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Clinical outcomes in hypertension patients after coronary stenting due to exertional angina

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Aim. To study clinical outcomes in hypertension patients after coronary stenting due to exertional angina.

Material and methods. The study included 214 patients with class 3 stable angina and hypertension. All patients underwent coronary angiography followed by elective stenting. Clinical outcomes were assessed on average after 44 months of outpatient follow-up.

Results. During the follow-up period, 43% of patients retained class III angina; the decrease in systolic (SBP) and diastolic blood pressure (DBP) was 18- and 14-mm Hg, respectively. There were 35 cases of myocardial infarction (MI) in this category of subjects. We revealed that 57% of patients had a progression of angina: from class III to class IV; the decrease in SBP and DBP was 10- and 18-mm Hg, respectively. There were 110 cases of MI and 10 cases of acute cerebrovascular accident in these patients.

Conclusion. Inadequate control of SBP in patients after stenting due to stable exertional angina leads to a greater number of complications, mainly myocardial infarction.

Key words: hypertension, exertional angina, systolic blood pressure, myocardial infarction.

Relationships and Activities: not.

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Hypertension (HTN) is one of the most important independent risk factors of coronary artery disease (CAD). At the same time, patients with CAD and HTN belong to a very high cardiovascular risk [1]. The combination of these diseases is common — according to the REACH registry, 80% of patients with CAD had HTN [2].

The combination of these diseases also significantly worsens the prognosis. According to a meta-analysis of 22672 patients with stable CAD, 5-year blood pressure (BP) increase >140 and 80 mm Hg is associated with a high risk of cardiovascular events [3]. BP decrease can significantly reduce the risk of major cardiovascular events, including those associated with CAD. A meta-analysis demonstrated that a decrease in systolic BP (SBP) for every 10 mm Hg can reduce the CAD risk by 17% [4]. Current guidelines for HTN management emphasize that BP decrease <130 mm Hg is associated with a favorable outcome and is the target [5].

There is a close hemodynamic relationship between HTN and CAD: an increase in afterload and pulse wave velocity leads to an increase in pulse pressure, which rises the myocardial oxygen demand. Similar hemodynamic mechanisms are responsible for target organ damage, including coronary arteries and myocardium. Increased oxidative stress, endothelial dysfunction, and hyperactivity of the sympathetic nervous and renin-angiotensin systems modulate the atherogenic potential of high BP [6].

There is much data on the prevalence of CAD and HTN combination and their common pathogenesis, but there is little data on the CAD progression in stented patients depending on the extent of BP decrease.

The aim was to study the clinical outcomes of HTN patients stented for stable angina depending on the extent of SBP and diastolic BP (DBP) decrease.

Material and methods

The study included 214 patients aged 45 to 75 years (mean age 61,35±8,2 years). There were following inclusion criteria: age <75 years, CCS class III stable angina, HTN with BP ⩽180/110 mm Hg, sinus rhythm, signed informed consent. The exclusion criteria were: age >75 years, not signed informed consent, stage ⩾2 heart failure, a history of cerebrovascular accident, severe kidney (creatinine >160 μmol/L) and liver failure (transaminase levels ⩾3 times the normal range), any heart rhythm disorders requiring treatment; second- and third-degree atrioventricular block; bradycardia (⩽50 bpm); sinoatrial block; respiratory failure (⩾II degree); ineffective contraception in women of reproductive age; pregnancy and lactation; alcoholism and drug addiction; history of cancer.

We assessed the following parameters in all patients: a complete blood count; lipid profile; levels of creatinine, glucose, and blood potassium. Electrocardiography, echocardiography, and coronary angiography (CA) were performed. All patients underwent coronary stenting followed by dual antiplatelet and statin therapy. Conventional antihypertensive therapy was chosen taking into account the individual response of patients and was continued after hospitalization.

The clinical course of angina was evaluated by the questioning patients. BP changes was assessed using patient self-monitoring data. The dynamics of angina class and extent of BP decrease were evaluated on average 44 months after hospitalization by telephone survey.

