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Effects of coronary artery bypass graft surgery and coronary stent implantation on erectile function in the treatment of coronary artery disease

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Abstract

We aimed to investigate the changes in International Index of Erectile Function-5 (IIEF-5) scores before and after the procedures in patients who underwent coronary artery bypass graft surgery (CABG) or coronary stent implantation due to coronary artery disease (CAD). This prospective study included male patients who underwent 31 CABG and 47 coronary stent implantations. The patient's age, height, weight, smoking history, records of previous interventions, beta-blocker usage, comorbidities (diabetes mellitus (DM), hypertension (HT), hyperlipemia (HL)), and nocturnal penile tumescence (NPT) data were recorded. Patients were asked to fill out the Turkish-validated IIEF-5 form regarding their sexual lives six months before the procedure and during the 6-month post-procedure follow-up. Demographic data, β -blocker usage, and pre-and post-procedural IIEF-5 score changes of patients who underwent CABG and coronary stent implantation were compared through univariate analysis (UVA). There were no statistically significant distinctions found between the two groups concerning body mass index (BMI), current smoking, DM, HL, HT, NPT, and β -blocker use. The difference in IIEF-5 score before and after treatment was not statistically significantly different between the two groups. In UVA, it was found that age and DM were associated with an IIEF-5 score decrease. In multivariate regression analysis (MVA), Age and DM were found to be predictors of IIEF-5 score decline (OR=1.02, 95% CI=1.01-1.04, $p=0.001$ and OR=1.56, 95% CI=1.15-2.04, $p<0.001$). We observed that the negative impact on sexual function in CAD treatment is more attributable to factors such as age and DM rather than treatment choice.

Keywords: Erectile function, coronary artery disease, coronary stent implantation, coronary artery bypass graft surgery

Introduction

Erectile dysfunction (ED) is characterized by the inability to attain or maintain an erection sufficient for satisfactory sexual performance [1]. This condition has been documented to impact approximately 322 million men worldwide and is documented to affect 52% of male adults aged 40 to 70 in the United States [2,3]. In the etiology of ED, both organic and psychogenic factors play a role. Studies have indicated associations between ED and age, risk factors for atherosclerosis, and coronary artery disease (CAD) [4]. There is a strong association between CAD

and cardiovascular risk factors with ED. In male patients with CAD, the prevalence of ED has been shown to range from 46% to 75% [3,5]. Among the treatment options for CAD, invasive interventions such as coronary artery bypass graft surgery (CABG) and coronary stent implantation hold significant roles [6]. There are studies investigating the impact of these interventional methods on ED [4,7].

In this study, we intended to explore the changes in International Index of Erectile Function-5 (IIEF-5) scores before and after the procedures in patients who underwent CABG or coronary stent implantation due to CAD.

CITATION

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Material and Methods

This study has been prepared in accordance with the principles of the Helsinki Declaration and has been confirmed by the Türkiye Yüksek İhtisas Training and Research Hospital Institutional Review Board (IRB number: 332/6).

This prospective study includes 113 male patients diagnosed based on the results of coronary angiography conducted at the coronary angiography unit of Türkiye Yüksek İhtisas Training and Research Hospital between October 2014 and July 2015. Individuals unwilling to participate in the study, those without an active sexual life, individuals who have received or are currently undergoing treatment for any malignancy, patients with coronary artery disease receiving medical therapy, and individuals for whom information could not be obtained were excluded from the study. A total of 78 male patients were included in the study. Following coronary angiography, CABG was decided for 31 patients, while coronary stent implantation was performed for 47 patients.

The patients' age, height, weight, smoking history, records of previous interventions, beta-blocker usage, comorbidities (diabetes mellitus (DM), hypertension (HT), hyperlipemia (HL)), and nocturnal penile tumescence (NPT) data were recorded. Patients were requested to fill out the Turkish-validated IIEF-5 form regarding their sexual lives six months before the procedure and during the 6-month post-procedure follow-up. Demographic data, beta-blocker usage, and pre- and post-procedural IIEF-5 score changes of patients who underwent CABG and coronary stent implantation were compared through univariate analysis.

