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ISCHEMIC HEART DISEASE, THE WAY OF TREATMENT AND ITS TIMING AFFECTS OCCURRING OF COMPLICATIONS AND THE PROGNOSIS OF THE DISEASE

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Abstract

Introduction: Ischemic heart disease (IHD) is a condition defined as not adequate perfusion of the myocard with blood. In 95% of the cases, it is caused by an atherosclerosis, in other words, because of an obstruction in the coronary arterial circulation. Epidemiologically, ischemic heart disease, haves the highest mortality rate in developing countires, than any other disease.

Methods: In diagnostic and therapeutic investigations, which have taken part in the Department of Internal Medicine and Interventional Cardiology Center in Tetovo, methods which have been used during the study are: electrocardiography, echocardiography, stres-echocardiography and angiography.

Results: 148 patients have been involved in the study, 92 of which males, while 56 females, which have been observed for one year. With conservative therapy have been treated 62% of them, while with interventional procedures, 38% of the cases. From those treated with conservative therapy, 80.5% haven't shown complications, 17.5% of the cases have shown compliactions while 2% have ended lethally. From the cases treated with interventional procedures, 96.5% haven't shown any complications, while 3.5% have shown complications. According to the study, the interventional treatment is more successful.

Conclusion: Percutaneous coronary intervention as a methode shows better prognosis at the patients with IHD. The success of the conservative treatment is directly depending on the time of appliaction, meaning the prognosis is better if the patient is treated in the first hours after the first symptoms appear.

Keywords: ischemic heart disease, infarction, PCI.

Introduction

Ischemic heart disease occurs due to a chain of conditions who take part in the coronary arterial circulation, starting from the creation of the atherosclerotic plaque until an obstruction of an artery branch is created. Atherosclerotic plaques are formed in the inner wall of the blood vessels. They occur from a young age but progress with time and are directly affected from the genetic predisposition, life style, comorbidities and risk factors.

When the obstruction of the coronary blood vessel progresses to an advanced stricture, the blood flow of an area of myocardium visibly decreases. This brings to the manifestation of symptoms at the most patients like angina pectoralis. When the obstruction causes stenosis, the blood flow of a myocardium area is stopped therefore causing acute ischemia of the myocardium tissue and symptoms who follow myocardial

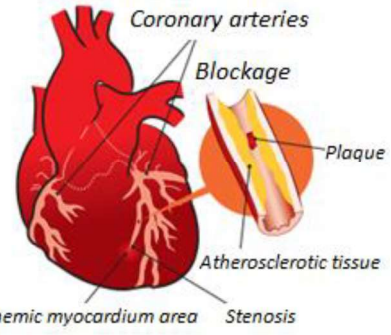

Fig. 1 - Illustrated view of a created atherosclerotic plaque and the ischemic area due to stenosis.

infarction appear.

The research and observation of IHD patients was motivated from the need of precise information of right-timing of when the patients should show up for medical help, after the first symptoms appear, the right methods for better diagnostication and determining the best kind of treatment for better prognosis. This research shows a study made on 148 patients who have been treated on the Department of Internal Medicine and in the Interventional Cardiology Center in Clinical Hospital of Tetovo.

Because of the difference in symptomatology, difference in treatment and the achieved results, patients during the research have been divided in many groups, depending on the target that we wanted to achieve. So, by age, we had three groups, the first one 20-30 years old, the second group 30-40 years old and the third group included patients with age of 40-55 years old. By gender, 92 of the patients were male while 56 female. Patients have also been grouped depending on the ECG results that they had during the symptoms.

Research development included not only patient observation during the hospitalization, but patient control exams after they left the hospital, which brought us a long-term patient follow-up with the purpose to monitor the therapy effect and the progression or improvement of the disease.

The purpose of the study is that the obtained results from the research, will invest in the efficacy and improvement of the treatment at the ischemic heart disease patients.

Materials and Methods

Methods used in the study have been divided in non-invasive, such as electrocardiography, echocardiography and stress-echocardiography, and invasive method – coronarography. Electrocardiography shows the electrical activity of the heart, in which abnormalities we can notice a number of changes or disorders on hearts function(1).

