THE REHABILITATION OF THE ARITHMIC PATIENT DUE TO PARASITARY CAUSES IN PSYCHOLOGICAL, BIOETHICAL AND SOCIAL CONTEXT – GENERAL STUDY

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Abstract: This study intends to present the inter-relationship between parasitic infections and the development of cardiovascular pathology, focusing on the study of arrhythmias, both atrial and ventricular, in terms of determinants and the ways of prevention and treatment. The psychological implications, the bioethical issues as well as the socio-community aspect are taken into account regarding this topic, insufficiently researched yet, but of a particular relevance and importance in the medical world.

Keywords: ***parasitic infection, arrhythmia, psychological, bioethical, social.***

Rezumat: Studiul are în vedere prezentarea interrelaţiei dintre infecţiile parazitare şi dezvoltarea patologiei cardiovasculare, axându-se pe studiul aritmiilor, atât atriale, cât şi ventriculare, în contextul factorilor determinanţi şi modalităţile de prevenţie şi tratament. Se iau în consideraţie implicaţiile psihologice, aspectele bioetice şi componenta socio-comunitară privind acest subiect insuficient cercetat, încă, însă de o deosebită actualitate şi importanţă în lumea medicală.

Cuvinte cheie: ***infecţie parazitară, aritmii, psihologic, bioetic, social***

1. **INTRODUCTION**: Among the many diseases caused by parasitic infections which usually act systemically in humans, the cardiac pathology of a parasitic causerepresents a current interest in the medical field, insufficiently studied so far and having a wide and various spectrum. This work considers the interrelation of various parasitic infections and the development of arrhythmias in cardiac pathology. Parasites such as Toxoplasma gondii (T. gondii), Trichinella spiralis (T. spiralis), Trypanosoma cruzi (T. cruzi), Trypanosoma brucei gambiense, Trypanosoma brucei rhodesiense and Echinococcus granulosus (E. granulosus) were discussed and analyzed in a cardiovascular context (1), (2), (3). Although the medical world commonly associates parasitic infections to with third world populations and to the poor and underdeveloped societies, a recent US study estimated that 85% of the adult American population suffers from a type of parasitic infection, even latent, and Dr. Ross Anderson, one of the leading Parasitology practitioners in the US,thinks that the parasitic diseases represent one of the biggest undiagnosed challenges of the human race, based on 20 years of experience and 20,000 patients. Also discussed were the psychological, bioethical and socio-community components, involved in the rehabilitation of such arrhythmic patientswho need to be informed in advance about the nature of these parasitic diseases by way of educational programs and rehabilitation programs, special medical psychotherapy,when the disease has already occurred, helping the patient within the doctor-patient relationship to resort to a lifestyle adapted to the changes installed in the body (4), (5).

2. **IMPLICATIONS OF PARASITIC INFECTIONS IN DETERMINING ARRHYTHMIAS :** Many of the cardiac pathologies of a parasitic cause - parasitic myocarditis, parasitic pericarditis, parasitic endocarditis, pulmonary hypertension, cardiac arrhythmias, both atrial and ventricular, mainly tachyarrhythmia- in developed Western countries, are caused by parasitic infections due to the multitude of travelers and immigrants from poorer countries, immunosuppressive therapy, the infection with HIV- AIDS and organ transplantation (1), (2), (3).
Cardiac arrhythmias represent deviations from the physiological rhythm (sinus rhythm) given by the heart's natural pacemaker (sinoatrial node) in the right atrium, under the influence of the central nervous system. They fall into bradyarrhythmia -irregular cardiac rhythm with a low heart rate and tachyarrhythmia - irregular heart rhythm, with a high heart rate, being in turn both atrial and ventricular (3).

   Most commonly at the chest level, the heart and lungs are affected by parasitic infections. As far as the heart is concerned, when the pericardium is affected by a parasitic cause (T. gondii, T. spiralis, trypanosomiasis, E. granulosus), pericarditis, pericardial effusion and cardiac tamponade occur,which are relevant for the development of cardiac arrhythmias. Similarly, in the case of myocardial damage, cardiac arrhythmias occur, as a consequence of myocarditis or cardiomyopathy of a parasitic cause (T. gondii, T. spiralis, T. cruzi (Chagas disease), E. granulosus, Entamoeba histolytica). In the case of pathology at endocardium level, infective endocarditis develops with the parasitic infectious agents such as: T. spiralis, T. cruzi (Chagas disease), E. granulosus (1), (2), (6).

   Of the above mentioned species, the main pathology of a parasitic cause with remarkable effects on the heart is given by Trypanosoma cruzi, by Chagas disease affecting all three of the heart structures: pericardium, myocardium and endocardium (1), (2), (6). However, taking into account all the species listed, we will elaborate on the interrelations between parasites and types of arrhythmias determined in the following sections.

