Srce i krvni sudovi 2023; 42(1): 20-25

Review article

Sport and recreation after revascularization, pacemakers implantation or valve replacement: Insights and future perspectives

Ivana Burazor[1,2], Marija Marić[1], Ivana Nedeljković[2,3]

[1]Institute for Cardiovascular Diseases 'Dedinje', [2]University of Belgrade - Faculty of Medicine, [3]Cardiology Clinic, University Clinical Center of Serbia

Abstract In the last few years, numerous recommendations of the European Association of Cardiologists and guides of the European Association for Preventive Cardiology - Sports Cardiology section and Secondary prevention/Cardiac rehabilitation section pointed the importance and positive effects of physical activity on functional capacity improvement, reduction of mortality and reduction of rehospitalization rates. Physical activity and playing sports are recommended for individuals in accordance with personal affinities, age, comorbidities, cardiovascular risk factors, and for cardiology patients after prior evaluation and classification of the underlying disease and associated risks.
Sports cardiology is a field that is constantly developing. Till today, there are no unique registries or documents with unique recommendations for patients after revascularization, after the implantation of a pacemaker and replacement of valves. We analyze the available data from the literature, recommendations and guides, the basic algorithms for sports and recreation of these patients and highlight the necessity and importance of future research in the field.

Key words sports and recreation, myocardial revascularization, valve replacement

Introduction

We are witnessing the time when physical activity and sports activities are recommended to all individuals in accordance to personal affinities, age, comorbidities, and for all cardiac patients with prior evaluation and classification of the underlying disease and associated risks.

In the last few years, numerous recommendations of the European Society of Cardiology (ESC) and position papers of the European Association for Preventive Cardiology (EAPC), Sports cardiology and Secondary prevention/cardiac rehabilitation sections, indicate the importance and positive effect of physical activity. Generally, higher levels of physical activities and fitness are associated with lower all-cause mortality, lower rates of cardiovascular diseases, and lower prevalence of several known malignancies[1-6].

Despite the substantial health benefits provided by regular physical activities, intense exercise may paradoxically act as a trigger for life-threatening conditions[1].

Sports cardiology is a field that is constantly evolving, there are no unique registries or documents that would indicate exact recommendations for individuals after coronary artery revascularization, after pacemaker implantation and valve replacement, we aimed to review the available recommendations and literature and highlight the necessity and the importance of future research in this area.

Cardiovascular pre-participation screening in athletes to detect the diseases lies outside the scope of this article and is discussed elsewhere [1].

Athletes: Competitive and Recreational

The ESC defines an athlete as 'an individual of young or adult age, either amateur or professional, who is engaged in regular exercise training and participates in official sports competition' [7]. A recreational athlete engages in sports for pleasure and leisure-time activity, whereas a competitive athlete is highly trained with a greater emphasis on performance and winning (*elite* or *competitive* athletes). Nevertheless, sporting discipline is in relation to the predominant component (skill, power, mixed and endurance) and intensity of exercise. Intensity of exercise must be individualized after maximal exercise testing, field testing and/or after muscular strength testing[1]. Thus, it will be of great importance for physician to indicate the type of sport, frequency and duration of exercise and intensity to provide the advice and make shared decision with patients, especially after revascularization, pacemaker implantation or after valve replacement.

Corresponding author: Ivana Burazor, Heroja Milana Tepića 1, Beograd, E-mail: ivana.burazor@gmail.com

Figure 1. Sporting discipline in relation to the predominant component and intensity of exercise (Adopted from ESC – EAPC, see reference 1).

Sport and recreation in patients after myocardial revascularization

The major cause of myocardial ischemia in subjects >35 years of age, including athletes, is coronary artery disease [8]. Major cardiovascular risk factors, in addition to age and sex are family history of coronary artery disease, hypercholesterolemia, hypertension, diabetes mellitus and smoking, particularly if combined [2]. Coronary artery disease in subjects below 35 years is rare (most often caused by familiar hypercholesterolemia). Physical inactivity is an additional cardiovascular risk factor, and conversely, regular physical training reduces the risk of accelerated atherosclerosis, as well as the risk of sudden cardiac death or arrest during vigorous exertion[9].

