9.Salazar-Camarena DC, Ortíz-Lazareno P, Marín-Rosales M, Cruz A, Muñoz-Valle F, Tapia-Llanos R, et al. BAFF-R and TACI expression on CD3+ T cells: Interplay among BAFF, APRIL and T helper cytokines profile in systemic lupus erythematosus. Cytokine. 2019 Feb;114:115-127. doi: 10.1016/j.cyto.2018.11.008.
10. Sarı S, İnanç M. BLyS (BAFF) and APRIL in the pathogenesis of systemic lupus erythematosus. J Turk Soc Rheumatol. 2019 Dec;11(2):110-116. doi:10.2399/raed.19.43434.
11. Tsokos GC, Lo MS, Costa Reis P, Sullivan KE. New insights into the immunopathogenesis of systemic lupus erythematosus. Nat Rev Rheumatol. 2016 Nov 22;12(12):716-730. doi: 10.1038/nrrheum.2016.186.
12. Vitri RY, Wachjudi RG, Ghassani NG, Hamijoyo L. Correlation of B-Cell-Activating Factor Levels and Diseases Activity in Systemic Lupus Erythematosus Patients. Indian Journal of Rheumatology 16(1):p 13-17, March 2021. doi: 10.4103/injr.injr_122_20.

Стаття надійшла 27.03.2024 р.

DOI 10.26724/2079-8334-2025-1-91-81-84
UDC 616.12-005.4-089.8:615.8

S.A. Musayev
Scientific Center of Surgery named after M.A.Topchubashov, Baku, Azerbaijan

IMPLEMENTATION OF REHABILITATION PROGRAM IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING IN THE EARLY POSTOPERATIVE PERIOD

e-mail: mic-amu@mail.ru

With the purpose to develop the recovery protocol for the patients undergoing coronary artery bypass grafting 132 patients were observed (30 of them received isolated coronary artery bypass grafting, 30–mitral valve prosthesis, 72–concomitant coronary artery bypass grafting and mitral valve surgery). The rehabilitation program (physical and psychological therapy) was initiated from the first postoperative day (physical therapy within 10–12 days with a further transition to the next stage of rehabilitation during hospital stay). Of the 132 operated patients, only 37 (28 %) had an adequate mental state, 95 (72 %)– significant mental changes: neurosis (20 cases), anxiety-depressive state (49 cases), hypochondria (19 cases), hysteria (7 cases). At the end of the program 121 (91.7 %) patients had an adequate mental state on days 12–14 postoperatively. The mortality was in 8.3 %. The implementation of rehabilitation programs in early period accelerates convalescence period of coronary artery bypass grafting patients.

Key words: ischemic heart disease, coronary artery bypass grafting, rehabilitation, mitral valve prosthesis, mental disorders.

С.А. Мусаєв

РЕАЛІЗАЦІЯ ПРОГРАМИ РЕАБІЛІТАЦІЇ У ХВОРИХ, ЩО ПЕРЕНЕСЛИ АОРТОКОРОНАРНЕ ШУНТУВАННЯ, У РАНЬОМУ ПІСЛЯОПЕРАЦІЙНОМУ ПЕРІОДІ

З метою розробки протоколу відновлення пацієнтів, які перенесли аортокоронарне шунтування, спостерігалося 132 пацієнти (з них 30 перенесли ізоловане аортокоронарне шунтування, 30 – протезування мітрального клапана, 72 – поєднане аортокоронарне шунтування та операцію на мітральному клапані). Реабілітаційна програма (фізична та психологічна терапія) починалася з першої післяопераційної доби (фізична терапія протягом 10–12 днів з наступним переходом на наступний етап реабілітації в період перебування у стаціонарі). Зі 132 прооперованих хворих лише у 37 (28 %) спостерігався адекватний психічний стан, у 95 (72 %) – виражені психічні зміни: неврози (20 випадків), тривожно-депресивний стан (49 випадків), іпохондрія (19 випадків), істерія (7 випадків). Після закінчення програми у 121 (91,7 %) пацієнта на 12–14 добу після операції зберігався адекватний психічний стан. Летальність становила 8,3 %. Реалізація реабілітаційних програм у ранні терміни прискорює період реконвалесценції у пацієнтів, які перенесли аортокоронарне шунтування.