The research data were statistically analyzed using the Statistical Package for Social Sciences (SPSS) software, version 22.0 (SPSS Inc., Chicago, USA). The distribution of the data was

tested using the Kolmogorov-Smirnov test. Categorical variables were summarized as numbers and percentages in the descriptive statistics section. Non-parametric data were reported as mean±SD. Based on the normality analysis, the Mann-Whitney U test was employed for group comparisons. The Wilcoxon test was used to assess the change in IIEF-5 scores pre- and post-procedure. Predictors of post-procedural IIEF-5 score reduction in patients were assessed using univariate (UVA) and multivariate regression analysis (MVA). Clinical variables with p < 0.05 were regarded as statistically significant.

Results

A total of 78 male patients, 47 of whom underwent coronary stent implantation and 31 of whom underwent CABG treatment, were included in the study. The demographic and clinical characteristics of patients who underwent coronary stent implantation and CABG were given in Table 1. There were no statistically significant distinctions found between the two groups concerning BMI, current smoking, DM, HL, HT, NPT, and β-blocker use. The mean age of patients who underwent coronary stent implantation was 58.7±10.2, whereas the age of patients treated with CABG was 64.1±9 (p: 0.019). The history of invasive intervention was 8 (26%) in patients treated with CABG and 1 (2%) in patients treated with coronary stent implantation (p: 0.002). Before and after treatment IIEF-5 scores were statistically significantly lower in patients treated with CABG than in patients treated with coronary stent implantation (p: 0.043 and p: 0.043). However, the difference in IIEF-5 score before and after treatment was not statistically significantly different between the two groups (p>0.05). A statistically significant decrease was detected in the change of IIEF-5 scores before and after the procedure in both groups (p<0.001 and p<0.001).

Table 1. Comparison of demographic and clinical data of patients who underwent coronary stent implantation and CABG treatment

Variables	Coronary stent implantation (n: 47)	CABG (n: 31)	P
Age, years	58.7±10.2	64.1±9	0.019
Current smoker, n (%)	34 (72)	27 (87)	0.122
DM, n (%)	14 (30)	8 (26)	0.7
BMI, kg/m²	27.9±2.4	27.6±3	0.612
HT, n (%)	19 (40)	15 (48)	0.488
HL, n (%)	13 (28)	13(42)	0.524
NPT, n (%)	42 (89)	25 (81)	0.329
β- blocker use, n (%)	17 (36)	10 (32)	0.722
History of invasive intervention, n (%)	1 (2)	8 (26)	0.002
IIEF-5 score before treatment	17.1± 6.5	14.0±6.8	0.043
IIEF-5 score after treatment	14.6± 6.9	11.2±7.9	0.043
IIEF-5 score difference	-2 (0-5) (-2.5*)	-2 (-1-5) (-2.7*)	0.747

CABG: coronary artery bypass graft surgery, DM: diabetes mellitus, HT: hypertension, BMI: body mass index, HL: hyperlipidemia, NPT: nocturnal penile tumescence, IIEF-5: International Index of Erectile Function-5 *<0.001

In patients with a decrease in IIEF-5 score after treatment, the predictors of the decrease were evaluated by UVA and MVA (Table 2). In UVA, it was found that age and DM were associated with IIEF-5 score decrease. In MVA, Age and DM were found to be predictors of IIEF-5 score decline (OR: 1.02, 95% CI: 1.01-1.04, p: 0.001 and OR: 1.56, 95% CI: 1.15-2.04, p<0.001).

