Sexual Activity After Myocardial Revascularization Surgery

Ignacio Dávolos, MD[1,2,3], Enrique González Naya, MD[3], and Maya Marini Marcilla, MD[3]

From the [1] Cardiologist, MTSAC. Cardiovascular Rehabilitation at Hospital de Clínicas José de San Martín, Exercise Cardiology Council, Epidemiology and Cardiovascular Prevention Council of the Argentine Society of Cardiology, [2] Cardiologist, Specialist in Sports Medicine. Head of Cardiovascular Rehabilitation at IADT, Exercise Cardiology Council of the Argentine Society of Cardiology and [3] Gynecologist, Obstetrician, Sexologist. Obstetrics Coordinator at Sanatorio de la Trinidad Palermo. Collaborator in the Sexology and Sexual Medicine Area, Urology Division, Dr. Enrique Tornú Hospital. Member of the Society of Obstetrics and Gynecology of Buenos Aires and of the Argentine Society of Human Sexuality.

Abstract: After a cardiovascular event, patients and their families often face numerous changes in their lives. Poorly addressing physical and psychological challenges can lead to an impaired quality of life. Sexuality is an aspect of quality of life that is important to many patients and couples who can be negatively affected by a cardiovascular event. Sexual health requires a positive and respectful approach to sexuality and sexual relationships. The timing of return to sexual activity after myocardial revascularization surgery is a gap in cardiology practice. We know from the literature that coronary patients have a decrease in sexual activity. There are barriers from the medical environment such as lack of knowledge, confidence, and training, and many others that arise from the patient's perspective, which do not allow generating a space to address sexual problems. This review aims to familiarize and update the cardiologist, bringing knowledge and resources closer to the impact of myocardial revascularization surgery on the quality of

Conflict of Interest: The authors have no conflicts of interest to disclose.
Curr Probl Cardiol 2021;46:100660
0146-2806/$ – see front matter
https://doi.org/10.1016/j.cpcardiol.2020.100660

sexual life of patients, always encouraging multidisciplinary management among doctors and other professionals in health. (Curr Probl Cardiol 2021;46:100660.)

Introduction

The challenge of return to sexual activity (SA) after myocardial revascularization surgery (MRS) is often considered a problem; coronary heart disease patients experience a high prevalence of anxiety and depression. They frequently experience physical and mental concerns regarding SA, which as we know is a critical component of people's mental and psychological health, and impaired sex life can reduce quality of life. In the postoperative period of MRS, fears from the patient and partner, and even the low participation of the doctor in giving instructions, turn out to be the most frequently observed causes.[1] Generally, it is observed that returning to SA takes more work than recovering other habitual activities, such as mood, job satisfaction, and family relationships.

Being the original source from 1994 and that there are no different data from more recent publications, it is estimated that only 25% of patients return to SA after a diagnosis or cardiovascular procedure, around 50% decrease their usual SA and 25% do not resume it.[2-5] Therefore, it should be an unavoidable topic in the postoperative consultation, between the doctor and the patient, whether the patient received education in this regard during hospitalization or not.

On the one hand, we observe an increasing number of older individuals, in whom chronic degenerative diseases (arterial hypertension, dyslipidemia, diabetes mellitus, and ischemic heart disease) predominate, but at the same time advances in medicine, invasive procedures and more distant mortality have been developed, resulting in physically and sexually active older adult patients. On the other hand, the prevalence of ischemic heart disease in younger individuals has also been increasing, and of course SA is an extremely important topic.

The considerable prevalence of sexual dysfunction among cardiovascular patients is associated with physical changes in the disease, mental changes, drug side effects, and other factors. Probably the most common cause of this disorder is erectile dysfunction, which produces a decrease in sexual satisfaction, a feeling of deprivation, risk of poor mental health and, consequently, disintegration of family life.

There are various associations between cardiovascular disease (CVD) and SA, although some of them are statistically very rare, the literature

shows us that SA can trigger angina pectoris, acute myocardial infarction (AMI), arrhythmias, and sudden death.[6-9] There may also be sexual dysfunction secondary to cardiovascular drugs. Treatment of erectile dysfunction with phosphodiesterase-5 inhibitors is often contraindicated in this type of patient.[10,11]

Regarding the bibliography, there are few publications that refer to the SA and evolution of women after cardiovascular events, more precisely after the postoperative period of cardiac surgery.

