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COMORBIDITY CONCEPTION OF SOMATIC DISEASES IN CARDIOLOGY PRACTICE

Abstract. The article review discusses the comorbidity of somatic diseases in cardiology practice. There are discussed the definition and formation history of comorbidity theory prevalence and options for the development of comorbidity. In the article also is analyzed the prevalence of comorbidity in the population and cohorts of individuals with various diseases. The commonality of risk factors for chronic non-inflectional diseases is an important prerequisite for the development of comorbidity. This study considers various options for the comorbidity development. We have to apply the concept in practical health care create. We also have to create the available tools to determine the prognostic of comorbidity of somatic diseases and. In the article are presented three methods for assessing the prognosis and survival in case of comorbidity of somatic diseases. There are considered unified views on the tactics of treatments, prevention of comorbidity and high risk of complications. At the moment the data is being accumulated on the benefits of poly pills tactics treatment. However, studies with firm endpoints are few in number to date. We have to combine the medicine with different mechanisms of action that have an evidence base for achieving target levels of individual indicators requires. The authors propose algorithms for managing patients with comorbid pathology, for which they have developed schemes of actions from diagnostics to monitoring the main indicators for evaluating the effectiveness of therapeutic interventions and preventive measures.

Key words: comorbidity, cardiovascular diseases, risk factors, forecasting scales.

List of abbreviations:
AH – arterial hypertension
WHO – World Health Organization
IHD – Ischemic heart disease
NID – Non-inflectional diseases
DM – Diabetes Mellitus
CVD – Cardiovascular diseases
COPD – Chronic Obstructive Pulmonary Disease

According to the documents of WHO about non-infection diseases (NID), 80% of the death are associated with four groups of NID in the developed countries in current certainly. [1] The cardiovascular diseases (CVD) at the first place. The same way the neoplastic and pulmonary diseases, there are Chronic Obstructive Pulmonary Disease (COPD) and Diabetes Mellitus (DM), are actual. [2]

The doctors encounter with more than one disease, they face with combine and mix pathology in the last years. It is called comorbidity, the Latin term means «coniunctim» and «morbus» - «together» and «disease». The comorbidity is coexistence two and more syndromes (transsyndromic comorbidity) or two and more diseases (transdiseases comorbidity) in a patient. The syndromes or diseases are interconnected or coinciding in time. [5].

The «comorbidity» term was suggested in 1970 by an American epidemiologist and researcher Alvan R. Feinstein. He considered by comorbidity the presence of a concomitant clinical picture, which manifests with main and other diseases. The

professor Feinstein showed it on the example of patient with acute rheumatic fever. The patients had a worse prognosis if they had concomitant diseases. Currently, the comorbidity is separate research direction.

The research of comorbidity is actual issue:

1. The comorbidity has pandemic condition and it has a lot of significance to prognosis. According to M. Fortin research, the prevalence of comorbidity is 69% of young patients, up to 93% of middle age patient and up to 98% of older patients group. The count of comorbidity significantly increases from 10% in the 19 ages, up to 80% in the 80 ages and it up more in elderly patients naturally. According to domestic research of pathological materials, the frequency of comorbidity is up to 94,2% [6, 7].

2. Doctors often have got the patient with comorbidity in the practice, it is two or more nosology of diseases. Sometimes the patient has got 6 or 8 diseases in isolated cases, it is up to 2,7% [8];

3. The comorbidity causes the problems to diagnosis, choice the treatment tactics, management patient tactics and prevention of associated complications diseases.

4. The comorbidity is independent state of death and it is significantly affects the prognosis of the disease and life. According to the Russian researches, if the patient with cardiovascular diseases has two or more other diseases, the risk of developing primary endpoints and deaths are 2 or 3 times more than the control group ($p<0.002$) [10].