Ключові слова: ішемічна хвороба серця, аортокоронарне шунтування, реабілітація, протез мітрального клапана, психічні розлади.

Ischemic heart disease (IHD), or coronary heart disease, is the leading causes of mortality in developed countries. According to the data, it annually claims the lives of more than 2.5 million of population globally, which more than one third of them are people of middle age [13]. In recent years, significant progress has been made in the management of this disease. The landscape has changed considerably since the inception of surgical coronary artery revascularization. An important achievement in the treatment of the ischemic heart disease was the performing of direct surgical myocardial revascularization, which is also referred to as coronary artery revascularization or coronary artery bypass grafting (CABG), which considerably improves the quality and the life expectancy of patients, and reduces the risk of developing of possible complications of the disease [10].

The prognosis of patients who have undergone CABG operation depends on a number of circumstances. The first is the “technical” features of the performed surgical intervention (for example,

auto-arterial bypass grafting compared to auto-venous grafting is characterized by better patency of grafts and a lower risk of repeated complications of coronary artery disease) [6]. The second is the presence of concomitant diseases before the operation (previous myocardial infarction, diabetes mellitus, heart failure, age, etc.) [2]. Third, the better management and preventing of early possible complications of CABG (atrial fibrillation, heart failure, venous thrombosis and thromboembolism, mediastinitis, infections. etc.), prevention of further progression of atherosclerosis and ischemic heart disease. For this purpose, along with the necessary medical treatment, physical psychological therapy of patients should be carried out, aimed at an earlier recover and return to the normal life [11, 12].

Cardiac rehabilitation is a complex intervention that seeks to improve the functional capacity, wellbeing and health-related quality of life of patients with heart disease [14]. Future research priorities include strengthening the evidence base for cardiac rehabilitation in other indications, including heart failure with preserved ejection fraction, atrial fibrillation and congenital heart disease and after valve surgery or heart transplantation, and evaluation of the implementation of sustainable and affordable models of delivery that can improve access to cardiac rehabilitation in all income settings. The duration of hospital stays and recovery following cardiac surgery is 10–14 days [12, 14].

The purpose of the study was to develop of recovery protocol for the patients with coronary artery disease undergoing coronary artery bypass grafting.

Materials and methods. The study included 132 patients with coronary heart disease (CHD). 119 (90.15 %) were men and 13 (9.85 %) were women. Patients' age ranged from 35 to 70 years (mean age was 51.8±7.01 years). Of the 132 patients, 71 (53.8 %) had a history of myocardial infarction, of which 67 (94.4 %) were male and 4 (5.6 %) were female. Depending on the etiology of the disease, 30 patients received isolated CABG, 30 patients – mitral valve prosthesis, and 72 patients underwent concomitant CABG plus mitral valve surgery.

We usually perform mitral valve surgery through the left atrium, after the completion of coronary anastomoses and complete it just before removing the clamp from the aorta. According to the number of the bypasses, 1 vessel bypass was performed in 14 (10.6 %) patients, 2 vessel bypass – in 21 (15.9 %) patients, 3 vessel bypass – in 86 (65.2 %) patients and 4 vessel bypass – in 11 (8.3 %) patients.

In the postoperative period, all the patients received comprehensive care including standard medical treatment and rehabilitation activities.

In patients who underwent coronary artery bypass grafting on the first postoperative day, as well as in patients who underwent coronary artery bypass grafting combined with mitral valve surgery, the following methods of gradually increasing physical activity were subsequently used, such as semi-sitting position, simple exercises for arms and legs, etc.

In addition, numerous tests were used to assess the function of the coagulation system, including activated partial thromboplastin time, prothrombin time, international normalized ratio, platelet count. Medical treatment was carried out strictly individually for each specific patient, taking into account the severity of the clinical condition and sensitivity to drugs. For the medical treatment after CABG following drug were used: aspirin, clopidogrel, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, statins.