Coronary artery disease includes the entire spectrum of acute and chronic clinical syndromes caused by myocardial ischemia in the field of obstructive or non-obstructive atherosclerotic disease of the epicardial coronary arteries. From a clinical point of view, it is not a simple and homogeneous group, but is expressed by a series of subgroups in a variety of clinical forms that can proceed not only typically, but also atypically, with different levels of risk and complications, often unpredictable in course and prognosis. Patients with established atherosclerotic cardiovascular disease require timely clinical monitoring with risk stratification and treatment to stop or delay the further progression of disease, preserve quality of life, maintain or improve functional capacity and prevent the occurrence of recurrent events, which is why prevention programs in highly specialized centers are recommended.

The ESC Guidelines on CVD prevention in 2021 [2] gave the stepwise approach for prevention. All patients with established atherosclerotic cardiovascular diseases are recommended to stop smoking, adopt a healthy lifestyle and control all risk factors in Step 1. Further intensification of therapy to lower therapeutic targets is defined in Step 2 (depending on residual risk, comorbidity, lifetime risk, benefit from therapy, presence of frailty, and patient preference).

In general population, physical activity is recommended to everybody - adults of all age groups are recommended to strive for moderate-intensity physical activity for 150 to 300 minutes per week or 75-100 minutes per week of intense aerobic physical activity or their combinations in order to reduce all-cause mortality and morbidity, or in some cases, to the extent that their abilities and their health condition.

In athletes, the EAPC position paper from 2019 [6] and ESC recommendations 2020 [1] singled out a group of patients with chronic coronary syndromes:

- all patients with stable angina
- asymptomatic and symptomatic persons within one year after an acute coronary syndrome
- persons who recently underwent revascularization
- asymptomatic and symptomatic persons more than one year after the initial diagnosis or revascularization.

Inclusion in intensive activities and participation in competitive sports in these individuals depend on numerous factors among which are: the type of competitive sport, fitness level of the patient, cardiovascular risk profile, presence of ischemia and arrhythmias indicated by physical activity, or evidence of myocardial dysfunction. All these factors may be determined by: assessment of previous history of the disease, testing with physical load (cardiopulmonary exercise testing) or functional imaging methods and echocardiographic examination. Guidelines suggests that asymptomatic persons with normal tests and preserved left ventricular systolic function belong to the category with a *low risk* for the occurrence of adverse events induced by myocardial ischemia, and therefore can be involved in competitive sports on an individual level. There are no restrictions in low-risk patients for skills sports regardless of age (Figure 1).

Some restrictions may apply for high-intensity power, mixed, and endurance sports (Figure 1) and for older patients (>60 years old) with chronic coronary syndromes - age is an additional, strong predictor of adverse events during exercise. Individuals with high-risk coronary features may gradually return to sport 3–6 months after successful revascularization pending a normal maximal exercise or functional imaging test.

When ischaemia cannot be treated despite adequate therapy, including revascularization, the individual should be restricted from competitive sports, with the possible exception of individually recommended low-intensity skill sports. Such individuals may engage in regular recreational exercise of low and moderate intensity provided risk factors and symptoms are treated adequately and there is regular clinical surveillance (Figure 2). These individuals may also participate in leisure sports, 2–3 times/week, in selected cases, if the intended activity is below (around 10 beats) the ischemic threshold and below the level of arrhythmias.

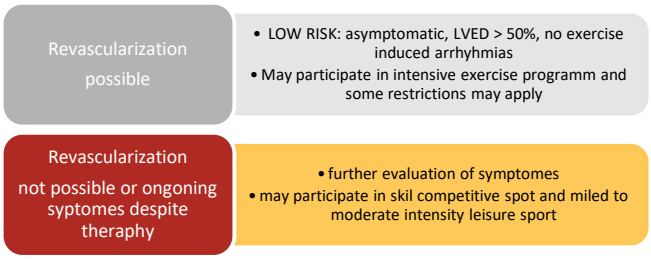

Figure 2. Clinical evaluation and recommendation in ASCVD (adopted from ESC, reference 1)

Secondary prevention after revascularization: Return to sport and recreation

Secondary prevention through comprehensive cardiac rehabilitation (CR) has been recognized as the most cost-effective to ensure favorable outcomes across a wide spectrum of cardiovascular disease, reducing cardiovascular mortality, morbidity and disability, and to increase quality of life. The delivery of a comprehensive and 'modern' cardiac rehabilitation program is mandatory both in the residential and the out-patient setting to ensure expected outcomes.

