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ABSTRACT

of the Dissertation for the degree of Doctor of Philosophy

THE ROLE OF HELICOBACTER PYLORI IN RESTENOSIS IN CORONARY STENT IMPLANTED PATIENTS

Specialty: 32 18.01 - Cardiology

Field of science: Medicine

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GENERAL CHARACTERISTICS OF WORK

Relevance of the subject. Cardiovascular disease (CVD) ranks first in the world for the prevalence of disability and mortality. At present, cardiovascular disease (CVD) is the leading cause of death from IHDs. Therefore, the choice of optimal treatment tactics for IHDs is one of the important tasks for cardiologists today.

Endovascular intervention marked the beginning of a new phase in cardiology and expanded the treatment options for IHDs. Although balloon angioplasty was initially widely used to restore coronary circulation, it was later rejected due to the development of restenosis in about half of the patients[1].

Although coronary stenting, which is included in practical health care, was highly successful in the early stages, the results of the first randomized studies did not lead to optimistic results[2-4]. These results forced cardiologists to change their position on coronary stenting and to take an individual approach to endovascular treatment. Although the development of drug-coated stents has significantly reduced the incidence of restenosis, it has not completely solved the problem[5-8].

Although restenosis is rare after medication-covered stenting compared to standard metal stent, other complex complications are observed[7].

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In order to prevent restenosis from developing, the first thing that is required is to identify its risk factors and to make appropriate corrections. To date, there are many risk factors for the development of restoration[8-9.]In recent years, there has been a focus on the role of inflammation in the development of atherosclerosis and the formation of restenosis. Some researchers associate the development of atherosclerosis and restenosis with infection, and in this regard, H.Pylori's infectionis of seriousimportance[10-13.] However,literature reports on the role of H.pylori infection in the development of restenosis after p erkutant coronary intervention are contrasting. As a result, a group of scientists have determined that H.pylori infection is nota risk factor for restenosis that occurs after coronary angioplasty.[14] On the contrary, Mr.Kowalfound that in patients that are positive, there is a high probability of a restoration after narrowing the benefits of coronary arteries and implanting stents in coronary arteries. He also showed that the erading of H. pylori infection dramatically reduced the likelihood of narrowing the arteries in patients who had a stent placed in coronary arteries.

Because the current state of invasive cardiology does not allow you to predict the development of restenosis in a specific patient subject to percutant coronary intervention, no preventive measures can be planned. It makes new research necessary to study the role of unconventional risk factors in shaping this process, including the role of H.pylori infection and its interaction with other traditional risk factors.

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The study aims to determine the role of H.pylori infection in the development of restenosis in patients withstents placed in coronary arteries.

The responsibilities of the study:

1. Detection of patients with recurrent stenosis (restenosis) after the stenting of the coronary arteries;

2. Identify the detection frequency of Helicobacter pylorin in patients with and without restenosis;

3. Comparative study of lipid spectrum indicators in patients with H.pylori positive and negative;

4. CRP and homocysteine levels in patients with H.pylori positive and negative;

5. Study of the dynamics of CRP and homocysteine levels and lipid spectrum indicators after eraseration therapy of H. pylori.

Key periods of protection:

1.13.6 percent of patients with stent implants in the coronary arteries develop restenosis, which usually occurs within the first five years.

2.H. pylori infection is detected in 86 percent of patients with restenosis and 11 percent of non-restenosis patients.

3.In compare of H. Pylori negative patients, the level of C-reactive proteine and homocysteins in H.Pylori positive ones was significantly high.

4. In compare of H. Pylori negative patients, there was more cases of lipid spectrum worsening in H. H.Pylori positive ones.

5. Following the successful eradiation of H. pylorin, indicators of lipid exchange have improved on background of reducing the amount of C-reactive protein and homocysteine level.

Scientific novelty of research: Forthe first time, the random frequency of recurrence stenosis (restenosis) was detected among patients who underwent coronary arteries stent insertion;

- The role of H. pylori infection in the development of restenosis in coronary veins has been identified;

- H. pylori infection has been studied in connection with inflammatory markers and lipid spectrum indicators.

The practical significance of the study:

- It is recommended that Helicobacter pylori be tested among patients undergoing coronary vascular stenting surgery;
- In case of H. Pylorine be diagnosed, it is recommended its treatment with an eradiction therapy;
- Following the successful eradication of H. pylorin, it is recommended to monitor inflammatory markers and lipid spectrum indicators.

