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SEXUAL ACTIVITY IN PATIENTS WITH CARDIAC DISEASES

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SUMMARY – In this article, we outline the latest guidelines published by the American Heart Association on sexual activity in patients with coronary artery disease, heart failure, structural heart diseases, arrhythmias, implanted pacemakers or cardioverter defibrillators, as well as on treatment options of sexual dysfunction. Sexual activities are similar to mild/moderate physical activity during a short period. Most patients are recommended to involve in sexual activity after prior comprehensive evaluation of physical condition. Those with stable cardiac symptoms and good functional capacity are at a low risk of adverse cardiovascular events, and others require treatment or stabilization before involving in sexual activity. Stress testing is useful in evaluating safety of sexual activity in patients with questionable or undetermined risk. Treatment of sexual dysfunction includes counseling of patients and their sexual partners, and drug treatment with phosphodiesterase inhibitors (sildenafil, tadalafil, vardenafil) which have been demonstrated to be safe and effective, in men, and with serotonin reuptake inhibitors (flibanserin) and local vaginal estrogen administration in women. In conclusion, in routine clinical practice, patients should be approached individually and multidisciplinarily in order to detect and eliminate the factors that interfere with normal sexual activities and disturb the quality of life.

Key words: *Cardiovascular diseases; Sexual dysfunction, physiological – drug therapy; Sexual behavior; Quality of life*

Introduction

Erectile and sexual dysfunction in males and females (decreased libido, inability to achieve orgasm, dyspareunia) are independent predictors of adverse cardiovascular events and poorer quality of life (QoL). Both entities have common causal factors such as older age, arterial hypertension, obesity, disorders of glucose and lipid metabolism, metabolic syndrome, smoking and sedentary lifestyle, which individually or synergistically lead to endothelial dysfunction of cardiovascular and reproductive organs. It takes 2 to 5 years from sexual dysfunction to evident appearance of some of undesirable cardiovascular events (acute coronary event, stroke, peripheral arterial disease). It could be explained by the smaller caliber of sexual organ blood vessels and thus earlier clinical manifestations of endothelial dysfunction[1,2]. This article brings a review of the latest American Heart Association (AHA) guidelines and other relevant literature about sexual activity (SA) in patients with various cardiac pathology, and treatment options for sexual dysfunction[3].

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Sexual Activity and Acute Cardiovascular Response

During sexual foreplay and arousal, the values of blood pressure (BP) and heart rate (HR) rise and reach maximum during orgasm. After that, they rapidly de-

cline to the normal values[4-10]. SA is equal to mild/moderate physical activity for a short duration (climbing 2 flights of stairs or walking briskly, i.e. with 3-4 metabolic equivalents (METs))[11]. The values of HR and systolic BP are usually below 130 bpm and 170 mm Hg, respectively[6,12,13].

Due to medical or emotional reasons, or older age, some patients may have difficulty reaching orgasm and exert greater demand on their cardiovascular system[14].

General Recommendations about Sexual Activity in Various Cardiac Diseases

Initial clinical evaluation in patients with cardiovascular disease (CVD) is necessary before initiating or resuming SA, which is acceptable in a group of subjects with no or minimal symptoms during routine activities and low risk of cardiovascular complications[3,15-18]. This group consists of patients with Canadian Classification System (CCS) class I or II angina; New York Heart Association (NYHA) class I or II heart failure; mild to moderate valve disease; previous myocardial infarction; successful coronary revascularization; most types of congenital heart disease; and ability to achieve ≥3-5 METs during exercise stress testing without angina, ischemic electrocardiographic changes, hypotension, cyanosis, arrhythmia, or excessive dyspnea. In patients with unstable or decompensated heart disease (i.e. unstable angina, decompensated heart failure (HF), uncontrolled arrhythmia, or significantly symptomatic and/or severe valve disease), SA should be deferred until the patient is stabilized and optimally managed[3]. Exercise stress testing is reasonable for patients who have unknown cardiovascular risk to assess exercise capacity and development of symptoms, ischemia, or arrhythmias. Accordingly, SA is acceptable in patients who can achieve ≥3-5 METs without angina, excessive dyspnea, ischemic ST-segment changes, cyanosis, hypotension or arrhythmias[3,19]. Finally, cardiac rehabilitation and regular exercise in patients with CVD are reasonable and can be useful in reducing the risk of complications during SA. It increases the maximum exercise capacity and leads to reduction of maximal coital BP and HR[13,20].