The obtained data were processed using descriptive statistics methods. For each group, the mean numerical value (M), and its standard error (m), minimum (min) and maximum (max) values of the series were determined. Differences were considered statistically significant at $p<0.05$.

Results of the study and their discussion. Depending on the nature of the pathology, we performed isolated CABG surgery on 30 patients, mitral valve replacement on 30 patients, and concomitant CABG plus mitral valve surgery on 72 patients. In our patients undergoing isolated CABG and CABG plus mitral valve reconstruction surgery, the early medical treatment included aspirin, clopidogrel, beta-blockers, angiotensin-converting enzyme inhibitors. Staring from the first postoperative day, 300 mg/day of aspirin was prescribed. 3 patients had symptoms of neurological disorder, which attenuated or disappeared with the conservative medical treatment prescribed by a neurologist. In addition to aspirin 121 (91.7 %) patients received cardio-selective betablocker – esmolol (intravenously), at a dosage 0.05 mg/kg/min (maximum maintenance dose 0.2 mg/kg/min). In 11 (8.3 %) patients with systolic dysfunction of the left ventricle, carvedilol was prescribed at a dose of 25 mg/day. In 35 (26.5 %) patients with reduced left ventricle function (ejection fraction <50 %), with concomitant arterial hypertension in the early postoperative period, intravenous ACE were used (enalapril in a dose of 10 mg/day).

For patients undergoing CABG (1st group) on the first postoperative day and patients undergoing CABG plus mitral valve surgery (2nd group) on the second postoperative day raised the head of the bed to put the patient in half-sited position; on the 2nd and 3rd postoperative days for patients of 1st, 2nd groups,

respectively, was allowed to perform simple exercises for the arm and leg. On the 3rd and 4th postoperative days, patients of 1st and 2nd groups were allowed to get out of bed and sit on the chair for 5–8 minutes. In the subsequent 2–3 days, the number of independent moving activities from bed to chair increased 3 to 4 times for both group of patients. Breathing exercise 1st group patients performed starting from the 4th day, 2nd group patients from the 5th day.

Starting from the 7–8th day, the patients were accompanied by walks along the corridor. In the following days, patients were allowed to gradually increase physical activity. On the 10–14 days, they performed 50 to 100 meters of walking. At the same time, they performed self-monitoring of the pulse at rest, immediately and 3–5 minutes after exercise. The frequency and velocity of walking was determined on the basis of the patient's well-being and hemodynamic. Initially, the patient recommended walking up to 45–50 meters per minute, then 50–60 m/min. On the 2nd to 5th postoperative period, 105 (79.5 %) of the 132 patients had asthenic neurotic syndrome, and only 27 (20.5 %) patients had an adequate mental status. Through the appropriate use of medical treatment, 121 (91.7 %) patients had an adequate mental state on days 12–14. The mortality rate was 8.3 % (11 patients).

Early initiation of aspirin for CABG patients is not advocated in many centers, despite that in 2001 the Society of Thoracic Surgeons recommended prescribing aspirin 325 mg/day 6 hours after surgery [13].

Brouwer J, et al (2020) in a randomized, controlled trial, assigned a subgroup of patients who were undergoing transcatheter aortic-valve implantation and did not have an indication for long-term anticoagulation, in a 1:1 ratio, to receive aspirin alone or aspirin plus clopidogrel for 3 months. A total of 331 patients were assigned to receive aspirin alone and 334 were assigned to receive aspirin plus clopidogrel. According to their results, among patients undergoing transcatheter aortic-valve implantation who did not have an indication for oral anticoagulation, the incidence of bleeding and the composite of bleeding or thromboembolic events at 1 year were significantly less frequent with aspirin than with aspirin plus clopidogrel administered for 3 months [7]. We started to use aspirin from the first postoperative day, that is more effective than later prescribing.