Echocardiography uses ultrasound to examine hearts condition. It's a non-invasive and safe technique which is used widely in cardiovascular disease investigations. In our research, specialized echo machines were used, with cardiology transducer and variable frequency of the ultrasound (in adults usually 2-4 MHz). It functions in a way that the ultrasound transmits throughout the probe which is usually placed in the anterior chest wall. The view angles are: suprasternal, left and right parasternal, subcostal and apical angle.

Transthoracic stress-echocardiography is an efficient method in diagnostics and explorations on the IHD. As a method, it is used to localize and staging of ischemia by identifying changes which occur during physical stress. Physical stress can be caused by physical activity or sometimes with medication (vasodilatation infusions like dobutamine or dipiridomole). The sensitivity of this method is 80% while its specificity is 90% (2).

As an invasive method, coronary angiography was used. Its purpose is to visualize obstructions or stenosis in the coronary arterial circulation and their precise localization. In our research the procedure is done in an angio-room, localized at Interventional Cardiology Center. Femoral approach was done. When the catheter is near the coronary vessels, contrast is applied in the circulation to improve X-ray visibility, where the occlusions or stenosis are identified.

Results

The first group of patients - age 20-30 years. In this group there's only one male patient, who presented with symptoms typical for IHD: angina pectoris, bradypnea, confusion and weakness. ECG shows a supraventricular tachyarrhythmia and ST-elevation on V_1-V_4 leads-suspect for anterior infraction(3), for what the patient was transported in the ICU. A venous line was started, and blood was taken for specific heart biomarkers analysis. The results of the biomarkers values showed high levels of CK-MB and troponin, giving signs for possible myocardium damage4). Family anamnesis shows genetic predisposition for myotonic dystrophy, which as a disease haves high correlation with ischemic pathologies of the heart(5). The patient was treated conservatively and the therapy started from symptomatic: morphine 4 mg i.v. and oxygen to inhale for the dyspnea, continuing with fibrinolytic therapy – streptokinase 1,5 million units i.v., non-fractioned heparin 1000 units and beta-blockers. The patient was nonstop monitored but died later on the ICU.

The second group of patients - age 30-40 years old. Two patients belong to this group, both males. The first one, looked for medical help after chest pain complaining. During anamnesis, he gives information that the chest pain is getting worse during physical activity. Pain episodes last 8 to 10 minutes associated with stable angina pectoris. An ECG was done but no abnormalities were detected. Sublingual nitroglycerin was administrated and beta-blockers were applied. After that, an echocardiography was made were also no abnormalities were visualized, no disorders on wall motion, deviation on dimensions of heart cavities, changes on the valve apparatus and nor ejection fraction

abnormalities were measured. The fact that the chest pain appeared or used to be worse during physical stress was an indication for a stress-echocardiography test. Physical stress was caused at the patient, than the heart was visualized in different projections like long and short parasternal axis and standard apical views. The echo results during rest and during physical activity were compared and the test was positive. After minimal short lasting physical stress, wall thickness was enlarging which improves heart contractility (6). But, when higher physical stress was achieved, a left ventricle wall hypokinesia was detected, which brings to inability to efficient blood pumping of the needed amount of blood for myocardium perfusion, thereby ischemia occurs and stable angina pectoris is manifested. Ejection fraction measured with stress-echocardiography showed subnormal levels. This is not a sign that ECG at those patients has to be abnormal, because there is not significant correlation between abnormal ejection fraction and age, sex or ECG specific abnormalities for myocardial infarction(7). After the stress-echocardiography, a coronary angiography was done which results showed a 60% stenosis of LAD (left anterior descending artery) which was an indication for a PCI (percutaneous coronary intervention) to be done. Endovascular prosthesis (stent) was placed and successfully replaced the atherosclerotic plaque in the periphery of the vessel lumen. Normal diameter of LAD lumen was restored. One month after leaving the hospital a control exam was done. Symptoms of chest pain were gone in rest or physical stress while the ECG and echocardiography were both normal.