Application of the results of the study. The results of the study were applied to the practice of teaching therapeutic and teaching surgery clinics of the Medical University of Azerbaijan.

Abbropation of dissertation materials. The dissertation work was discussed at the interdepartmental meeting on May 17, 2019 and at the meeting No. 02 of 22.04.2021 of the scientific seminar on "Cardiology" of the Dissertation Council of ED 2.27 operating under the Azerbaijan Medical University (protocol №2).

Name of the organization where the dissertation work is performed. The dissertation work was performed on the basis of the I Department of Internal Medicine of the Azerbaijan Medical University and the cardiology department of the Central Clinical Hospital

Publications. According to the results of the study, 14 scientific papers were published. 10 articles, 4 thesises. 2 articles on the topic of the dissertation were published in foreign journals (РИНЦ) included in the international citation database

The structure and scope of the dissertation. The certificate was presented in a 141-page printing sheet. These include the introduction, the literature summary, the materials and methods of the study, the results of the study and their discussion, the conclusions, the results, the practical recommendations, and the list of publications. The work has been illuminated with 28 charts and 30 pictures. The Biblical indicator includes 204 sources.

MATERIALS AND METHODS

The study was conducted in six stages:

In the first stage, The Central Clinic Hospital examined the disease history retrospectively of 1,000 patients who had been implanted stent into their coronary arteries from 2005 to 2015. Among these patients were those who had recurrence stenosis and those who did not have restenosis.

In the second stage, we have studied the random frequency of helicobacter pylori infection in them by separating 100 patients from each group who have a restenosis and are not restenosis after a stent implant in their coronary arteries.

In the third stage, we continued our study on patients with H.pylori positive (main group, n=50 patients) and H.pylori negative (control group, n=50 patients).

In the fourth stage, the main group of patients underwent antihecobacter therapy in the base therapy fund.

In the fifth stage, following antihelicobacter therapy a review was carried out to make sure the H.pylori infection was erased.

In the sixth phase, after the eradiation of H. pylorin, the condition of the CRP, homocysteine, and lipid spectrum was studied.

The observation period lasted three months.

Complex examinations of patients include general clinical, laboratory, and instrumental examinations.

All patients enrolled in the study were subjected to an ECG examination, a tredmil test based on the Bruce protocol (General electronics, U.S.A.).

An ECG Holter monitor examination has been carried out on patients who have been examined to determine the likelihood of painless ischemia episodes.

Initial and repeated coronary examinations of patients were conducted in the General Electronic (U.S.) and Siemens (Germany) in accordance with the Anjo Conventional Angiography Protocol. Repeated angiography has been valued as 50% or more narrowing stenosis in the implanted vascular segment.

In our initial examination, the blood levels of H. pylori IgG antibodies were determined by a reagent belonging to the IBL firm in a semi-autotomate statfax device. A re-examination of the effects of H. pylorine's eradication was carried out by means of urea breath test.

The CRP's blood level was determined by the particle enhanced Turbidimetric Immunoassay (PETIA) in the Siemens Dimension Xpand plus machine. The normal level of the CRP has been adopted 0-5 mq/l.

Homocysteine's blood is determined by the CLIA method on siemens immulyte 2,000 xpi devices. The normal amount of blood was 0-13 mkmol/l.

Blood levels of total cholesterol (TC), high density (HDL) and low-density lipoproteins (LDL) were determined by photoelectrocalorymetric measurement of the intensity of the color generated by various fermentative reactions in the Siemens Dimension X pand plus machine. The normal level of XS in the blood was 120-200 mq/dl, the normal level of ASLP was 0-99 mq/dl, and the normal level of YSLP was 40-80 mq/dl. LDL level calculated according to the generally accepted Friedewald formula: LDL-C (mg/dL) = total cholesterol – HDL-C – (triglycerides/5)

All patients took bisoprolol, statins, perindopril, and aspirin as base therapy.

Patients with H.pylori infections in their blood were provided with standard antihelicobacteria therapy according the Maastricht Consensus (Pantap - twice a day 40 mg, Claritromycin - twice a day 500 mg, amoxicillin- twice a day 1,000 mg, and de-NOL 120mg) for 14days.