This review aims to familiarize and update the cardiologist, bringing knowledge and resources closer to the impact of postoperative MRS on the quality of sexual life of patients, encouraging multidisciplinary management among doctors and other health professionals.

Materials and Methods

The bibliographic search strategy was carried out during the months of May and June 2020 and articles published in the period between 1980 and 2020 were selected. For highly relevant reasons, 3 publications dating from years prior to the date have been included.

The Pubmed advanced search engine was used, combining keywords (title/abstract) and MESH terms: "cardiac surgical procedures" AND "coronary artery bypass" AND "quality of life"; "cardiac surgical procedures" AND "coronary artery bypass" AND "quality of life" NOT "angioplasty, transluminal, percutaneous coronary" NOT "heart transplantation"; "Coronary artery bypass" AND "sexual behavior"; "coronary artery bypass" AND "sexual behavior" AND "rehabilitation"; in no case were there any language restrictions.

Selection of studies included initial selection of titles and abstracts, followed by an evaluation of full-text reports of all potentially relevant trials.

Among the combinations of terms, 65 publications were found, excluding those referring only to individuals with erectile dysfunction, arrhythmias, and those describing electrocardiographic findings.

A manual search was performed in Lilacs, Cochrane, and Medline and articles from the bibliography of the covered studies have been included to identify any other study not retrieved by the initial search; and those exclusively referred to individuals with AMI because cardiovascular responses to SA have been studied in this group of patients.

Results

Definition According to Scenario

The definition of SA is a methodological challenge. The existence of different cultures makes different sexual behaviors. A few years ago, Stein et al proposed the term KiTOMI (Kiss, Touch, Oral sex, Masturbation, Intercourse) so that the medical recommendation is made according to the patient's clinical condition and CVD.[12]

The family and monogamous scenario has a very modest coronary risk, in fact epidemiological studies suggest benefits in terms of longevity for sexually active individuals. Sedentary patients have a 2 to 3 times higher relative risk of AMI during intercourse than physically active patients, due to greater sympathetic activation. The risk of AMI is generally low, but there is an increased risk when SA is extramarital. Regarding the latter, energy expenditure is higher (6-7 METS) and involves other issues such as increased tension, higher degree of excitement, advanced age, alcohol consumption, heavy intake, a younger couple, and eventually the use of sildenafil or other stimulants.[13]

The metabolic and hemodynamic demand of SA is similar to that of daily physical activity (3-5 METS), although there are interindividual variations.[13] Cardiovascular and metabolic responses to SA appear to be more related to arousal than physical exertion.

The human sexual response was studied and described by Masters and Johnson in 1966. In 1977, the sexologist Helen Kaplan added the Desire phase.[14,15]

The preponderance of the literature with respect to SA suggests that the average maximum heart rate (HR) during sex varies from approximately 104-131 beats per minute (average maximum HR 120-130 bpm) and the maximum systolic blood pressure of 150-180 mm Hg. Regarding energy expenditure, it is considered that it is equivalent to 2 METS (before orgasm) and 5-6 METS (during orgasm)[13] (Figure).

Despite these generalizations, there are variations in hemodynamic and metabolic parameters, both interindividually and between different sexual activities, whether it is intercourse in a superior position, in supine position, noncoital stimulation by the partner and self-stimulation.[16]

Sexual dysfunction is quite frequent among older people and negatively affects their health-related quality of life, psychological well-being, marital quality, and the risk of adverse cardiovascular events. In CVD patients, this is probably more frequent than in younger patients, as they often combine high levels of anxiety and stress, low fitness, unhealthy