The second patient of this group showed up in the hospital with chest pain lasting more than 30 minutes, with ECG ST-elevations, tachycardia and hypertension. He was an intense smoker and had genetic predisposition for coronary heart diseases. He was treated with conservative therapy characteristic for STEMI: morphine, streptokinase, statins, anti-thrombosis drugs, anti-coagulants and beta-blockers within first two hours after the symptoms appeared. A series of ECG-s was done and the results normalized after the therapy was administrated. Angina pectoris also disappeared. The patient was kept for observation, and then was sent home with prescription of aspirin 100 mg per day, and advices for an immediate healthy life-style change were also given.

Third group, is made of 145 patients from a total of 148 included in the research. 98 were males while 47 females. The main reason for most patients to show up for medical help has been chest pain and at some of them fatigue, weakness, chest pain getting worse with physical stress, dyspnea and at 39% of the cases a sub-febrile body temperature was measured. ECG results showed various results between the groups, such as:

1) no ECG abnormalities, 2 patients (2%)
2) ST-elevations in various leads (depending on infarction localization) 102 patients (70%)
3) ST horizontal segment, ST-elevation with T wave inversion, 41 patients (28%).

One of the patients without abnormalities on ECG results, but with worse chest pain, during differential diagnosis an echocardiography was made. It didn't showed changes on the heart structures, but increased diameter -46mm of the aortic arch lumen was measured. An angiography was made and confirmed an aortic dissection. The patient was transferred in another clinic for cardiothoracic surgery consult. The other patient of this group (without ECG abnormalities) also showed normal echocardiography results. A stress-echocardiography test was made and it was positive. Sublingual nitroglycerine was administrated for the pain and beta-blockers were applied to prevent another ischemic stroke of the myocardium.

At the group of patients with ST-elevations on ECG, with conservative therapy were treated 59% of them (60 patients from a total of 102), while at 41% of them (42 from a total of 102) PCI was done. On the patients treated conservatively, 79% of them were chest pain free and with ECG results improved while 21% of the cases developed an episode of angina pectoris and ECG or echo abnormalities on 6^{th} month and 12^{th} month after treatment control exam. On patients treated with PCI, 97% didn't showed ECG abnormalities on the control exam after 6 and 12 month post-treatment and chest pain was gone in rest or during physical stress. Only 3% developed symptoms or ECG abnormalities like ST-elevations on 6-12 month time period after treatment.

Patients with no ST-elevation on ECG but with T-wave inversion, were treated conservatively – 69% (28 from 41 in total) while interventional treatment have undergone 31% of the cases, respectively 13 patients from a total of 41. On the cases treated with medicaments, 60% of them didn't showed signs of chest pain or ECG changes in the control exam after one month of treatment or after 6 months, while 8% of them developed ischemic heart disease symptoms in the next six months and 1% ended lethal, as a result of progressed stenosis and other comorbidities. Patients treated with PCI, didn't developed symptoms or ECG changes in the next 6 months or 1 year (98% of them), while 2% of this group showed complications associated with a new stenosis in the same artery or in other branches of the coronary arterial circulation.

Discussion

Achieved results give information on the symptomatology of IHD manifestation, ECG and echocardiography results on various forms of IHD and data for the best treatment of the disease.

The patient from the age group 20-30 years old, who except ECG abnormalities characteristic for STEMI, had myotonic dystrophy which caused dilative cardiomyopathy seen on echocardiography, ended lethally as a result of not only acute ischemia but and other accompanying circumstances that where present. The dilatation of the cavities causes low contractibility which lowers ejection fraction and enhanced the ischemia even more. Vascular redistribution in lungs very often leads to accumulation of fluids in pleura which causes dyspnea. The combination of many pathologies, is thought to be the reason this patient ended lethal.