According to the comparative cohort research, other cardiovascular diseases is founded up to 41% of the all cases and non-cardiovascular disease is founded uo to 35% of all cases in the patients with ischemic heart disease (IHD). It is 2 or 2,5 times more that in the patients who hasn`t the IHD [11].

The 80% of patient with angina pectoris has got a combination of two or more somatic diseases in reality doctors practice. It happens in spite of that the somatic diseases has got difference in frequency of the gender characteristics. The women have comorbidity of IHD, thyroid diseases and cholelithiases. The men have comorbidity of brain`s vessels atherosclerosis, nephritises, urolithiases, COPD, stomach ulcers [11]

In the several researches was shoved that comorbidity, somatic diseases and patient`s ages have got the clear correlation between each other's. It together affected the patient`s clinical condition. If one says about the compatibility of pathologies in elderly patients, the most common following combinations are atherosclerosis of the heart, brain, AH, emphysema of the lungs, neoplastic processes in the lungs, digestive system, on the skin, the gastroesophageal reflux disease, gallstone disease, gastroesophageal reflux disease, chronic pyelonephritis, prostate adenoma, DM, arthrosis, the spine osteochondritis, cataracts, glaucoma, hearing loss, osteoporosis. Recently, special attention has been paid to the combination of IHD and digestive system pathology [12].

The famous risk factors have the main role in development of the comorbidity CVD and NID [14, 15]. Obviously the universal risk factors start the cascade of several somatic disease systems. In other words, the same risk factors can simultaneously contribute to the development of CVD, respiratory diseases, oncology diseases, endocrinology diseases (table 1). Certainly, the hereditary predisposition has a significant and main role [16].

Table 1 - The general risk factors of basic non-infection diseases

Risk factors	Cardiovascular disease	Diabetes mellitus	Oncological disease	Respiratory disease
Smoking	+	+	+	+
Harmful consumption of alcohol	+		+	
Poor nutrition	+	+	+	+
Lack of physical activity	+	+	+	+
Obesity	+	+	+	+
The BP increasing	+	+		
The high level of glucose in the blood	+	+	+	
The high level of cholesterol in the blood	+	+	+	

We know several options for the development of the comorbidity of somatic diseases in cardiological practice:

• There are no etiology links between diseases (in mechanical combination)

• There has the pathology links between diseases and disorders

• There are has the causality of a disease, it can be cause another disease

It is gratifying to note, the conception of comorbidity included in modern scale for prediction the complications risk and in the fatal cases. The illustrative example of the modern scale is European scale of the cardiovascular risk complications by AH. It shows that the predicted risk can be increased several times by similar numbers of systolic or diastolic blood pressure, the presence of additional violations and associated diseases.

The predictive assessment methods of somatic disease comorbidity

The foreign researches have made enormous attempts to quantitatively assess of the clinical and prognostic significance in the comorbid pathology patients [17]. The number of indices and systems have been developed for the purpose. The main ones are the following Kaplan-Feinstein index (KFI), Index of Co-Existent Disease (ICED), Geriatric Index of Comorbidity (GIC), Total Illness Burden Index (TIBI), Chronic Disease Score (CDS), Adjusted Clinical Groups (ACG), Cumulative lllness Rating Scale (CIRS or CIR), Cumulative lllness Rating Scale for Geriatrics (CIRS-G) [1,2].

Comparative overview of a number indices (Charlson, CIRS, Kaplan-Feinstein, GIC) shows in 2010 year that the GIC is the most accurate predicting mortality index in hospitalization and the CIRS is index of the length of hospital stay. It is for predicting adverse hospitalization outcomes [3].

Another systematic review shows in 17 methods for assessing comorbidity in 2009 year, that the CDS, ACG, Charlson, CIRS and DUSOI are the most commonly used indices.

The authors concluded that the methodology needs to be developed. It has to be combination of multiple indices. The analysis of questionnaires and scales shows the correct of conclusion. Today the original tool for quantitative and predictive assessment of comorbidity hasn't been developed in the firs-line Russian doctors` practice.