Angina pectoris

Sexual activity is possible in patients with no or mild angina pectoris (class I or II), while it should be postponed in others until their condition is stabilized or optimally controlled[3,15-18]. In patients with intermediate symptoms or whose risk is unknown, exercise stress testing can provide additional information on exercise tolerance and estimate the severity of ischemia. If the person can achieve energy consumption ≥3-5 METs, then the risk of ischemia during SA is very low.

Previous myocardial infarction/coronary revascularization

After myocardial infarction, asymptomatic patients, those without signs of ischemia during exercise stress testing, and subjects with complete coronary revascularization performed are at low cardiovascular risk during SA. Current guidelines suggest beginning of cardiac rehabilitation as soon as possible, and SA ≥1 weeks after myocardial infarction[3]. SA may be resumed several days after percutaneous coronary intervention, or 6-8 weeks after coronary artery bypass surgery or non-coronary open heart surgery[3,15-18,21,22]. In case of incomplete revascularization, exercise stress testing may provide information on residual ischemia[3].

Heart failure

Sexual activity is possible in patients with compensated and/or mild HF (NYHA class I or II)[3,23-26]. Sexual problems occur in 60%-87% of patients with HF, including significant reduction in sexual interest and activity. Sexual dysfunction correlates with symptomatology, but not with ejection fraction. Most patients with HF give priority to improving QoL (including sexual component) rather than survival[27-32]. Optimal treatment increases the probability of safe and satisfactory SA. Exercise improves QoL and can affect SA. Patients who have shortness of breath or fatigue during SA can be advised to take certain positions during intercourse that reduce the level of physical exertion[33-35].

Valve disease

Sexual activity is acceptable only in patients with mild/moderate valve disease, who are asymptomatic or with mild symptoms, as well as in patients with normal function of artificial valves, and those who have undergone successful trans-catheter valve correction[3].

Time to resume SA after cardiovascular surgery procedure is discussed below. Exercise stress testing

can be useful in estimating individuals with asymptomatic moderate or severe aortic stenosis and those with other asymptomatic severe valve dysfunction. Exercise echocardiography can give other helpful information on the physiological response to exercise[3].

Arrhythmias and electrostimulation

Sudden cardiac death is very rare during SA in general population[36-38]. The risk of ventricular arrhythmia during SA in patients with CVD, including those with implanted cardioverter defibrillator (ICD), does not seem to be greater than during comparable physical exertion or stress testing[39,40]. SA is acceptable for patients with atrial fibrillation or flutter and good control of ventricular frequency, with properly controlled supraventricular tachycardia, with pacemakers, with ICD implanted for primary prevention, and those with ICD used for secondary prevention, in whom moderate physical activity (≥3-5 METs) does not precipitate ventricular tachycardia or fibrillation and who do not receive frequent multiple appropriate shocks[3]. It is not acceptable in individuals who have more device activation until arrhythmia is stabilized or is not under optimal control[3]. SA often decreases after ICD implantation, primarily due to concerns of patients and partners about the danger of cardiac arrest during sexual intercourse[41-43]. Exercise stress testing can provide proof of enough security to the patient that sexual activity is unlikely to lead to the incidence or worsening of arrhythmias[44]. Also, researches have shown that there is minimal risk of so-called 'electric shock' during ICD activation for partners because it is very small energy that rarely reaches surface of the patient's body[45].

Congenital heart disease

Sexual activity is acceptable for most patients who have no decompensated or advanced HF, symptomatic or severe valve disease, and uncontrolled arrhythmias[3]. Published guidelines allow unlimited physical activity for asymptomatic patients with closed or small atrial or ventricular septal defect, mild coarctation of the aorta, closed *ductus arteriosus*, and other mild congenital defects with normal right-sided heart volume without pulmonary hypertension and without significant outflow tract obstruction of the left or right ventricle[46-49]. Thus, SA may be acceptable in most patients with congenital heart disease. It is doubtful in significant pulmonary hypertension, cyanosis, severe outflow obstruction of left ventricle, uncontrolled arrhythmias, and anomalous coronary artery, which passes between pulmonary artery and aorta.