Individuals who have experienced cardiac surgery, or percutaneous intervention should be referred to an early exercise-based CR program, soon after the discharge, for 8–12 weeks after the cardiac event [11]. Several controlled cohort studies and meta-analyses have found a survival benefit for patients receiving cardiac rehabilitation after acute event compared with no cardiac rehabilitation (26% reduction of cardiac mortality, 18% recurrent hospitalization), even in the modern era of early revascularization and statins [12].

Campos et al recently analyze the effects of exercise-based cardiac rehabilitation on physical performance after myocardial revascularization (coronary artery bypass grafting and percutaneous coronary intervention) [13]. Their systematic review and meta-analysis indicated that exercise-based CR increases physical performance after myocardial revascularization with an emphasize that aerobic and combined training lasting at least 8–12 weeks might be more effective in improving physical performance. Every week that exercise is delayed requires an additional month of exercise to accomplish the same level of benefit [14].

Exercising individuals with coronary artery disease may start performing low- to moderate-intensity recreational sporting activities in parallel with participation in the structured progressive exercise program. All types of sports activities may be considered, at an appropriate intensity level; however, careful attention should be paid to the development of new symptoms. In general, structured outpatient exercise program, for 3–6 months, are required to achieve the appropriate level of activity for sports participation.

In competitive athletes, an echocardiogram, maximal exercise test with 12-lead ECG recording or cardiopulmonary exercise (CPET) test is recommended for risk stratification before return to sports. CPET specifically adds information on aerobic and anaerobic thresholds, guiding exercise intensity prescription and progression

In recreational athletes (and leisure-time activity), similar principles apply regarding risk stratification. A symptom-limited/maximal exercise test or CPET should precede the return to sports. If aerobic exercise is not tolerated, predominantly strength-related sports with a small amount of muscular work are recommended.

Sport and recreation after device implantation

Currently, millions of people with cardiac implantable electronic device live in Europe and hundreds of thousands join them every year. According to a 2017 report of the European Heart Rhythm Association, a total of 547 586 pacemakers, 105 730 implantable cardioverter-defibrillators (ICDs), and 87 654 cardiac resynchronization therapy devices were implanted in the ESC area in 2016[11,15,16].

Pacemakers (PM) are common and individuals with PM have less severe disease and comorbidities than patients with an ICD. For that reason, patients with a PM may participate in competitive or recreational sports in the absence of structural or other heart disease for which exercise may be prohibited as recommended in recent guidelines [1]. It is of great importance to avoid sport activities within first weeks after device implantation (eg. strong upper extremity movements might increase risk of lead dislocation). Late lead damage due to subclavian crush (with insulation or conductor failure) can be seen in sports with pronounced arm movements (such as volleyball, basketball, tennis, golf, climbing etc). In these individuals, implantation on the contralateral side of the dominant arm, fixation within the pocket, or submuscular placement may improve durability of the system. Exercise testing and/or Holter monitoring during sports may improve individualized programming of the upper sensor and the tracking rate and exclude inappropriate rate acceleration in other circumstances (e.g. horse riding)[1,17].

Implantable cardioverter defibrillators

The burden of sudden cardiac death in the young is disproportionately larger because of their greater life expectancy and the tragic effect on families and communities. Since 1980, the ICD is proven to be effective in preventing sudden cardiac death in patients of all ages, including children and adolescents, with cardiac disease at high risk of ventricular arrhythmia [18-20] and for patients with risk factors, ICDs are more cost-effective for the young recipients because of the greater life expectancy[21]. However, prior recommendations disqualified young patients with ICDs from competitive and high-intensity sports except those with low cardiovascular demand, such as billiard, bowling, or golf.