Currently, the Charlson index is widely used in clinical science practice (Table 2). It is the point assessment system from 0 to 40 score, it allows to use the comorbidity diseases to predict the 10 years survive rate [18]. When counts the all points are summed up of comorbidity diseases. The one point is added every ten years of live if the patient exceeds the age of forty.

There is also an opportunity to estimate the patient`s age and deaths rate. It is 12% without comorbidity diseases and it rises to 25% with 1 or 2 points of comorbidity scale, 52% with 3 or 4 points of comorbidity scale, 85% with 5 points of comorbidity scale.

Table 2 - The score of concomitant disease with comorbidity index calculation Charlson

Concomitant diseases	Score
Acute myocardial infarction	1
Heart failure	1
The lesion of the peripheral vessels (the presence of intermittent claudication, aortic aneurism more than 6sm, acute arterial insufficiency, gangrene)	1
Transient ischemic attack	1
The stroke with minimal residual effects	1
Dementia	1
Bronchial asthma	1
Chronic nonspecific lung disease	1
Collagenases	1
Peptic ulcer and/or duodenal ulcer	1
Cirrhosis without portal vein hypertension	1

Diabetes mellitus without end-organs lesions	1
The stroke with hemiplegic or paraplegic	2
Chronic kidney disease with level of creatinine more than 3mg%	2
Diabetes mellitus with end-organs lesions	2
Malignance tumors without metastases	2
Acute and chronic lymphocytic or myeloid leukemia	2
Lymphomas	2
Hepatocirrhosis with portal vein hypertension	3
Malignance tumors with metastases	3
Acquired immunodeficiency syndrome	6

In the series of cohort researches to predict 10-years survival in patients with AH (n=110) and/or IHD (n=110) who has comorbidity of somatic diseases (COPD or DM) are shown genders difference (Table 3). The 20% patient`s survival rate is higher more among women, than men if they have AH and IHD. The proportion of people with low survival in both groups is 2 times higher than in groups of people with high 10-year survival rates in general. The patients with comorbidity of AH, IHD and DM has in low survival rate [11].

Table 3 - The Charlson index of comorbidity of 10-year survival rates in men and women with AH and IHD

Index	I group of AH n=110		II group of IHD n=110	
	Men n=56	Women n=54	Men n=80	Women n=30
More than 90%, n(%)	13(23,2)	8(14,8)	18(22,5)	5(16,7)
77%, n(%)	13(23,2)	11(20,4)	15(18,8)	4(13,3)
53%, n(%)	9(16,1)	7(13,0)	15(18,8)	6(20,0)
21%, n(%)	21(37,5)	28(51,9)	32(40,0)	15(50,0)

We have some rules to create the **clinical diagnosis formulation** for the comorbidity patient, it has to be observed in doctors practice [5, 13].

The ground rule is to highlight **the main** and **background** diseases as well as the **complications** and **concomitants** pathologies:

1. The highlight of **the main** disease is the nosological unit that determines the primary need for treatment in connection with the greatest threat to life or disability. As a rule, the disease is the reason for seeking medical help, but the situation can change if we examine the patient. The main disease can be the least prognostically favorable disease, in that case all other diseases become concomitant. Sometimes the main disease can be the several competing diseases.

2. **The competing** diseases is the other nosological unit which has the same criteria of main disease. **The background** disease causes the unfavorable course of underlying disease, contributes to the development of complications. The background disease has to be treated as well as the main disease.

3. **The complications** further in the unfavorable outcome and sharp deterioration in the patient`s condition. They are pathogenically associated with

the main disease. In some cases, the complications of main disease associated by etiology and pathology factors. It means that the main disease and complication are conjugated. The complications have to be listed in decreasing order of predictive or disability significance.

4. **The rest** of the diseases, which patient has got, have to be listed in order of importance.