Hypertrophic cardiomyopathy

Hypertrophic cardiomyopathy (HCM) is a heterogeneous genetic heart disease and it is the most common cause of arrhythmia-related sudden cardiac death in young people, including athletes[50,51]. About 70% of patients with HCM have left ventricle outflow obstruction, either during rest or physiological exertion regardless of whether or not there are limiting symptoms[52,53]. The connection between physical activity and sudden death is to be assigned to the occurrence of ventricular tachycardia/fibrillation, which raises concerns that strong SA may increase the risk of sudden death in these patients[51].

However, there are no documented cases of cardiac arrest related to SA in that population. It is in line with the recommendation according to which patients with HCM should not participate in intense competitive sports or similar activities[54]. Thus, SA is possible in most patients with HCM, and it should be postponed in symptomatic patients with HCM until their condition is stabilized or optimally controlled[3].

Cardiovascular Drugs and Sexual Function

Cardiovascular drugs that can relieve symptoms and improve survival should not be avoided because of the concern about their potential impact on sexual function[3]. If the patient complains of sexual dysfunction, then it should be evaluated whether it is associated with primary CVD, cardiovascular drug adverse effect, or it is a consequence of anxiety or depression[3].

Various cardiovascular drugs can cause erectile dysfunction (ED)[3]. In patients who developed ED during treatment with thiazides and β-blockers, using Henle's loop diuretics and nebivolol are reasonable alternative. Some males treated with spironolactone can experience antiandrogen side effects with compromised sexual function and activity (e.g., decreased libido, ED, and gynecomastia), and eplerenone may be reasonable alternative[55,56]. Women treated with thiazides and aldosterone may have problems with vaginal lubrication or menstrual irregularities[57,58]. Studies proved positive

effect of valsartan in improving ED, including orgasmic function, sexual desire and satisfaction with sexual life in patients with arterial hypertension, especially in obese and diabetics. The basic mechanism of this action is the inhibition of local angiotensin converting enzyme, but there are other indirect mechanisms. Appropriate alternative is treating ED with phosphodiesterase inhibitors (PDE5)[59].

Pharmacotherapy of Sexual Dysfunction

PDE5-inhibitors

These medications prevent the breakdown of cGMP and increase the concentration of nitrogen oxide, with vasodilatation and improvement of erectile function[3,60-62]. Tadalafil and sildenafil are used in patients with pulmonary hypertension. There are several main facts about these drugs[3,60-62], as follows: PDE5-inhibitors are useful in the treatment of ED in patients with stable CVD; safety of treatment with PDE5-inhibitors is unknown in patients with severe aortic stenosis or HCM; PDE5-inhibitors should be avoided in patients treated with organic nitrates; and in patients with chest pain and/or acute coronary syndrome, organic nitrates must be avoided within 24 hours of the application of sildenafil or vardenafil, or for 48 hours after using tadalafil.

Previous studies have not proven that one drug is more effective and/or safer than the others. When used with other cardiovascular drugs, PDE5-inhibitors could be associated with symptomatic hypotension (alpha-blockers) and prolongation of QT-interval[3,60,62].

In 2015, Food and Drug Administration (FDA) approved flibanserin (selective serotonin reuptake inhibitor, SSRI) for treating sexual dysfunction in premenopausal women[63-67]. It can be caused by mental and/or physical factors such as stress and hormonal changes during the woman's life. With the exception of hypotension and syncope, especially in combination with alcohol or liver enzyme CYP3A4-inhibitors, the drug has been proven to be generally safe for use through testing on more than 11,000 women.

Local estrogen therapy

Estrogen treatment through vagina or vulva is effective for alleviating symptoms of vaginal atrophy and dyspareunia, which usually occur in menopause and postmenopause[3,68]. Oral administration of estrogen and progesterone may lead to increased cardiovascular risk, which has been excluded with local estrogen therapy. Moreover, by vaginal application, systemic absorption is minimal by vaginal application and even lower by vulva, so there is no noticeable impact on cardiovascular risk[69-71].