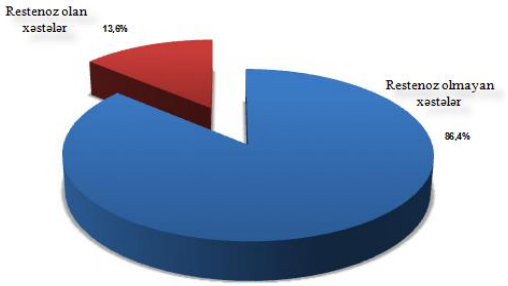
Mathematical and statistical analysis methods. All the number indicators obtained during the study were conducted using variation, discrimination, and dispersion techniques, taking into account modern recommendations.

All calculations were made in the EXCEL-2013 electronic chart and the SPSS-20 package program, and the results were concentrated in charts and diagrams.

THE RESULTS AND THEIR DISCUSSION

Restenosis frequency in patients with stent implants in coronary arteries

In accordance with the design of the study, the random frequency of restenosis was retrospectively studied by our side in 1,000 patients who were placed stents in coronary arteries at the Central Clinic Hospital over the past 10 years (2005-2015).



Şəkil. Restenoz olan və restenoz olmayan xəstələr

Among the patient who were studying 850 were men (average age56.5 ±6.2 years) and 150 were women (average age - 58.2±7.0 years). During the observation 136 patients (13.6%) with restenosis was detected, and 864 (86.4%) patients hasn't had a restenosis.

Analysis of the main clinical features of patients with and without restenosis showed that there was no significant difference in the age indicator of patients (appropriate - 57.6±7.0 and 57.1±6.4 years, $p>0.05$). At first glance, the results are based on the idea that age is not decisive in the development of restenosis. However, our intended analysis showed that the random indicator of restenosis varies in different age groups.

As the age increases, the likelihood of restenosis increases: 7.7% of patients under the age of 45 were seen restenosis, 14.4% of patients between the ages of 45 and 60, 15.3% between the ages of 61 and 70, and 17.2% of those over the age of 70. The high frequency of restenosis in upper age groups is likely to be linked to the high incidence of accompanyning disease in patients in this category.

The gender comparison of restenosis showed that 116 of the 136 patients with restenosis (85.3%) were men, wereas 20 of them (14.7%) were women. Among non-restenosis patients, these indicators are 734 (85%) and 130 (15%) that indicates that there is no statistical difference between groups ($p>0.05$). Overall, the random frequency of restenosis among male patients who had been implanted in the coronary arteries was slightly higher than that of female (appropriate - 13.6% and 13.3%), but the difference was not statistical ($p>0.05$).

Among the patients with and without restenosis, the duration of the IHD (appropriate - 6.7±1.6 years and 6.8±1.5 years) and the duration of the stent implantation (appropriate - 3.4±1.3 years) did not differ statistically (in both cases, $p>0.05$).

During the investigation, which was released to determine the role of restenosis in the formation of the new restenosis, it became clear that 12 patients in restenosis group have already had the restenosis in their anamnesis. However, in non-restenosis group, no patient with restenosis was determined. This means that the fact of restenosis in anamnesis can be considered a serious risk factor in the formation of restenosis in the future.

We conducted research to determine the extent to which diabetes, metabolic syndrome and arterial hypertension play a role in the development of restenosis. It found that compared with a non-restenosis group in a group with restenosis diabetes (appropriate - 27.9% and 19.9%, $p<0.05$), metabolic syndrome (appropriate - 23.5% and 12.0%, $p<0.01$) and arterial hypertension (35.3% and 25.1%, $p<0.05$) were in significantly more statistic amount. Referring to the results, diseases, such as diabetes, metabolic syndrome, and arterial hypertension, are likely to play a predisposing role in the development of restenosis.

As the number of risk factors increases, likelihood of the restenosis develops. Restenosis was defined in 8.4% of patients with 1 risk factor, 12.5% of patients with 2-3 risk factors, and 16% of patients with more than 3 risk factors.

Among patients with restenosis, gastric and duodenal ulcers occurred in 32.4% of patients, while in patients without restenosis this figure was 3.8% ($p < 0.001$). Also, the incidence of chronic gastritis and duodenitis among patients with restenosis was 48.5% higher than that of patients without restenosis (8%) ($p < 0.001$).

Thus, as it can be seen, there are many differences between the groups with and without restenosis in terms of the main clinical features. The analysis showed that in the group with restenosis, the incidence of diabetes, metabolic syndrome, arterial hypertension, gastric and duodenal ulcers, chronic gastritis and duodenitis was significantly higher than co-morbidities.