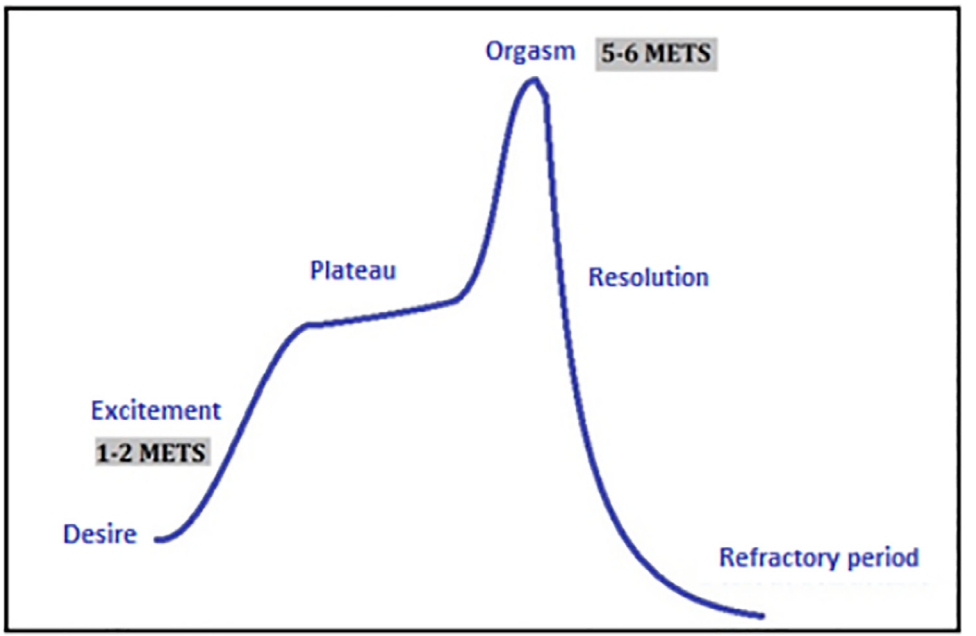

FIG. Diagram that reflects the correlation between METS and phases of the human sexual response cycle.[13]

TABLE 1. Causes of erectile dysfunction

Organic	Neurological, hormonal, cavernous, drug-induced abuse, pharmacological, vascular, anatomical
Psychological	Psychosocial stress, anxiety, depression (emotional, family, economic, work)

body composition, excessive alcohol consumption, smoking, and regular use of cardiovascular medications. Therefore, it is important to bear in mind that erectile dysfunction is a marker of hidden CVD and a marker of progression of CVD[17] (Table 1).

Erectile dysfunction is approximately 35% between 40 and 70 years of age, while it is close to 75% in those over 80.[18] The severity of ischemic heart disease is correlated with erectile dysfunction. Various publications postulate cardiovascular risk factors (CVRF) as predictors of post-MRS sexual function. The impact of CVRF separately on the erectile function index used showed that neither age, smoking, hypertension, and dyslipidemia had a negative influence separately, with the exception of diabetes mellitus.[19,20] Likewise, other studies address different factors that predict erectile dysfunction in the postoperative period, among which sexual knowledge, the duration of the disease, communication with the partner, the use of an extracorporeal circulation pump and the state of presurgical erectile function stand out, the latter being the most representative. Although the concept is developed within the framework of written questionnaires, it is clear that individuals with good presurgical erectile function have a high probability of preserving it, and those who have some degree of erectile dysfunction prior to surgery, surely will not improve it postoperatively, since its dysfunction is possibly due to previous penile vascular and tissue damage.[21,22]

Regarding the extracorporeal circulation pump, the highest number of patients reporting postoperative improvement in erectile function was found in the group without a pump. However, there were no significant changes in the ultrasound data (systolic peak, final diastolic speed and resistance index), concluding that the characteristic of the MRS can be considered a predictive factor of sexual function but it is not clearly explained how it affects the tissue of the penis without any change in the vascular bed.[20,23]

It should be noted that the vast majority of publications refer only to men's sexual behavior. Regarding the female sex, the data points toward higher 60-day mortality in women post-MRS isolated or combined, due to the fact that they possibly arrive later to the surgery expressing an underestimation of their CVD.[24-31]

The stage of elderly patients is also poorly represented in the studies, since postoperative quality of life evaluations do not usually include sexual behavior. A single Finnish study showed significant improvement at 6 months in mobility, breathing, habitual activities, symptoms, vitality, and SA.[32] Although it is a subgroup of individuals that probably present more complications in the postoperative period of isolated or combined MRS, it is considered that they can undergo cardiac surgical procedures with reasonable risk and show a marked improvement in their symptoms, functional status, and quality of life.[33]

Risk Stratification and General Strategies

Princeton was the city chosen for the year 1999, 2006, and 2012 to hold expert conferences for the evaluation of scientific evidence between SA and cardiovascular risk stratification, from which guidelines for the management of erectile dysfunction have been developed. and the practice of SA.[34-36]

The risk is classified as low, intermediate, or high. Intermediate risk individuals require restratification by cardiological evaluation and eventually stress test. In high-risk patients, the SA will be deferred until the cardiovascular condition of the individual is stabilized (Table 2).