In the study of Saarel et al, shocks for ventricular arrhythmias occurred during sports, but all were successful at termination of arrhythmia without harm. Authors showed that many young athletes with ICDs could participate in competitive and high-intensity sports with-

out failure to terminate arrhythmias or injury, despite the shocks, confirming results of a smaller single-center registry of 21 young people[22,18]. The rate of appropriate shocks during sports was low—1.5 per hundred person-years, and of the total shocks received, less than one-quarter occurred during sports. This finding suggested that restriction from the activity would not have a large impact on the overall burden of treated arrhythmias. Only 4 athletes received appropriate ICD shocks during sports, precluding the identification of meaningful and statistically significant predictors of risk. Although hours spent in competition or practice were greater for the 4 athletes who received shocks during sports, there was a wide variation; whether longer hours spent in competition or practice significantly increase the likelihood of appropriate shock during sports cannot be determined from this study. All of the athletes who received shocks (appropriate or inappropriate) during sports were prescribed β-blockers. It remains unclear whether they were adherent to prescribed therapy.

This large multinational ICD Sport Safety Registry on 440 athletes and additional analysis in 82 non-professional recreational athletes pointed out that shared decision making is appropriate when deciding whether or not to continue sports in ICD receivers.

In some patients, sport might be contraindicated, predominantly due to progression of underlying disease (eg arrhythmogenic cardiomyopathy). In case of inappropriate shocks, sinus tachycardia or supraventricular arrhythmias may occur due to underlying disease.

Further, in some cases, participation in moderate and high intensity exercise should be discouraged, as in ICD shocks in general (eg 30 to 40% of athletes who experienced shocks in ICD registry stopped participation). In case of moto sports, diving, cycling loose of focus could cause harm to a third party or athlete and informed decision making is needed to reevaluate all options.

For all patients with cardiac devices (PM, cardiac resynchronization therapy, and ICD), sports activities associated with a risk of chest trauma should be avoided.

Exercise-based cardiac rehabilitation after ICD implantation

It was recently proposed that cardiac rehabilitation for all patients with cardiac implantable electronic device can be a unique opportunity to optimize medical treatment, to increase exercise capacity, and to improve their clinical condition and to supervise the correct functioning of the device[10,15].

This is not only related to the underlying heart disease but also to specific issues, such as psychological adaptation to living with an implanted device and, in ICD patients, the risk of arrhythmia, syncope, and sudden cardiac death.

Clinical and laboratory evaluation is the first step in evaluating ICD patients in the setting of comprehensive CR. Minimally, history and clinical examination, device interrogation, chest X-ray, echocardiogram, CPET, and Holter should be performed before starting exercise-based CR.

As the basis for exercise advice and prescription, a symptom-limited exercise test, preferably CPET, is mandatory. Endurance training intensity zones can be determined on the ventilatory thresholds, peak VO2, or, in absence of a CPET, on heart rate and heart rate reserve. Exercise prescription may include both endurance and resistance training. Endurance training may use continuous and/or interval or intermittent training models, 3–5 days/week, during 30–60 min, associated with dynamic exercises. For continuous aerobic training, prescription may be similar to that used in heart failure patients, keeping in mind upper limits of the device. In case of chronotropic incompetence, rate-adaptive pacing should be programmed. Resistance training sessions (2–3 sessions/week) may be tailored according to a preliminary evaluation of strength, but special attention is required with shoulder movement in order to avoid important strain in the side of implant, particularly in the early phase after device placement.

Implantable cardioverter-defibrillator patients, following exercise-based CR, achieved a better exercise capacity. The impact on all-cause mortality, serious adverse events, and health-related QoL remained unclear [15].

ICD patients, however, still have low referral rates and poor adherence to CR (due to the high incidence of anxiety (18–38%) and depression (28–32%) and to the fear of ICD discharges,[23] highlighting the importance of psychoeducational component of CR[15,16].

Future research and registries should focus on the sport and recreation in real life ICD recipients.