As a further study, the results of the initial angiographic indicators of patients who were examined were also examined by us. 433 of the patients (43.3%) had been implanted holometallic stents, 567 (56.7%) - medicine-covered stents. Studies of patients show that 19.6% of those with holometal stent implants (85 out of 433 patients) and approximately 9% of patients with medication-covered stents (51 out of 567 patients) developed restenosis. 85 patients with restenosis (62.5%) had been installed standard metallic stent and 51 (37.5%) of them a medicine-covered stent. In a non-restenosis group, these indicators correspond to 348 (40.3%) and 516 (59.7%) (in both cases, $p<0.01$). As can be seen, restenosis was relatively common in patients with holometallic stent implants, and in relatively rare cases in patients with medicine-covered stents.

The number of stents placed in two groups of patients was analised comparatively. The number of stents placed on patients in a group with restenosis is significantly higher than in the non-restenosis group. Thus, the number of patients with 2 and 3 stents in a non-restenosis group was 25.6% and 18.4%, compared with 39% and 43.4% respectively. The difference between the groups is statistically honest.

In both groups of patients involved in the study, the stentin diameter was virtually identical ($p>0.05$). However, as the diameter of the stented vein decreased, the random frequency of the restenosis increased. As a result, only 2% of restenosis patients had more than 3.5 mm in diameter, 18% had a diameter of 3.5-3.2

mm, 32% of patients were 3.2-3.5 mm, and 48% were less than 2.8 mm in diameter.

In the restenosis group, the length of the stent was up to 10 mm in 7 patients (5.1%), 10-20 mm in 74 patients (54.4%), and more than 20 mm in the remaining 55 (40.5%) patients. The average length was 22.3 ± 3.80 mm, which is significantly higher than the non-restenosis group (17.2 ± 2.74 mm) ($p<0.05$). This indicates that the probability of restenosis is parallel to the length of the stent.

Detection of H. pylori in patients with restenosis and non-restenosis after coronary artery stenting

n accordance with the design of the study, in order to correctly determine the role of H. pylori in the development of restenosis, we first formed a group of patients with restenosis (n = 100) and non-restenosis (n = 100) as a result of special selection.

Initially, both groups of patients were examined for concomitant gastrointestinal diseases and H. pylori infection. We found that concomitant gastrointestinal diseases, including gastritis, duodenitis, and gastric or duodenal ulcers were many times more common among patients with restenosis than in the non-restenosis group (86% and 11%, respectively; $\chi 2=112,861$, $p<0,001$). H. pylori infection was detected in all patients with gastrointestinal pathology in both groups (Table 1).

Table 1

Frequency of gastrointestinal diseases and H. pylori infection among patients with and without restenosis

Gastrointestinal diseases nd H.pylori infection		Restenosis		χ2	P
		yox	var		
Gastrointestinal diseases	no	89 (89,0%)	14 (14,0%)	112,861	< 0,001
	Gastritis and/or gastoduodenitis	8 (8,0%)	63 (63,0%)		
	Gastro and/or gastroduodenal ulcer	3 (3,0%)	23 (23,0%)		
H.pylori	no	89 (89,0%)	14 (14,0%)	112,601	< 0,001
	yes	11 (11,0%)	86 (86,0%)		

H.pylori infection was not detected in only 14 (14%) patients with restenosis. In 9 of these patients, diabetes + 6 patients were diagnosed with hypertension, in 5 patients with metabolic syndrome + 5 patients with hypertension. All patients were smokers. Despite the presence of H. pylori infection, restenosis was not observed in 11 (11%) patients. Seven of these patients underwent drug-coated stents for one year and four for two years, and no co-morbidities (including metabolic syndrome, diabetes mellitus, and hypertension) were found to affect restenosis.

The results suggest that the role of H. pylori infection in the development of restenosis is serious.

Comparative analysis of CRP and homocysteine in patients with H. pylori positive and negative

At the next stage of the study, a group of patients with H. pylori positive (main group, n=50) and H. pylori negative (control group, n=50) was formed in the blood. Of the patients with H. pylori positive, 48 had restenosis and 2 had no restenosis. Of those with H. pylori negative, 48 did not develop restenosis, and 2 patients had restenosis.