Stopping aspirin before the CABG increased hospital mortality, its relative risk was 1.79 (1.18–2.69; p=0.01) in relation to the patients operated on the aspirin [8]. It should be noted that according to Baumann Kreuziger L. et al., preoperative use of aspirin not only did not increase the risk of gastrointestinal and other bleeding, on the contrary, their frequency was significantly lower in the first 48 hours postoperatively (1.1 % vs 2 %, p=0.01) [4].

Prescribing beta-blockers in the early postoperative period is especially indicated in the presence of tachyarrhythmias, ischemic events, myocardial infarction, postoperative hypertensive crises. Esmolol is an ultra-short-acting, cardio-selective, intravenous beta-blocker, with a half-life of 9 minutes, which is particularly useful addition in postoperative treatment. The possibility of a long-hour infusion, adherence to an individual dosing regimen, relative safety allows to consider it as an ideal beta-blocker in several postoperative scenario [5]. 121 of our patients received esmolol intravenously, which is concordant with presence recommendations.

ACE inhibitors are prescribed in the early postoperative period for patients with reduced left ventricle function (ejection fraction less than 50 %), as well as coexisting arterial hypertension. In case of urgency in patients with ventricle dysfunction the rapid effect can be achieved with the use of intravenous route of administration (enalaprilat, etc.). In cases of intolerance to ACE inhibitors, blockers of angiotensin receptor type II are used – valsartan, candesartan, losartan. In the later postoperative period, indications for ACE inhibitors may be substantially expanded [7].

Physical therapy of patients following the CABG has been shown to have beneficial effects, which began as early as in the first days of the postoperative period. The patients underwent gymnastics and massage while receiving drug treatment. We have developed referral recovery programs for patients after the CABG, which give the opportunity to a following doctor to appoint an individual course of treatment using the hospital technical equipment [1, 3, 9].

Preoperative psychological preparation has positive effects on postoperative outcomes and gaining importance for cardiac surgery. Psychological rehabilitation of patients following the CABG is extremely necessary, since due to extensive chest trauma, which is a source of pain, perioperative cerebral hypoxia, causing functional disorders of the nervous system. For this purpose, the use of Seduxen® (diazepam) with trifluoperazine is recommended; in resistant conditions – amitriptyline or Pyrazidol® (pirlindole hydrochloride) which is not producing cardiotoxicity, do not have negative impact on myocardial contractility and not causing orthostatic hypotension [13]. In our study we used effectively the psychological treatment as a part of rehabilitation program and achieved the improvement of mental status of patients.

Long-term studies of the implementation of various rehabilitation programs for patients undergoing CABG suggest that they contribute to a more complete and rapid improvement in cardio-respiratory function and return to normal life. However, although the beneficial effect of CABG is indisputable, there is an obvious inconsistency between the clinical and functional status of patients and the social significance of surgery, because the disability rate after surgical treatment is still unreasonable. In this regard, to study the effectiveness of existing rehabilitation programs, as well as the development of novel programs remain an important task for the future.

Conclusion

Implementation of rehabilitation programs including physical and psychological therapy accelerates convalescence period and return to normal life of early post-CABG patients. Of the 132 operated patients, only 37 (28 %) had an adequate mental state at the start of program, and at the end of program 121 (91.7 %) patients had an adequate mental state on days 12–14 postoperatively. The mortality rate was 8.3 % (11 patients).

Considering the effectiveness of cardiac surgery in the treatment of coronary artery disease, it's necessary to review the existing protocols for establishing disability groups and monitoring the implementation of individual rehabilitation programs for patients after coronary artery bypass grafting at the outpatient department.