Sports and recreation after valve replacement

Valvular heart disease is usually an age-related degenerative process, predominantly affecting individuals in their fifth decade and onwards. There is a pertinent population of younger individuals with congenital valvular heart disease. Exercise recommendation in individuals with valvular heart in 2020 ESC Guidelines on sport cardiology and exercise in patients included general principles in assessment and risk stratification of those individuals prior to leisure exercise or competitive sports[1]. Till today, little is known on sports and recreation after valve replacement. In 2021, a position statement of the Sport Cardiology Section of the European Association of Preventive Cardiology on Athletes with valvular heart disease and competitive sport added a valuable data[24].

Although patients improve clinically after heart valve replacement, the long-term mortality is higher than in a healthy control population. Patients with normal haemodynamic patterns at rest may have abnormal values under physical stress. A proportion of individuals warranting surgical correction for mitral regurgitation may undergo valve repair instead of replacement. There are no data on the natural history of a valve replacement or repair in individuals who exercise intensively, therefore the current consensus recommendations are relatively conservative. Therefore, exercise testing should be performed up to the intensity consistent with that of the

sport the athlete wishes to pursue. Given that artificial valves are associated with some flow limitation, it is recommended that athletes who have had valve replacements have the same exercise limitations as asymptomatic athletes with moderate native valve disease provided ventricular function is preserved and pulmonary artery pressure is within normal limits. Anticoagulation is mandatory for mechanical prosthesis and those with atrial fibrillation which further limits their choice of competitive sports. As with native valves, athletes with prosthetic valves or valve repair should undergo annual re-evaluation[24.25]

Blank et al recently conducted retrospective cohort the study on one hundred twenty-one patients aged 18 to 65 years who underwent a first-time mitral valve replacement for primary mitral regurgitation in a tertiary care center with an aim to examine the impact of sports on outcomes after mitral valve replacement in a 34 month follow up[26]. Participation in sports was quantified by the number of hours per week during the past 6 months, classified according to the Mitchell classification and assessed with the International Physical Activity Questionnaire (IPAQ) short form. Fifty-six patients participated in sports regularly (median of 3 h/week), 17% patients reached the primary composite endpoint with no correlation with participation in sports, IPAQ categories in any of the Mitchell classification subgroups and a high level of participation in sports ≥6 hours. According to these results, sports seem to be unrelated to the worst outcome after mitral valve replacement.

Exercise- based cardiac rehabilitation after valve replacement

Cardiac rehabilitation programmes should be available for all patients undergoing valve surgery, including those after minimally invasive cardiothoracic surgery or aortic valve replacement in order to improve short-term physical capacity. Core Components of cardiac rehabilitation following valve heart surgery include: patient assessment (wound healing, comorbidities, complication and disabilities; special focus on perioperative congestive heart failure, atrial fibrillation, pleural and pericardial effusion, and diaphragmatic paralysis etc), evaluation and appropriate treatment of postoperative pain; echocardiography (pericardial effusion, prosthetic function and disease at other valve sites); exercise capacity to guide exercise prescription - symptom limited exercise stress test as soon as possible and a maximal exercise test about four weeks after surgery[10].

Exercise training should be individually tailored according to the clinical condition, baseline exercise capacity, ventricular function and different valve surgery. After mitral valve replacement exercise tolerance is much lower than that after aortic valve replacement, particularly if there is residual pulmonary hypertension. Upper-body training can begin when the chest is stable, i.e. usually after six weeks.

The actual exercise prescription for patients with recent valve replacement or repair is the same used for CABG surgery patients. The physical activity of these patients may have been more restricted for an extended period of time prior to the surgical intervention. Early after valvular surgery, the spontaneous exercise capacity improvement is weak and consequently, the resulting low functional capacity may require these patients to initiate with exercise in a conservative fashion. Exercise intensities may vary according to the patient´s needs using interval training such as in heart failure patients or a steady state modus in the light or light to moderate domains and it should be supervised by the target heart rate and the rate of perceived exertion. Exercise-based cardiac rehabilitation after heart valve surgery positively impacts VO2 peak after 4 months, but recently no long-term benefit was found after 12 months[27].

Future research should focus on defining the risks of returning to exercise following valvular intervention.