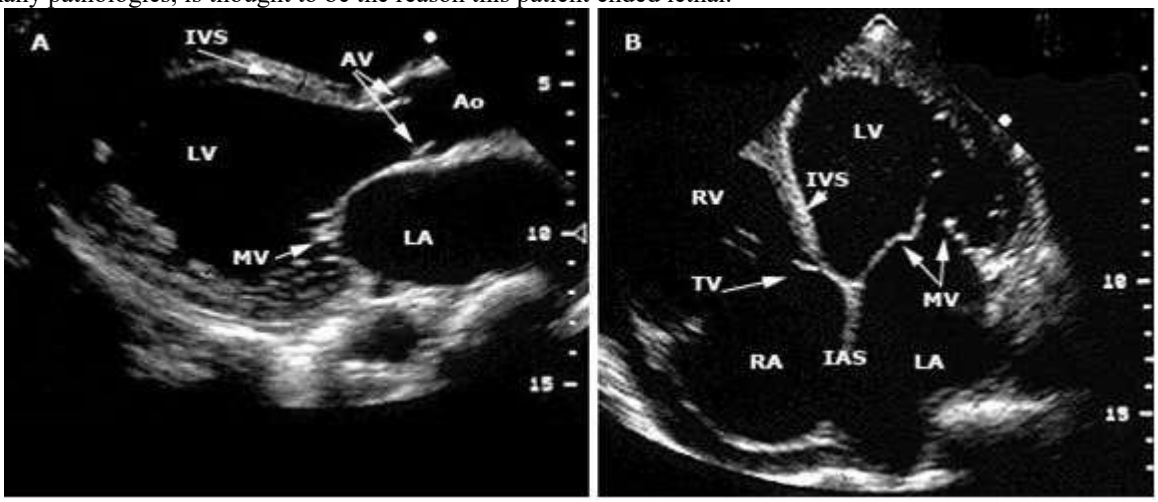

Fig. 2 Long axis (left) and apical views of all cavities (right) are shown, in a patient with dilative cardiomyopathy. Long axis view demonstrates high sphericity of the LV. LA enlargement is visualized and enlarged ventricular end-systolic volume is identified, which shows that in the end of systole a huge part of the volume is left un-ejected in a dilated LV. Dilation in the RA and RV is also visualized. Prognosis is poor.

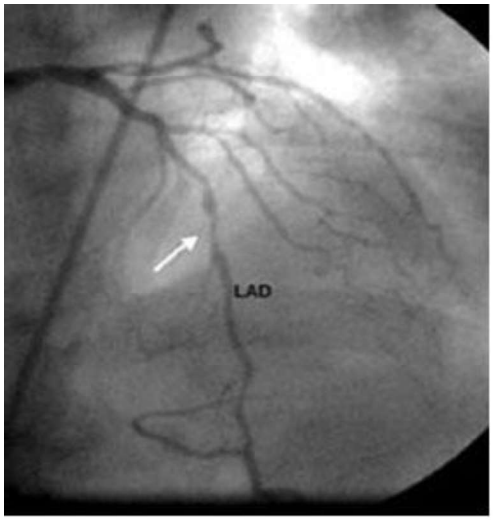

Fig. 3 - X-ray view during coronarography which shows a medium LAD stenosis.

In the second group of patients (age 30-40 years old), one of the patients showed an angina pectoris lasting shorter than 10 minutes and excessive weakness. After the normal results of ECG and echocardiography, a stress-echocardiography was indicated so the chest pain could be explained. After the positive result, stable angina pectoris was identified. Coronarography explained one more time that the case is ischemic heart disease, after a LAD stenosis was visualized. PCI was one and the patient was pain free even during physical activities on his 1 year observation. The other patient who belongs on this group, except chest pain had an ST-elevation on ECG, hypertension and tachycardia. Social and family anamnesis where positive, with information about active smoking and genetic predisposition for coronary heart diseases. Conservative treatment was successful, because on control exams after 6 respectively 12 months, the patient did not developed chest pain or ECG and echo abnormalities. The success is due to the right time that the patient looked up for medical help, which made it possible that the fibrinolysis was effective. To prevent another stroke, advices for healthy life-style were given, in order to improve prognosis.