TABLE 2. Risk stratification for return to SA. (Adapted from DeBusk R, et al)[34]

Low	Intermediate	High
- Asymptomatic moderate intensity exercise - Less than 3 CVRF - Controlled hypertension - Mild SCA - Post asymptomatic AMI (event happened >6-8 weeks) - Post revascularization, without residual ischemia or symptoms (3-4 weeks) - Mild LV dysfunction (NYHA I) - Mild valve disease	- Asymptomatic and ≥3CVRF - Increased cardiovascular risk, sedentary - Moderate SCA - Post AMI (2-6 weeks) - Ventricular dysfunction (NYHA II) Fey 40% - Noncardiac atherosclerotic sequela (peripheral arterial disease, stroke/TIA history)	- Unstable angina - Uncontrolled hypertension - CHF (NYHA III, IV) - Recent AMI (<2 weeks) - Malignant arrhythmia - Obstructive hypertrophic cardiomyopathy - Moderate-severe valve disease

AMI, acute myocardial infarct; CHF, congestive heart failure; LV, left ventricular; SCA, stable chronic angina; TIA, transient ischemic attack.

According to De Busk's classification; low-risk patients may be allowed SA KiTOMI (meaning SA may include kissing, touching, oral sex, masturbation, and penetration), moderate-risk patients may have SA KiTOM (all of the above except penetration) and the high risk ones only KiT (SA only kiss and touch).

Clarifications

- In stable chronic angina (SCA), the functional reserve is greater than that required by the SA. The relative risk of a coitus-induced coronary event is not higher in patients with established coronary disease. Non-invasive evaluation is also suggested. The existence of mild ACE does not rule out the existence of severe obstructions.[34]
- In patients with ventricular dysfunction, cardiovascular rehabilitation (CR) allows reclassification to a lower risk.[34]
- SA could be resumed 6-8 weeks after MRS or noncoronary open heart surgery. In the event of incomplete revascularization, exercise stress tests can provide information on residual ischemia.[34,37]
- Regarding the graduated ergometric test, the functional capacity and exercise tolerance are extrapolated to the ability to maintain SA, being useful in patients who are not low risk and in whom functional capacity is unknown. In general, individuals who can perform activities of daily living that require more than 3-5 METS are authorized to maintain SA. If signs or symptoms of residual ischemia (dyspnea, angina, cyanosis, ST-segment abnormalities, arterial hypotension, or arrhythmias) appear, the SA should be restarted according to ergometric test.[38] In elderly, less

TABLE 3. General strategies for the return to SA. Taken from Steinke et al[39]

Recommendation Class I B	Explain alarm signals
Recommendation Class IIa B	Explain energy consumption
	SA risks
	Gradual SA as a bridge to return to SA
	Physical training and CR
Recommendation Class IIa C	Effects of pharmacological treatment
	Environment and surroundings suitable for SA
	Sexual/anal/oral position
Specific recommendations (Class IIa B)	Resume SA in 6-8 weeks (sternal scarring)
	SA increases intrathoracic pressure (stress, breathing)

CR, cardiovascular rehabilitation; SA, sexual activity.

trained patients, carriers of heart failure or severe coronary heart disease, the 6-minute walk test will take place.

At the time of the consultation, the treating doctor should take into account the following recommendations to educate the patient with CVD about their SA (Table 3).

SA is recommended during the first hours of the morning, avoid unusual positions, and that the couple commands the sexual act to gain confidence. Avoid SA after heavy food or alcohol intake. An important factor to take into account is the temperature of the room, and a warm environment is recommended.[39]

As mentioned above, it is not until exertion is combined with excitement that the greatest expenditure of energy occurs. SA can be compared to an exercise load of 2-3 METS in the preorgasmic stage and -6 METS during orgasm; the equivalent of climbing 2 stories upstairs. Some examples of energy expenditure are: top man 3.3 METS versus woman 2.5 METS; self-stimulation 1.8 METS, stimulation by the partner 1.7 METS.[40]

Giving alarm guidelines is very important. Patients should be aware that HR, blood pressure, and respiratory rate are expected to increase during SA. We should also report that in the context of SA, the relative risk of presenting a cardiovascular event is low. However, you should consult your doctor if symptoms such as chest pain, dyspnea, palpitations, dizziness, or asthenia appear the day after SA. In patients with stable chronic coronary heart disease under treatment with nitroglycerin and with symptoms during SA, this should be ingested before it. The same occurs with the use of oxygen in patients who usually require it for activities of daily living.