Patients included in the study did not differ in the anamnesis of all other clinical and angiographic indicators, except for gastric and duodenal ulcers, chronic gastritis and duodenitis, which allowed to make an objective comparative analysis between them.

In accordance with the task of the study, the levels of CRP, which is a marker of inflammation, as well as homocysteine, were studied in both groups. It was found that in the vast majority of patients in the main group (46 patients, 92%), and in only 5 (10%) patients in the control group, the level of CRP in the patient was higher than normal ($\chi 2 = 67{,}267$; $p < 0.001$). This fact once again confirms that patients in the main group have higher symptoms of inflammation.

Elevated homocysteine levels were also more common in the baseline group than in the control group (12% and 84%,

respectively). The results confirm a statistically significant difference between the groups ($\chi 2 = 51,923$; $p < 0.001$).

Also, as a result of purposeful research conducted by us, it was determined that the quantitative indicators of CRP and homocysteine in the patients of the main and control groups also differ statistically from each other. . In the control group, this figure was 2,950 ± 0.2664 mg/l. The results show a statistically significant difference between the groups ($p < 0.001$).

The average homocysteine content in patients with H. pylori-negative was 9.756 ± 0.3009 μmol/l. In patients with H. pylori positive, this value was high and averaged 16,358 ± 0.8638 μmol/l, which was statistically significant compared to those with H. pylori negative.

One of the highlights was the interaction of homocysteine with CRP. It was found that an increase in blood levels of CRP is often accompanied by an increase in the amount of homocysteine in the blood (84.8%). The growth rate between the indicators did not differ statistically significantly ($\chi 2 = 0.262$; $p = 0.609$).

Comparative analysis of lipid spectrum in patients with H. pylori positive and negative

Significant differences were also observed between the incidence of lipid metabolism disorders among patients in the primary and control groups. Thus, the incidence of both TC (84%) and LDL (88%) in the main group of patients was statistically higher than in the control group (66% and 58%, respectively). --2 = 4,320, $p = 0.038$; $\chi 2 = 11,416$, $p < 0.001$). Blood levels of HDL in 88% of patients in the main group (44 patients), in only 32% of patients in the control group (16 patient) was below normal, indicating a statistically significant difference between the groups ($\chi 2 = 11,416$; $p < 0.001$).

Quantitative indicators of lipid metabolism also differed significantly between baseline and control group patients. This difference was statistically significant in LDL and HDL, with the exception of TC. Thus, the average amount of HDL in the main

group of patients was 35,580 ± 0.9485 mg/dl, in the patients of the control group 48,600 ± 1,9136 mg/dl (F = 37,117; p <0.001). The mean amount of LDL in the patients in the main group averaged 133,540 ± 4,6355 mg/dl, which was significantly higher than in the control group (110,360 ± 3,7804 mg/dl) (F = 15,018; p <0.001).

Our results show that the vast majority of patients in both the main group and the control group have severely impaired lipid metabolism. In comparison, these disorders were more pronounced in the positive group of H.pylori. This fact once again confirms that H. Pylori infection plays a significant role in the disruption of lipid metabolism.

Dynamics of CRP and homocysteine levels after eradication of H. pylori

In accordance with the task of our study, the dynamics of CRP, as well as homocysteine levels, which are considered an indicator of inflammation 3 months after the eradication of H. pylorine in patients in the main group, were re-examined by us and compared with baseline. It was found that the quality of CRP and homocysteine improved significantly after successful eradication of H. pylori in the main group of patients (Table 2). Thus, the number of people with abnormally high CRP (46 patients, 92%) decreased statistically significant after treatment (16 patients, 32%; p <0.001) decreased (from 68% to 32%) (p <0.001) (Table 2).

Table 2

Effect of H. pylori eradication on CRP and homocysteine levels

İndicators of quality	indicators		Before eradication (n=50)	After eradication (n=50)	χ^2	P
	CRP (mq/1)	norm	4 (8%)	34 (68%)	29,429	<0,001
		>norm	46 (92%)	16 (32%)		
	Homocysteine (mkmol/l)	norm	8 (16%)	34 (68%)	22,689	<0,001
		>norm	42 (84%)	16 (32%)		

The effective influense of successful eradication of H. Pylori on the amount of CRP and homocysteine in the blood is also reflected in the sharp change in the quantitative dynamics of these indi-

cators during the background of treatment. Thus, on the background of eradication therapy, the levels of CRP (from 10,618 mg/l to 4,942 mg/l) and homocysteine decreased statistically significant (from 16,358 μmol / l to 12,296 μmol/l; in both cases, p <0.001) (Table 3).

