treatment
NYHA	II	N	3
		%	7,5
	III	N	26
		%	65,0
	III/IV	N	7
		%	17,5
	IV	N	4
		%	10,0
Total		N	40
		%	100,0

Table 1. NYHA classification

The number of implanted bypasses in operated patients was: one bypass in 2,5% (1/40), 2 bypasses in 42,5% (17/40) , 3 bypasses in 45% (18/40), and 4 bypasses in 10% (4/40) of patients (Figure 2).

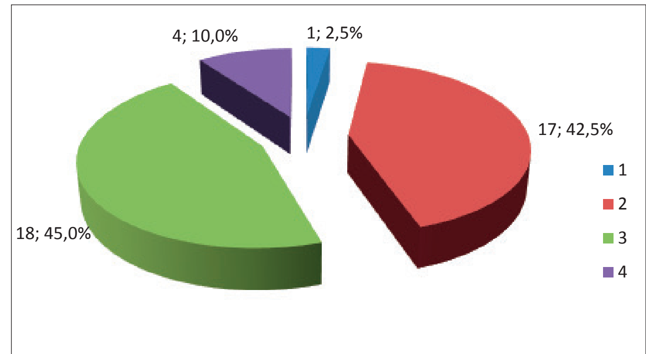

Figure 2. Coronary arteries bypass grafting in operated patients

Anginal pain was present in 22 patients preoperatively. Mostly of the patients had before myocardial infarction and the pain was mostly present at rest and during minimalphysicalactivity.After ao rtocortonary bypasses in a 55% patients (22/40) anginal pain dissapeared (Figure 3).

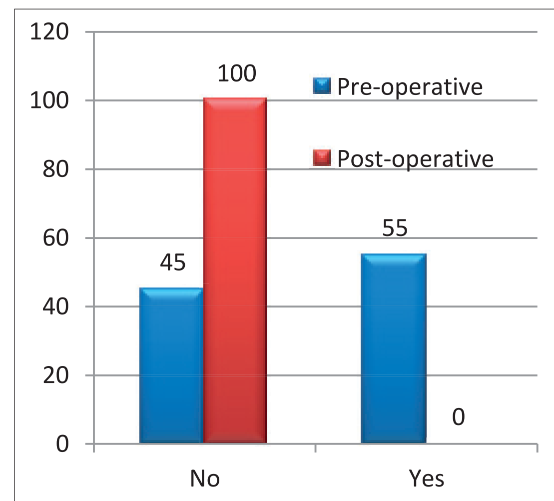

Figure 3. Preoperative and postoperative angina pectoris

Heart failure symptoms were present preoperatively in 42,5% (17/40). In this group of we had patients with COBP (chronical pulmonary disease). After aortocoronary bypass grafting heart failure symptoms were present

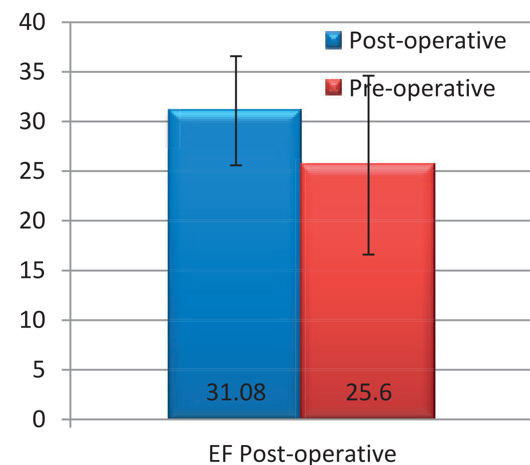

Figure 4. Ejection fraction pre and postoperatively.

in only 5% (2/40). Ejection fraction preoparatively was in range from 18%- 27%, and average value was 25%. After the aortocoronary bypass grafting ejection fraction increased from 25,6±5,2 to 31,08±5,5 postoperatively. This was evaluated 30 days after operation (Figure 4).

4. DISCUSSION

Selection of patients with ischemic heart disease who will benefit from coronary revascularization often is problematic. Some authors correctly note that coronary artery bypass grafting (CABG) carries increased risk in this patient group. Indeed, several authors have suggested that recruitable contractile reserve is an important determinant of improvement after CABG in ischemic heart disease patients who undergo surgery (primary for heart failure) (11, 12, 13). Patients without such reserve are less likely to benefit simptomatically from CABG whereas those with reserve are. Further, studies have shown that ischemic heart disease patient with a low left ventricle EF who undergo surgery primarily for angina are more likely to obtain symptomatic benefitthan are those who undergo surgery primarily for heart failure (14, 15, 16, 17). Mickleborough LL et al. (2000) reported no difference in longtime survival between patients who underwent surgery primarily for angina and patients who underwent surgery for heart failure (18). Although one can define a subset of ischemic cardiomyopathy patients who are likely to have an increase in left ventricle EF with CABG, this information often has not proven useful in predicting improvement in functional class. Moreover, improvement in mortality after revascularization of viable myocardium may have little to do with change in either ejection fraction or functional class. Instead, improvement may be result of other factors, such as electric stabilization or reduction of ischemic events (19, 20). Indeed, existing data from observational studies indicate no difference in survival after CABG between patients with left ventricle EF improvement and patients without, again suggesting that changes in contractile function may not be the most helpful surrogate endpoint (21). The most important findings of this study can be summarized as follows. First, the magnitude of improvement in left ventricle EF is directly related to the extent of dysfunctional but viable issue. Second, the presence and extent of viability is predictive of the improvement in heart failure symptoms after revascularization.