The return should be gradual since it is synonymous with trust. Vital signs are gradually increased and this allows patients to assess their tolerance to SA. Needless to say, physical training improves exercise capacity and lowers the peak HR during intercourse.

Sexual Advice

The concerns and needs of the couples of individuals suffering from a cardiovascular event are real and no less important. The first publications in this regard began in the 1980s.[41] Sexual counseling refers to the introduction of the concept of sexual health; defined by the World Health Organization in 2002, as the state of physical, emotional, mental, and social well-being in relation to sexuality. It is not simply the absence of

disease. Sexual health requires a positive and respectful approach to sexuality, including the possibility of obtaining pleasure and safe sexual experiences; in other words, improve sexual performance and satisfaction.[42]

Although the American and European guidelines recommend sexual advice for return to SA after a coronary event, it is not a fact that usually occurs in medical practice. According to data from international registries, 70% of doctors do not talk about sexuality (risks, instructions, CR), only 40% of patients and 30% of couples consider having received sexual information 1 year after the cardiovascular event, and moreover, patients consider that dialogue with the doctor is the most important factor to resume SA.

A few years ago it was postulated that cardiac patients with increased sexual concerns are less likely to resume their SA as often as before a cardiac diagnosis. For some patients, this may be a short-term decrease in SA, while for others the change may be permanent and negatively affect the couple's relationship.[43] Various sociodemographic factors, such as lack of a sexual partner, education, unemployment, insufficient income, or smoking, can contribute to a change in sexual function. In cardiac patients, a study suggested that the presence of sexual problems may vary depending on the type of SA, and some require more effort than others. For symptomatic cardiac patients, this may be an important consideration regarding return to SA. Furthermore, cardiac and noncardiac comorbidities can affect the ability to be sexually active, including the number and type of comorbidities such as stroke, emphysema, or kidney disease.[44]

Role of Cardiovascular Rehabilitation and Sexual Quality of Life

The change proposed by Drs Hellerstein and Ford in 1950 laid the foundations for home CR by promoting the abandonment of bed rest after presenting a coronary event. This radically improved expectations for the frailest and elderly patients with CVD.[45]

CR improves the functional capacity, aerobic and musculoskeletal fitness of all participants. In addition, it improves self-confidence, self-efficacy and body image, presenting an indirect positive effect in reducing fears related to SA after a cardiovascular event.[46] Cardiovascular rehabilitation is synonymous with physical and mental health, and therefore, a strategic ally to improve SA.[47]

Some authors suggest that the integration (observation) of the couple in the CR sessions tends to decrease anxiety in the couple.

Furthermore, it is always a good opportunity to clarify sexual doubts and prejudices.[10,38]

Although there are no meta-analyzes in this regard, semi quantitative approaches have been published that conclude the positive effect of CR on sexual function and frequency. The impact of CR on some endpoints, such as the resumption of postevent SA and satisfaction, remains controversial.[48,49] Some reports on sex education during CR have shown improvement in libido, erection, sexual satisfaction, frequency of erection, and sexual enjoyment from 50% to 87%.[50-52]

Regarding sexual satisfaction, it is suggested that treatment through doctors specialized in sexual therapy could play an important role.[53] In therapy, the couple is involved and focuses on the satisfaction of each phase of the sexual response cycle. In patients with erectile dysfunction, it is sought that the patient enjoys SA even without achieving an erection, therefore, there is no feeling of failure. However, the available information does not show that this therapy has a positive impact on partner satisfaction. It is possible that the latter is due to the fact that progress in sexual satisfaction is not reflected in other aspects of the marital relationship.[54]

Another aspect that should not be neglected is socioeconomic status and comorbidities as preoperative predictors of quality of life, because they are associated with postoperative morbidity, survival, and quality of life. Patients with a lower socioeconomic level have a disproportionate greater burden of disease and more complications of CVD. Although it is unknown why the patients of low socioeconomic level present more functional deterioration; not only can it alert us to discriminate patients with a higher risk of low quality of life in the postoperative period, but it is also extremely important for the allocation of resources and discharge planning for recovery after hospital discharge.[55]

Discussion

The SA taboo is oversized when health, especially cardiovascular, is involved. It is enough to look at the scarce amount of medical publications that can be found in traditional search engines in the last 40 years, to realize the infrequent handling by the cardiology community.