Statistical processing was carried out using software package Statistica 6.0 (StatSoft Inc., USA). The differences in quantitative traits was evaluated by the Mann-Whitney U test, and in qualitative traits — by the Pearson's chi-squared test.

Results

During the follow-up period, 92 patients (43%) retained class III angina. The decrease of SBP and DBP in these patients was 18 and 14 mm Hg, respectively. According to CA, coronary stenosis >70% was found in all above-mentioned patients (n=92). In this subgroup, 35 cases of myocardial infarction (MI) were recorded. In 122 patients (57%), there was an increase in the angina severity — from class III to IV. The decrease in SBP and DBP in this subgroup was 10 and 18 mm Hg, respectively. According to the CA, coronary stenosis >70% was found in all these patients (n=122). In this subgroup, 110 cases of MI and 10 cases of acute cerebrovascular accident (CVA) were recorded during the follow-up (Table 1).

Table 1

Angina class and blood pressure levels at the beginning and end of the study

Angina class and cardiovascular events	Number of patients	Δ SBP, mm Hg	Δ DBP, mm Hg
Class III → class III	92	18*	14
IM	35		
CVA	0		
Class III → class IV	122	10*	18
IM	110		
CVA	10		

Notes: * — p<0,05, Δ — difference between the BP at the beginning and end of the study.

Abbreviations: DBP — diastolic blood pressure, MI — myocardial infarction, CA — coronary angiography, CVA — cerebrovascular accident, SBP — systolic blood pressure.

Discussion

There is a close relationship between CAD and HTN, since they are both related to the heart function as a pump. The BP level depends on the efficiency and tension of cardiac muscle. In turn, myocardial contractility depends on its filling (mainly in diastole) and coronary permeability. An obstruction in the coronary arteries (mainly due to atherosclerotic plaques) reduces the cardiac muscle efficiency.

This paper was devoted to the study of clinical outcomes of HTN patients stented for stable angina depending on the extent of SBP and DBP decrease.

It is known that angina is associated with a high risk of cardiovascular events [7]. The CLARIFY registry included 32,105 patients from 45 countries. The follow-up was on average 24 months. According to non-invasive testing, 4056 patients (20%) had angina symptoms, and 5242 (25,8%) patients had symptoms of myocardial ischemia. In the group of patients with angina symptoms, cardiovascular death or MI was recorded in 12,2% of cases. The presence/absence of HTN in this group was not determined. In our study, for 44 months of follow-up, among 214 patie nts after coronary stenting, 145 cases of MI and 10 cases of CVA were recorded (72,4% of hard endpoints). Such a large number of cardiovascular events can be explained by several reasons: 1) the severity of coronary atherosclerosis (all patients had coronary stenosis >70%); 2) all patients had severe angina manifestations (class III angina); 3) concomitant HTN in all patients significantly increased myocardial oxygen demand and aggravated myocardial ischemia.

Attention should be paid to the relationship of angina and the extent of BP decrease. In patients without angina class change, significant SBP decrease by an average of 18 mm Hg was noted, while in patients with angina progression, the SBP decrease was less pronounced — by 10 mm Hg ($p<0,05$). Our results are to some extent consistent with meta-regression analysis, which included 123 studies and 613815 patients [8]. The authors showed that a decrease in the relative risk of cardiovascular events is proportional to BP decrease. SBP decrease for every 10 mm Hg led to a significant reduction in the relative risk of cardiovascular events, CAD, and CVA by 20%, 17%, 27%, respectively.

Our data have something in common with widely discussed ISCHEMIA study, which demonstrated that coronary revascularization does not significantly influence on the prognosis of patients with stable angina [9, 10].

The data obtained showed that patients with more pronounced SBP decrease had less cardiovascular events (MI). DBP decrease, despite the fact that the coronary filling is performed mainly in diastole, did not have the same effect.

Study limitations: small sample; telephone survey.

Conclusion

The combination of severe coronary atherosclerosis and clinical manifestations of angina in patients with HTN leads to unfavorable outcomes, despite coronary stenting. Inadequate control of SBP in patients with stable angina leads to a greater number of events (mainly MI).

Relationships and Activities: not.

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