5. **The concomitant** disease isn`t associated etiologically and pathogenically with the main disease

The treatment tactics and basic principles in prevention of comorbid pathologies in the cardiology practice issue

The one-time correction of the several diseases is the one of the main patients with comorbidity management aspects [19, 20]. At the same time, the main goal remains to reduce the overall risk of complications and fatalities. If you adhere to international recommendations for the treatment of comorbid patients, it is required to take at least 5-6 drugs in total. In this regard, an urgent question arises about adherence to long-term therapy. According to American expert Valentin Fuster, the factors that determine a patient's poor adherence to treatment include: complex treatment, the number of drugs taken and the number of chronic diseases [21]. Multicomponent therapy is justified by the achievement of target levels of key indicators, since individual drugs from the point of view of evidence-based medicine prevent the risk of developing global complications. However, the issues of drug interactions and the cost of treatment are serious medical and social problems. Recently, the concept of poly pills has been widely discussed, when one tablet contains drugs with several mechanisms of action. For example: antihypertensive, lipid-lowering and antiplatelet agents in the one pill. There are a number of arguments for the widespread use of poly pills treatment. These are the aging population of the world (the proportion of older and elderly people will increase by 20-30% by 2050), urbanization / sedentary lifestyle, an impending epidemic of obesity and diabetes mellitus. The factors create a prerequisite for the development of comorbidity in somatic diseases. On the other hand, low adherence to treatment and low compliance with a healthy lifestyle can be addressed with poly pills treatment. Along with the advantages, poly pills treatment has some limitations. Namely, the lack of the possibility of dose titration, since the drugs are produced with fixed doses. Also, from an evidence-based medicine perspective, the effect of poly pills treatments on endpoints is not fully understood. Also, from an evidence-based medicine perspective, the effect of poly pills treatment on endpoints isn`t fully understood. Similar clinical trials are being carried out by the pharmaceutical industry in Latin America and India. It must be emphasized that this initiative is supported by WHO. Currently, two-component drugs (antihypertensive and statins) or two-three-component antihypertensive drugs with various fixed doses are widely used in clinical practice.

When we have to choose a treatment strategy, we have to take into account the overall risk of complications and the variant of comorbidity of somatic diseases. the principle of selection of therapy may be different with different mechanisms of development of comorbidity. For example: the presence of a pathogenic connection between diseases allows the use of a drug acting on this link, which can simultaneously reduce the severity of interrelated diseases. The presence of a mechanical combination of several somatic diseases requires the use of targeted multicomponent therapy. However, it is impossible to define strict indications for the use of multiple drugs or the poly pills treatment tactics. In some cases, a combination of the principle of polypharmacy and poly pills treatment tatcis may be considered. Despite such a differentiated approach, the unifying link of all variants of the comorbidity of somatic diseases is a change in lifestyle, which is multifaceted.

When discussing the prevention of comorbidity of somatic diseases, it is necessary to emphasize the strategy of three levels [22]. Prevention at the population level is the broadest and most effective, since the impact is carried out on those lifestyle and environmental factors. It increases the risk of developing non-communicable diseases in the population and their comorbidity. High risk strategy is identifying and reducing the levels of risk factors in people at increased risk of developing NID. Finally, targeted secondary prevention is the prevention of progression and complications of the comorbidity of NID diseases.

Conclusion

The comorbidity of somatic diseases occurs often in cardiology practice, it often has the gender differences. The comorbidity increases the severity of the patient`s condition and it worsens the patient`s prognosis. It has to be considered in diagnosing and developing treatment tactics. The treatment of several diseases requires taking into account the combination of drugs. It has to be prescribed with

differentiated and selected taking into account efficiency, portability and side effects. The using of poly pills treatments have to be considered in rationalize therapy. However, clinical studies have to be assess their effectiveness from the point view of evidence-base medicine. Multicomponent therapy is one of the basic principles in reducing the goal risk of complications and fatalities.

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