Table 3

Indicators of quantity	indicators			N	(M)	±σ	Min.	Max.	Pw
	CRP (mq/l)	eradication	before	50	10,618	6,7640	1,9	33,0	< 0,001
			after	50	4,942	4,0742	0,1	19,0	
	Homocysteine (mkmol/l)	eradication	before	50	16,358	6,1082	8,2	51,0	< 0,001
			after	50	12,296	3,0225	8,8	28,0	

The results not only show the effectiveness of the eradication treatment, but also confirms the link between H. pylori infection and CRP and homocysteine levels.

After eradication of H.pylori, the number of patients with high levels of homocysteine in men decreased from 36 to 11, which is significantly higher than in women (decreased from 6 to 1) ($\chi 2$ = 8,257; p = 0.004). Due to the sharp decrease in the number of patients among women, it would be incorrect to make a definitive statement about the effect of antihelicobacter therapy on the quality of homocysteine levels.

The dependence of the effect of successful eradication therapy on the qualitative and quantitative indicators of CRP and homocysteine, as well as the presence or absence of diseases (diabetes, metabolic syndrome, arterial hypertension) has not been confirmed.

Dynamics of lipid spectrum after eradication of H. pylori

Three months after the successful eradication of H. pylori, the number of normalized TC levels rose from 16% to 70% ($\chi 2$ = 5,556; p = 0.018), and the number of normalized LDL levels rose from 12% to 66%, which is significantly higher than the previous figure ($\chi 2$ = 26,488; p = 0.001).

Eradication therapy was also accompanied by an improvement in the quality of HDL: the level of HDL increased from 6 (12%) to 35 (70%), which is statistically higher than the previous indicator ($\chi 2$ = 4,046; p = 0.044). (Table 4).

Table4

The effect of H. pylori eradication on lipid metabolism

İndicators of quality	Indicators		Before Hp eradication (n=50)	After th Hp eradication (n=50)	χ2	P
	TC (mq/dl)	norm	8 (16%)	35 (70%)	5,556	0,018
		>norm	42 (84%)	15 (30%)		
	HDL (mq/dl)	norm	6 (12%)	39 (78%)	4,046	0,044
		<norm	44 (88%)	11 (22%)		
	LDL (mq/dl)	norm	6 (13,3%)	33 (66%)	26,488	<0,001
		>norm	44 (88%)	17 (34%)		

Eradication of H. pylori was also accompanied by quantitative changes in lipid spectra. Against the background of treatment, the level of TC in the blood decreased statistically accurately from an average of 219,300±18,1246 mg/dl to 184,060 ± 23,2593 mg/dl (pw <0.001). HDL levels increased from 35,580±6,7070 mg/dl to 45,940±7.7655 mg/dl (Pw <0.001), and LDL levels decreased significantly from 133,540 ± 32.7777 mg/dl to 93,340 ± Reached 17.5669 mg/dl (Pw <0.001) (Table 5).

Table 5

Indicators of quantity	Indicators		N	(M)	±σ	Min.	Max.	Pw
	TC (mq/dl)	əvvəl	50	219,300	18,1246	190,0	260,0	<0,001
		sonra	50	184,060	23,2593	140,0	220,0	
	HDL (mq/dl)	əvvəl	50	35,580	6,7070	26,0	57,0	<0,001
		sonra	50	45,940	7,7655	34,0	62,0	
	LDL (mq/dl)	əvvəl	50	133,540	32,7777	76,0	220,0	<0,001
		sonra	50	93,340	17,5669	62,0	135,0	

Our study of the relationship between the anti-lipidemic effect of eradication therapy and the sex factor refutes this link. Also, co-morbidities such as diabetes, metabolic syndrome and arterial

hypertension do not have an additional effect on the antilipidemic efficacy of successful eradication therapy.

Thus, on the background of basic treatment, eradication therapy of H. pylori reduces the amount of inflammatory markers (CRP and homocysteine) in the blood with anti-inflammatory effect, which is accompanied by an improvement in lipid spectrum.

RESULTS

1. After coronary artery stenting, recurrent stenosis (restenosis) occurs in 13.6% of patients [3, 8].

2. The incidence of Helicobacter pylori in patients with restenosis (86%) is several times higher than in those with non-restenosis (11%) ($p < 0.001$) [4].