Female sex and older adults are clearly the least represented subgroups. In the elderly population it will be very useful to carry out a careful evaluation of the fragility and cost-benefit of the procedure.[56]

Regarding the analysis of distinction and discernment of cardiovascular risk factors, deficiencies are revealed in terms of instruction and

knowledge on the part of patients.[57-59] It is true that the focus of learning and training should include not only patients, but also the patient's partner and the doctor. As is known, there is discomfort on the part of the doctor during questioning, and on the other hand, many patients do not want to talk about their SA.[60]

A few years ago, a Serbian publication questioned health professionals for not doing their job correctly when addressing "sexual rehabilitation", making it clear that ignorance and prejudice were the main reasons. Likewise, the low participation of the doctor in giving instructions (around 20%) and the resistance of all professionals during the hospitalization of the patient, especially nursing, are highlighted.[61] In Ireland, surveys were also carried out with health professionals with the aim of documenting the usual practice and assessing the needs of professionals in the areas of CR regarding the evaluation and sexual management of patients. The results support previous findings, and indicate that staff believe that patients do not expect them to ask about their sexual concerns. Barriers included a general lack of confidence (45%), knowledge (58%), and training (85%). In addition, a fact not irrelevant, was that in a high percentage (around 90%) the doctors responded that sexuality is too private a topic to discuss with the patient; and that it should only be discussed if it was initiated by the patient.[62] The aforementioned barriers that hinder an open patient-doctor dialogue about SA vary in the works consulted.[63-65]

The magazine articles, chapters and consensus that we have selected based on the bibliographic search carried out, speak for themselves. 36% of the publications come from areas of clinical cardiology, 18% from sexual health, 12% from nursing, and the rest from internal medicine or surgery, showing that the SA approach requires horizontal participation, predominantly clinical which shares the knowledge and skills of other specialties and integrates the biomedical, behavioral and social sciences.

Implementing an intervention on sexual counseling is not an easy task, since it is necessary to intervene on 3 levels (patient, partner, doctor) through conscious training.[66] Usually, the anamnesis does not include information about the SA of our patients and it is common for the doctor to avoid speaking and asking about topics in which he does not feel capable of giving an answer, a solution or indicating a treatment.[67]

Through this review, we have learned that the approach must be multidisciplinary and the goal is to achieve maximum quality of SA within the patient's capabilities.

To achieve these objectives, the ideal approach should include predictable and comprehensive long-term programs, from knowing patient comorbidities as predictors of low-postoperative quality of life, to

encompassing regular exercise, modifying risk factors, supporting psychological and appropriate use of cardiovascular drugs. With regard to the latter, many of them negatively influence the sphere of sexual response. It is important to keep this in mind when prescribing, looking for an alternative drug that does not influence sexual response if such a possibility exists. This approach requires a multidisciplinary team, which focuses not only on CR but also on the general improvement of the quality of life related to the health of patients.[68-71]

For all this, we must emphasize in our practice that there is sex life after the MRS, that we have to properly question and accompany the patient and partner on this path. It is very important that the health professional develops communication skills so that the approach is gradual, sensitive, and pleasant. We must also create a permissive climate for patients to raise questions, and in this regard the delivery of brochures related to sexual concerns is recommended.[72]

We must begin to think that SA is part of the usual medical prescription, as we do with the food plan, medication and physical activity. It is important to take into account the possibility of referral to a specialist sexology doctor and to work in an interdisciplinary way, as we usually do with other medical specialties.

Lastly, we must remember that each patient is unique, and so is its bonding emotional context, which makes sexuality also unique. And for daily practice, we must always assume that the patient wants to listen to medical advice.

Acknowledgment

The authors acknowledge Dr Daniel Piñeiro for support.

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