Table 2. Evaluation of predictors of IIEF-5 score decrease with UVA and MVA

	Univariate		Multivariate	
	OR (CI%)	p	OR (CI%)	p
Age, years	1.06 (1.03-1.10)	0.001	1.02 (1.01-1.04)	0.001
DM, n (%)	1.73 (1.25-2.33)	<0.001	1.56 (1.15-2.04)	<0.001
HT, n (%)	1.90 (0.75-4.84)	0.173		
HL, n (%)	1.03 (0.28-1.89)	0.516		
β- blocker use, n (%)	1.64 (0.52-4.33)	0.317		
History of invasive intervention, n (%)	1.12 (0.33-3.46)	0.857		
Type of treatment	1.17 (0.46- 2.95)	0.736		
Current smoker, n (%)	1.85 (0.63-5.49)	0.262		

DM: diabetes mellitus, HT: hypertension, HL: hyperlipidemia, NPT: nocturnal penile tumescence, IIEF-5: International Index of Erectile Function-5

Discussion

The factors causing endothelial damage in the etiology of ED are well-known, including DM, hypertension, smoking, atherosclerosis, and CAD [4]. Despite the known effects of CAD, causing endothelial damage and ED, the impact of CABG surgery and coronary stenting on ED remains uncertain [8]. In the literature, studies have evaluated ED with IIEF-5 scores before and after intervention in patients undergoing CABG surgery or coronary stenting. However, no studies have compared the IIEF-5 score changes of both intervention methods. This study displayed a significant drop of IIEF-5 score in patients with CAD after CABG surgery and coronary stenting. Previous studies examining the effects of CABG and coronary stenting on ED in CAD have shown different results [7-10]. Shervin et al. evaluated the change in ED using the IIEF-5 score after CABG and found a significant increase in the IIEF-5 score 6 months after surgery [8]. In the study by Akbulut et al., no significant change was observed in the IIEF score at the 6th month after CABG compared to the preoperative period [9]. In another study, a statistically non-significant increase in the IIEF score at 6 months after CABG was observed compared to the preoperative score [10]. In a study assessing the sexual functions of patients undergoing coronary stenting due to CAD, acute coronary syndrome (ACS), and chronic coronary syndrome (CCS), a significant increase in the ratio of ED was observed at 6 months after stenting in patients with CAD and CCS. However, there was no significant change in patients with ACS [7]. Patients with CAD usually harbor a high atherosclerotic burden pattern in contrast to patients with ACS. Given that atherosclerosis is a systemic condition, there is a possibility that penile circulation may be affected in a manner similar to the impairment seen in coronary circulation among patients with CAD. As expected, in our study, a significant decline in IIEF-5 scores at 6 months post-intervention was observed in patients with coronary artery disease (CAD).

We investigated the risk factors contributing to the decline in IIEF-5 scores at 6 months after CABG surgery and coronary stenting through MVA. We demonstrated that age and DM are predictors of the decline in IIEF-5 scores. Controversial results exist in the literature regarding the effects of CABG surgery and coronary stenting on sexual function. However, similar to our results, Shi et al. found age and DM as significant predictors of ED after coronary stenting [7]. Another study showed that only DM affected IIEF-5 score decrease after CABG [4].

There is no study in the literature comparing the changes in sexual function following CABG surgery and coronary stent implantation. Our analysis showed no significant variance in terms of IIEF-5 score changes following CABG surgery and coronary stenting.

Conclusion

This study evaluated the impact of CABG surgery and coronary stent implantation on erectile function in CAD patients. Both treatments significantly reduced IIEF-5 scores at six months, with no significant distinction between the groups. Age and diabetes mellitus were identified as predictors of this decline, highlighting that the negative impact on sexual function is more related to these factors than the type of treatment. Further research with extended follow-up is suggested to better understand the long-term effects.

The fact that sexual function evaluation was performed only at the 6th month after treatment may be considered as a limitation of the study.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

This study has been prepared in accordance with the principles of the Helsinki Declaration and has been confirmed by the Türkiye Yüksek İhtisas Training and Research Hospital Institutional Review Board (IRB number: 332/6).

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