3. CRP (10.6 ± 0.95 and 2.95 ± 0.26 mg / l, $p < 0.001$, respectively) and homocysteine levels (16, respectively) in patients with H. pylori-positive compared with those with H. pylori-negative , 4 ± 0.86 and 9.7 ± 0.30 μmol / l, $p < 0.001$) are statistically high [7].

4. Impaired lipid spectrum in patients with positive and negative. Compared with H. pylori-negative patients, H. pylori-positive patients had higher levels of XS (18.5%), higher ASLP (23.8%), and lower levels of YSLP (26.9%) (in all cases, $p < 0.05$) [2, 12].

5. Successful eradication therapy in patients with H. pylori-positive improves statidically accurate reduction of CRP and homocysteine levels, as well as lipid profile (in all cases, $p < 0.05$) [6,10].

6. The anti-inflammatory (CRP, homocysteine) and anti-lipidemic effects of eradication therapy are not significantly affected by sex factors and co-morbidities (diabetes, metabolic syndrome, arterial hypertension) [11].

PRACTICAL RECOMMENDATIONS

1. The choice of treatment tactics for patients undergoing coronary artery stenting should include the diagnosis of H. pylori infection in the clinical examination plan.

2. In order to reduce the likelihood of restenosis in patients with H. pylori, it is advisable to add antibacterial treatment to the treatment complex.

3. Successful eradication therapy improves the functional state of the vascular endothelium and lipid profile by suppressing the inflammatory process.

List of published scientific works on the topic of the dissertation

1. Is Helicobacter pylori infection a risk factor for cardiovascular and cerebrovascular pathologies? // Health, 2016, № 3, p. 188-191 (co-authors: V.A. Azizov, S.M. Mammadli, LG.. Efendiyeva)

2. Influence of Helicobacter pylori on the lipid spectrum of blood and inflammatory factors in patients with coronary artery restenosis / VI Eurasian Congress of Cardiologists. Moscow, April 18-19, 2018, p. 69-70 (author: V.A. Azizov, S.R. Muradova)

3. Is H. pylori a risk factor for atherosclerosis and restenosis?// Metabolism,2018,№ 3, p.3-14 (co-authors: V.A. Azizov, S.R. Muradova)

4. Possible link between Helicobacter pylori infection and restenosis of coronary arteries // Minsk, Medical News, 2018, № 3, p. (co .: V.A. Azizov, F.F. Hajieva)

5. Frequency of coronary artery restenosis and risk factors for its development // Materials of the scientific conference dedicated to the 80th anniversary of Honored Scientist, Professor Abbas Ahmad oglu Akhunbeyli. Baku, 2018 p. 100-101 (co-authors: N.I. Huseynova, G.Sh. Shiraliyeva, F.A. Ibadova, A.A. Nuriyev).

6. The effect of H. pylori eradication on lipid metabolism in patients with ischemic heart disease // Materials of the scientific conference dedicated to the 80th anniversary of the birth of Honored Scientist, Professor Abbas Ahmad oglu Akhunbeyli. Baku, 2018 p. 101-102 (co-authors: Kh.I. Gurbanova, G.Sh. Shiraliyeva, F.A. Ibadova)

7. Interaction of c-reactive protein and homocysteine in patients with restenosis in coronary arteries associated with H. pylori // Journal

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11. Influence of diseases along with anti-lipidemic effect of eradication therapy in patients with restonosis of coronary arteries associated with H. pylori // Health, 2019, № 1, p. 86-90 (co-authors: V.A. Azizov, F.N. Ibrahimov, S.R. Muradova, F.F. Hajiyeva)

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13. Coronary restonosis: Interaction of H. pylori infection with diabetes mellitus.// Health, 2019, № 5, p. 18-22

14. Influence of diabetes on the lipid spectrum of blood in patients with coronary vascular restenosis associated with Helicobacter pylori // Kazan Medical Journal 2019 No. 5p. 774-778

CONDITIONAL ABBREVIATIONS

AH – Arterial hypertension
LDL – Low-density lipoprotein
CRP – C-reactive protein
H.pylori – Helicobacter pylori
TC – Total Cholesterol
PCI – Percutaneous Coronary Intervention
DM – Diabetes Mellitus
CVD – Cardiovascular disease
IHD – Ischemic Heart Disease
HDL – high-density lipoprotein

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