References

1. Pelliccia A, Sharma S, Gati S, et al ESC Scientific Document Group, 2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease: The Task Force on sports cardiology and exercise in patients with cardiovascular disease of the European Society of Cardiology (ESC). Eur Heart J 2021: 42 (1): 17–96.
2. Visseren F, Mach F, Smulders Y, et al. ESC Scientific Document Group, 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice: Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies With the special contribution of the European Association of Preventive Cardiology (EAPC). Eur Heart J 2021; 42 (34), 3227–3337.
3. Shiroma EJ, Lee I-M. Physical activity and cardiovascular health: lessons learned from epidemiological studies across age, gender, and race/ethnicity. Circulation 2010;122:743–752.
4. Radford N, DeFina LF, Leonard D, et al. Cardiorespiratory fitness, coronary artery calcium, and cardiovascular disease events in a cohort of generally healthy middle-age men: results from the Cooper Center Longitudinal Study. Circulation 2018;137:1888–1895.
5. Shah R, Murthy V, Colangelo L et al. Association of fitness in young adulthood with survival and cardiovascular risk: the Coronary Artery Risk Development in Young Adults (CARDIA) study. JAMA Intern Med 2016;176:87–95.
6. Borjesson M, Dellborg M, Niebauer J, et al. Recommendations for participation in leisure time or competitive sports in athletes-patients with coronary artery disease: a position statement from the Sports Cardiology Section of the European Association of Preventive Cardiology (EAPC). Eur Heart J 2019;40(1):13–18.
7. Pelliccia A, Fagard R, Bjornstad HH, et al. Recommendations for competitive sports participation in athletes with cardiovascular disease: a consensus document from the Study Group of Sports Cardiology of the Working Group of Cardiac Rehabilitation and Exercise Physiology and the Working Group of Myocardial and Pericardial Diseases of the European Society of Cardiology. Eur Heart J2005; 26:1422–1445.
8. Adabag A , Peterson G , Apple F, et al. Etiology of sudden death in the community: results of anatomical, metabolic and genetic evaluation. Am Heart J 2010; 159:33–39.
9. Mittleman MA , Maclure M , Tofler GH et al. Triggering of acute myocardial infarction by heavy physical exertion. Protection against triggering by regular exercise. N Engl J Med 1993; 329:1677–1683.
10. Ambrosetti M, Abreu A, Corra U, 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;28(5):460–495.