5. CONCLUSION

The present study shows a significant improvement in both angina and heart failure status, not only objectively but also large enough to be of clinical revelance. Patients with angina as the main symptom were significantly more likely to improve their left ventricular ejection fraction after surgery. These findings are consistent with the concept that the preoperative angina predicts a good result, but its absence is not necessarily associated with a poor result. Ischemic dysfunction may be reversible or not, the degree of reversibility probably determining which patients will respond favourably to CABG. Potentially reversible dysfunction should be assessed when considering CABG for patients with poor left ventricular function (ischemic or hibernating myocardium).

CONFLICT OF INTEREST: NONE DECLARED.

REFERENCES

1. Ascione R, Narayan P, Rogers CA, et al. Early and mid term out come in patients with severe left ventricular dysfunction undergoing coronary artery surgery. Ann Thorac Surg. 2003; 76: 793-799.
2. Scott SM, Deupree RH, Sharma GV. A study of unstable angina: 10 year study shows duration of surgical advantage for patients with impaired ejection fraction. Circulation. 1994; 90(Suppl 2): 102-103.
3. Lam CS, Donal E, Kraigher-Krainer E, Vasan RS. Epidemiology and clinical course of heart failure with preserved ejection fraction. Eur J Heart Fail. 2011; 13: 18-28.
4. Attaran S, Shaw M, Bond L, Pullan MD, Fabri BM. Does off-pump coronary artery revascularization improve the long term survival in patients with ventricular dysfunction? Interact CardioVasc Thorac Surg. 2010; 11: 442-446.
5. Pocock SJ, Henderson RA, Clayton T, et al. Quality of life after coronary angioplasty or continued medical treatment for angina: three-year follow-up in the RITA-2 trial. Randomized Intervention Treatment of Angina. J Am Coll Cardiol. 2000; 35: 907-909.
6. Borlaug BA, Paulus WJ. Heart failure with preserved ejection fraction: pathophysiology, diagnosis and treatment. Eur Heart J. 2011; 32: 670-679.
7. Paterson DI, O'Meara E, Chow BJ, Ukkonen H, Beanlands RS. Recent advances in cardiac imaging for patients with heart failure. Curr Opin Cardiol. 2011; 26: 132-143.
8. Carney RM, Freedland KE. Depression and coronary heart disease: more pieces of the puzzle. Am J Psychiatry. 2007; 164: 1307-1309.
9. De Rose JJ, Toumpoulis IK, Balaram SK. Preoperative prediction of long term survival after coronary artery bypass grafting in patients with low left ventricular ejection fraction. J Thorac Surg. 2005; 129: 314-321.
10. Kunadian V, Zaman A, Qiu W. Revascularization among patients with severe left ventricular dysfunction: a meta-analysis of observational studies. Eur J Heart Fail. 2011; 13: 773-784.
11. Detre KM, Lombardero MS, Brooks MM, et al. The effect of previous coronary-artery bypass surgery on the prognosis of patients with diabetes who have acute myocardial infarction: Bypass Angioplasty Revascularization Investigation investigators. N Engl J Med. 2000; 342: 989-997.
12. Shah AM, Mann DL. In search of new therapeutic targets and strategies heart failure: recent advances in basic science. Lancet. 2011; 378: 704-712.
13. Eales CJ, Noakes TD, Stewart AV, Becker P. Predictors of the succesful outcome of one year survivors of coronary artery bypass surgery. Car- diovasc J South Afr. 2005; 16; 29-35.
14. Filsoufi F, Rahmanian PB, Castillo GJ, et al. Results and predictors of early and late outcomes of coronary artery bypass grafting in patients with severly depressed left ventricular function. Ann Thorac Surg. 2007; 84: 808-816.
15. Islamoglu F, Apaydin AZ, Posacioglu H, Ozbaran M, Hamulu A, Buket S, Telli A, Durmaz I. Coronary artery bypass grafting in patients with poor left ventricular function. Jpn Heart J. 2002; 43: 343-356.
16. Crossman AW, D'Agostino HJ, Geraci SA: Timing of coronary bypass graft surgery following acute myocardial infarction: A critical literature review. Clin Cardiol. 2002; 25: 406-410.
17. Wijns W, Kolh P, Danchin N; et al. Guidelines on myocardial revascularization: Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Car- dio-Thoracic Surgery (EACTS), Eur Heart J. 2010; 31: 2501-2505.
18. Mickleborough LL , Carson S, Tamariz M, Ivanov J. Results of revascularisation in patients with severe left ventricular dysfunction. J Thorac Cardiovasc Surg. 2000; 119: 550-557.
19. Cleland JG, Calvert M, Freemantle N, et al. The Heart Failure Revascularisation Trial (HEART) Eur J Heart Fail. 2011; 13: 227-233.
20. Topkara VK, Cheema FH. Coronary artery bypass grafting in patients with low ejection fraction.Circulation. 2005; 112: 344-350.
21. Kurki TS, Kataja M, Reich DL. Emergency and elektive coronary artery bypass grafting: comparisons of risk profiles postoperative outcomes, and resource requirements. J Cardiothorac Vasc Anesth. 2003; 17: 594-597.