Herbal drugs

It may be reasonable to warn patients with CVD of the potential adverse events with the use of herbal medications with unknown ingredients, taken for the treatment of sexual dysfunction[3]. Some of these may contain compounds (e.g., PDE5-inhibitors, yohimbin, or L-arginine) which may interact with cardiovascular drugs, have vasoactive or sympathomimetic effect, cause raise or reduce systemic BP, and are associated with adverse outcomes in patients with coronary artery disease[72-75].

Psychological Problems and Sexual Counseling

It is necessary to estimate anxiety and depression because a combination of psychological disorders and decreased sexual function is common in CVD[76-79]. SA or pleasure often declines due to fear of patients or partners who believe that SA would worsen physical status or cause death[77,80]. Counseling by health professionals is necessary and useful to help patients and partners in restoring SA after acute cardiac event, newly diagnosed CVD, or after implantation of the ICD[3,81-85]. General recommendation is that patients should be involved in sexual activities rested, they should avoid unknown environment and partners in order to reduce stress during SA, avoid consuming heavy meals or alcohol before SA, and practice positions that do not restrict breathing. Each patient should be approached individually, since reaching orgasm may require greater effort and may not be a realistic initial goal in some patients.

Summary of AHA Guidelines and Conclusion

In CVD patients, complete evaluation of physical condition is recommended prior to involvement in SA. Stable symptoms and good functional capacity carry a

low risk of adverse cardiovascular events. In others, SA should be postponed until their condition is stabilized or optimally controlled. In subjects with doubtful risk, exercise stress testing can give additional information on the safety of SA. Cardiovascular drugs that can relieve symptoms and improve survival should not be avoided because of the concern about their potential impact on sexual function.

Phosphodiesterase inhibitors are safe and effective in patients with CVD, but contraindicated during treatment with nitrates. Psychological conditions, such as anxiety and/or depression, may have influence on sexual function. Sexual counseling of both patients and their partners has a role in recovery of sexual function and habits.

Further researches of SA in certain CVDs are needed, especially in women and older persons. Future diagnostic, pharmacological and surgical guidelines for treating CVD patients should be much clearer in defining for SA. It is necessary to raise awareness of a multidisciplinary approach, including sexual counseling as one of the most essential items in daily work with these patients and their partners.

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Sažetak

SEKSUALNA AKTIVNOST U BOLESNIKA SA SRČANIM BOLESTIMA

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U ovom preglednom članku donosimo pregled posljednjih smjernica koje je objavilo Američko kardiološko društvo o seksualnoj aktivnosti u bolesnika s koronarnom bolešću, srčanom insuficijencijom, strukturnim bolestima srca, aritmijama, ugrađenim elektrostimulatorom ili kardioverter defibrilatorom, kao i o mogućnostima liječenja seksualne disfunkcije. Seksualna aktivnost je ekvivalent blage/umjerene tjelesne aktivnosti tijekom kratkog vremena. Za većinu bolesnika je preporučljivo da se uključe u seksualne aktivnosti nakon sveobuhvatne procjene fizičkog stanja. Oni sa stabilnim kardijalnim simptomima i dobrom funkcionalnom sposobnošću imaju nizak rizik od neželjenih kardiovaskularnih događaja. Ostali zahtijevaju liječenje ili stabilizaciju prije uključivanja u seksualne aktivnosti. Ergometrijsko testiranje je korisno u procjeni sigurnosti spolne aktivnosti u bolesnika s upitnim ili neodređenim rizikom. Liječenje seksualne disfunkcije uključuje seksualno savjetovanje bolesnika i partnera te farmakološku terapiju kod muškaraca inhibitorima fosfodiesteraze (sildenafil, tadalafil, vardenafil), koji su se pokazali sigurnima i učinkovitima, a u žena inhibitorima ponovne pohrane serotonina (flibanserin) i lokalnom vaginalnom aplikacijom estrogena. Zaključno, bolesnicima u svakodnevnoj kliničkoj praksi treba pristupiti individualno i multidisciplinarno u cilju otkrivanja i otklanjanja čimbenika koji ometaju normalnu spolnu aktivnost i dovode do narušavanja kvalitete života.

Ključne riječi: *Kardiovaskularne bolesti; Seksualna disfunkcija, fiziološka – farmakoterapija; Seksualno ponašanje; Kvaliteta života*