11. Piepoli MF, Corra U, Adamopoulos S, et al. Secondary prevention in the clinical management of patients with cardiovascular diseases. Core components, standards and outcome measures for referral and delivery: a policy statement from the cardiac rehabilitation section of the European Association for Cardiovascular Prevention and Rehabilitation. Eur J Prev Cardiol 2014; 21:664–681.
12. Rauch B, Davos CH, Doherty P, et al. The prognostic effect of cardiac rehabilitation in the era of acute revascularization and statin therapy: Systematic review and meta-analysis of randomized and non randomized studies – The Cardiac Rehabilitation Outcome Study (CROS). Eur J Prev Cardiol 2016;23:1914–1939.
13. Campos H, Rodrigues Q, Drummond L, et al. Exercise-based cardiac rehabilitation after myocardial revascularization: a systematic review and meta-analysis. Rev Cardiovasc Med 2022, 23(2):74 -90.
14. Haykowsky M, Scott J, Esch B, et al. A meta-analysis of the effects of exercise training on left ventricular remodeling following myocardial infarction: start early and go longer for greatest exercise benefits on remodeling. Trials 2011;12:92 -100.
15. Pedretti R, Iliou M, Israel C, et al. Comprehensive multicomponent cardiac rehabilitation in cardiac implantable electronic devices recipients: a consensus document from the European Association of Preventive Cardiology (EAPC; Secondary prevention and rehabilitation section) and European Heart Rhythm Association (EHRA). Eur J Prev Cardiol 2021;28 (15):1736–1752.
16. Raatikainen MJP, Arnar DO, Merkely B, et al. A decade of information on the use of cardiac implantable electronic devices and interventional electrophysiological procedures in the European Society of Cardiology Countries: 2017 report from the European Heart Rhythm Association. Europace 2017;19:ii1–ii90.
17. Lamas GA, Keefe JM. The effects of equitation (horseback riding) on a motion responsive DDDR pacemaker. Pacing Clin Electrophysiol 1990;13:1371–1373.
18. Saarel E, Pilcher T, Gamboa D, Etheridge S. Sports for young patients with implantable cardioverter-defibrillators: refining the risk.J Am Coll Cardiol 2014; 63(12s):A529.
19. Hamilton RM, Dorian P, Gow RM, Williams WG. Five-year experience with implantable defibrillators in children.Am J Cardiol 1996;77:524–526.
20. Mirowski M, Reid PR, Mower MM, et al. Termination of malignant ventricular arrhythmias with an implanted automatic defibrillator in human beings.N Engl J Med 1980;303:322–324.
21. Goldenberg I, Moss AJ, Maron BJ, et al. Cost-effectiveness of implanted defibrillators in young people with inherited cardiac arrhythmias. Ann Noninvasive Electrocardiol 2005; 10(suppl 4):67–83.
22. Saarel EV, Law I, Berul C, et al. Safety of sports for young patients with implantable cardioverter-defibrillators. Long-term results of the multinational ICD sports registry. Circulation: Arrhythmia and Electrophysiology 2018;11:e006305
23. Godemann F, Butter C, Lampe F, et al S. Determinants of the quality of life (QoL) in patients with an implantable cardioverter/defibrillator (ICD). Qual Life Res 2004;13:411–416.
24. Buuren F, Gati S, Sharma S, et al. Athletes with valvular heart disease and competitive sports: a position statement of the Sport Cardiology Section of the European Association of Preventive Cardiology, Eur J Prev Cardiol 2021;28(14):1569–1578.
25. Petek BJ, Baggish AL. Valvular heart disease in athletes. Curr Treat Options Cardiovasc Med 2021;23(11):69–75.
26. Blanc A, Lairez O, Cariou E, et al Participating in sports after mitral valve repair for primary mitral regurgitation: A retrospective cohort study. Clin J Sport Med 2021;31(5):414-422.
27. Nechwatal R. Cardiac rehabilitation after surgical and transcatheter valve replacement and repair. Dtsch Z Sportmed 2018; 69:285-292.

Sažetak

Sport i rekreacija posle revaskularizacije, implantacije pejsmejkera ili zamene valvule: Pregled sadašnjih saznanja i perspektive

Ivana Burazor[1,2], Marija Marić[1], Ivana Nedeljković[2,3]

[1]Institut za kardiovaskularne bolesti 'Dedinje', [2]Medicinski fakultet, Univetzitet u Beogradu, [3]Klinika za kardiologiju, Univerzitetski Klinički centar Srbije

U poslednjih nekoliko godina brojne preporuke Evropskog udruženja kardiologa i vodiči Evropske asocijacije za preventivnu kardiologiju - Sportsku kardiologiju i Sekundarnu prevenciju/kardiološku rehabilitaciju ukazuju na značaj i pozitivan efekat fizičke aktivnosti na poboljšanje funkcionalnog kapaciteta, redukciju mortaliteta i redukciju stope rehospitalizacije. Fizička aktivnost i bavljenje sportom preporučuju se pojedincima u skladu sa ličnim afinitetima, godinama života, komorbditetima, prisutnim faktorima rizika, a kardiološkim pacijentima, uz prethodnu evaluaciju i klasifikaciju osnovne bolesti i priduženih rizika.

S obzirom da je sportska kardiologija oblast koja se nesprestano razvija, i da ne postoje jedinstveni registri ni dokumenta koja bi ukazivala na jedinstvene preporuke kod osoba koje su podvrgnute revaskularizaciji, nakon ugradnje pejsmejkera i zamene valvula imali smo za cilj da kroz dostupne podatke iz literature i preporuka i vodiča ukažemo na osnovene algoritme za sport i rekreaciju ovih bolesnika i istaknemo neophodnost i značaj budućeg istraživanja u oblasti.

Ključne reči: *sport i rekreacija, revaskularizacija miokarda, veštačke valvule*