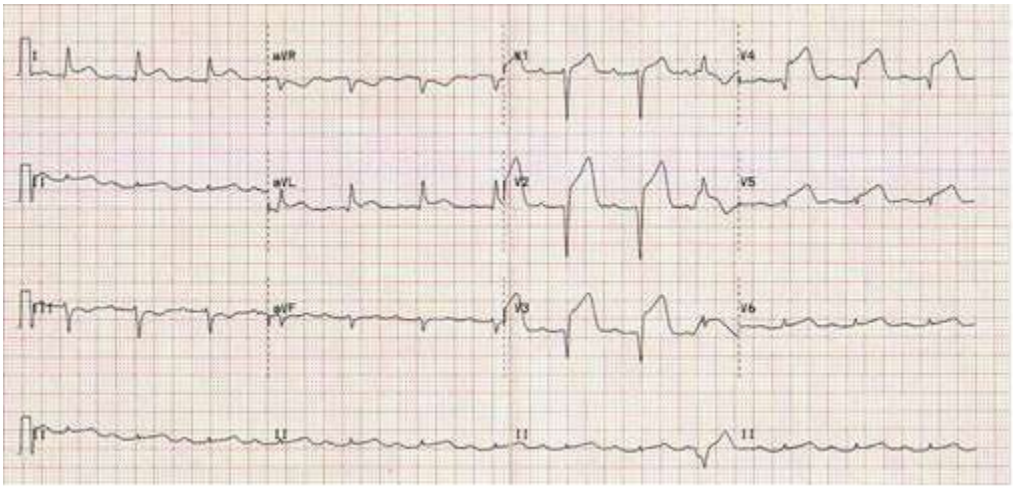

Fig. 4 – electrocardiogram with ST-elevation, similar to the aforementioned patient

From the third group of patients (age 40-55 years old), 145 of the patients were of this age (from the total number included in the study – 148). A wide success was achieved with both ways of treatment: conservative or interventional. Only one patient of this group died. PCI shows better results post-treatment, because of the lower number of cases who developed symptoms similar to pre-treatment or complications in their one year observation after treatment. But, it's not only the therapy who defines the outcome, risk factors and genetic predisposition for IHD play a crucial role on the progress or improvement of the disease, or the creation of a new stenotic lesion in the coronary circulation.

Males are more affected from the disease, 62% of all 148 patients were males and only 38% of them where females. In this study, we give importance to the acute nature of the disease and give awareness that if it's not in time treated, it puts patient life in risk. The right timing for showing up on the hospital for medical help is absolutely important and the prognosis is directly dependent on it.

Conclusion

The conservative and interventional treatment both show high success on the management of IHD patients, if the choice which treatment in which cases will be performed is made on the right time. IHD patient guidance is a challenge, which in our study was a successful one. Percutaneous coronary intervention as a methode shows better prognosis at the patients with IHD. The success of the conservative treatment is directly depending on the time of appliaction, meaning the prognosis is better if the patient is treated in the first hours after the first symptoms appear.

References

1. Thaler S. M., 2007, The only EKG book you'll ever need, Walnut Streetm, Philadelphia, 10 p
2. Kaddoura S., 2009, Echo Made Easy, Second Edition, Toronto, 145 p.
3. https://lifeinthefastlane.com/ecg-library/anterior-stemi/
4. Fauci S. A., Kasper L. D., Longo L. D., Braunwald E., Hauser L. S., Jameson L. J., Loscalzo J., 2008, Harrison's Principles of Internal Medicine 17th Edition, The McGraw-Hill Companies, Inc.
5. Muscular Dystrophy Association, Facts About Myopathies, updated December 2009
6. Cortez D. N., Pintoj F., Stress Echocardiography in Diagnosis of Coronary Artery Disease, Volume 6, Issue2.
7. Nelson R. G., Cohn F. P., Gorlin R., Prognosis in Medically-treated Coronary Artery Disease, Influence of Ejection Fraction Compared to Other Parameters.