References

1. Alaparthi GK, Gatty A, Samuel SR, Amaravadi SK. Effectiveness, Safety, and Barriers to Early Mobilization in the Intensive Care Unit. Crit Care Res Pract. 2020 Nov 26;2020:7840743. doi: 10.1155/2020/7840743.
2. Ambrosetti M, Abreu A, Corrà U, Davos CH, Hansen D, Frederix I, et al. Secondary prevention through comprehensive cardiovascular rehabilitation: From knowledge to implementation. 2020 update. A position paper from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology. Eur J Prev Cardiol. 2021 May 14;28(5):460-495. doi: 10.1177/2047487320913379.
3. Anderson L, Thompson DR, Oldridge N, Zwisler AD, Rees K, Martin N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev. 2016 Jan 5;2016(1):CD001800. doi: 10.1002/14651858.CD001800.pub3. Update in: Cochrane Database Syst Rev. 2021 Nov 6;11:CD001800. doi: 10.1002/14651858.CD001800.pub4.
4. Baumann Kreuziger L, Karkouti K, Tweddell J, Massicotte MP. Antithrombotic therapy management of adult and pediatric cardiac surgery patients. J Thromb Haemost. 2018 Nov;16(11):2133-2146. doi: 10.1111/jth.14276.
5. Blessberger H, Kammler J, Domanovits H, Schlager O, Wildner B, Azar D, et al. Perioperative beta-blockers for preventing surgery-related mortality and morbidity. Cochrane Database Syst Rev. 2018 Mar 13;3(3):CD004476. doi: 10.1002/14651858.CD004476.pub3.
6. Borzou SR, Amiri S, Salavati M, Soltanian AR, Safarpoor G. Effects of the First Phase of Cardiac Rehabilitation Training on Self-Efficacy among Patients Undergoing Coronary Artery Bypass Graft Surgery. J Tehran Heart Cent. 2018 Jul;13(3):126-131. PMID: 30745925; PMCID: PMC6368910.
7. Brouwer J, Nijenhuis VJ, Delewi R, Hermanides RS, Holvoet W, Dubois CLF, et al. Aspirin with or without Clopidogrel after Transcatheter Aortic-Valve Implantation. N Engl J Med. 2020 Oct 8;383(15):1447-1457. doi: 10.1056/NEJMoa2017815.
8. Chakos A, Jbara D, Singh K, Yan TD, Tian DH. Network meta-analysis of antiplatelet therapy following coronary artery bypass grafting (CABG): none versus one versus two antiplatelet agents. Ann Cardiothorac Surg. 2018 Sep;7(5):577-585. doi: 10.21037/acs.2018.09.02.
9. Moradian ST, Najafloo M, Mahmoudi H, Ghiasi MS. Early mobilization reduces the atelectasis and pleural effusion in patients undergoing coronary artery bypass graft surgery: A randomized clinical trial. J Vasc Nurs. 2017 Sep;35(3):141-145. doi: 10.1016/j.jvn.2017.02.001.
10. Paquin A, Poirier P, Beaudoin J, Piché ME. Secondary prevention after CABG: do new agents change the paradigm? Curr Opin Cardiol. 2020 Nov;35(6):664-672. doi: 10.1097/HCO.0000000000000783.
11. Patti A, Merlo L, Ambrosetti M, Sarto P. Exercise-Based Cardiac Rehabilitation Programs in Heart Failure Patients. Heart Fail Clin. 2021 Apr;17(2):263-271. doi: 10.1016/j.hfc.2021.01.007.
12. Rakhshan M, Toufigh A, Dehghani-Firouzabadi A, Yektatalab S. Effect of Cardiac Rehabilitation on Hope Among Cardiac Patients After Coronary Artery Bypass Graft Surgery. Risk Manag Healthc Policy. 2020 Aug 25;13:1319-1326. doi: 10.2147/RMHP.S262656.
13. Richards SH, Anderson L, Jenkinson CE, Whalley B, Rees K, Davies P, et al. Psychological interventions for coronary heart disease: Cochrane systematic review and meta-analysis. Eur J Prev Cardiol. 2018 Feb;25(3):247-259. doi: 10.1177/2047487317739978.
14. Taylor RS, Dalal HM, McDonagh STJ. The role of cardiac rehabilitation in improving cardiovascular outcomes. Nat Rev Cardiol. 2022 Mar;19(3):180-194. doi: 10.1038/s41569-021-00611-7.

Стаття надійшла 24.02.2024 р.