3. **TOXOPLASMA GONDII AND THE PATHOLOGY OF CARDIAC ARRHYTHMIAS:** T. gondii is a common anthropozoonosis globally spread with different clinical manifestations depending on body type: immunocompetent or immunosuppressed. The infection is transmitted from cats to humans through fecal-oral transmission, ingestion of undercooked food products or contaminated water. In immunocompetent patients, the infection is often asymptomatic, whereas in the case of immunosuppressed hosts, if the cardiovascular infection, the toxoplasmosis occurs, most often, in the form of myocarditis, constrictive pericarditis, arrhythmias and congestive heart failure. In the case of arrhythmias developed in T. gondii infection, they occur predominantly in myocarditis and consist in ventricular arrhythmias, mainly: ventricular fibrillation, ventricular tachycardia, both life-threatening, the most common cause of myocardial infarct, but also in an atrial arrhythmia - the sinus tachycardia. The effects of the first two types of arrhythmias are very harmful to the

body, developing the following symptoms: palpitations, headaches, episodes of syncope, chest pain, anxiety, and clinical aspects as hypotension, tachypnea, a decreased level of consciousness, pallor (1), (2), (7), (8).
T. gondii multiplies at intracellular level and disseminates to the lymphatic and blood vessels, thus reaching throughout the body, affecting it systemically. Diagnosis is based on serology or on tachyzoites detection within the myocardial tissue. A study carried out by Meghji Leak on 18 patients suffering from arrhythmia of atrial fibrillation nature, ventricular arrhythmias and atrium-ventricular block, has demonstrated T. gondii infection to be the cause, hence the involvement of atrial arrhythmias by this type of parasite (7), (8).

4. **TRICHINELLA SPIRALIS – CARDIAC ARRHYTHMIAS RELATIONSHIP**: T. spiralis is a globally spread nematode, localized at intracellular level in the larval and adult stage that infects the human host by improperly prepared food. In the larval stage, the parasite invades the lymphatic and blood vessels, entering first into the general circulation and then into mature myocytes where they form cysts. This type of parasitic infection affects at the cardiovascular level, all three cardiac structures: pericardium, myocardium and endocardium. In the acute pericarditis, sinus tachycardia is determined - atrial type arrhythmia. Within myocarditis, of the eosinophilic type, arrhythmias are both of the atrial kind and ventricular: sinus tachycardia, atrial fibrillation, atrial flutter, ventricular fibrillation and ventricular tachycardia. At endocarditis level, ventricular tachycardias are referred to and also extrasystoles and supraventricular arrhythmia (2), (3). Clinically, T. spiralis infection causes myalgia, fatigue, fever, generalized weakness and within arrhythmias, panic attacks, anxiety, sleepiness, daytime sleep episodes, dyspnea, anxiety are noticed (1), (2).

5. **TRYPANOSOMIASIS AND THE ARRHYTHMICAL CARDIOVASCULAR PATHOLOGY** : Out of the trypanosomiasis range, we can mention: T. cruzi, T. brucei brucei gambiense and T. rhodesiense, with a focus in particular on T. cruzi, generating Chagas disease, a tropical zoonosis, transmitted by a vector in endemic areas of South America, Central America and North America. The disease develops as a clinical picture: subcutaneous edema, lymph adenopathy, hepatosplenomegaly, myocarditis, pericarditis, endocarditis and sometimes meningitis encephalopathy. Within pericarditis, there are arrhythmias due to atrial sinusal tachycardia cause, atrial fibrillation, paroxysmal supraventricular tachycardia (PSVT), ectopic junctional tachycardia, atrial flutter and ventricular arrhythmias such as: ventricular tachycardia and ventricular fibrillation. Chagas disease, in its acute phase, does not usually exhibit symptoms, however, in the chronic phase, the following symptoms are present: fever, fatigue, joint pain, headache, diarrhea, vomiting, nausea (9), (10). Also in the chronic phase, congestive heart failure, myocardial infarction, from the cardiovascular point of view, are to be found. Based on all clinical aspects and symptoms highlighted, disabilities are noticed, arising out of this pathology of the body with important effects on the psychic of the patient (1), (2), (3), (4).

6. **CARDIAC ARRHYTHMIAS GENERATED BY ECHINOCOCCOSIS:** E. granulosus is a cestode flatworm parasite whose eggs, transmitted to the final host (dog, fox, wolf) to the intermediate host (human), are the infectious agent. According to Shevchenko et al., in a study conducted in 2006 on cardiac echinococcosis and its treatment, this is a rare pathology, being present only in 0.1% -2% of all cases of echinococcosis globally. On cardiac level, the evolved hydatid cyst reaches all layers of the heart, puncturing the pericardium (pericardial effusion). In the same study, there is indication of the location of the most common cardiac hydatid cyst: atrial septum, ventricular septum, right ventricle, left ventricle, pericardium, multifocal cysts of the atria, ventricles and pericardium (11), (12). Most patients die either of septic shock or of embolic complications. Usually, patients presenting a cardiac hydatid cyst,also suffer from its complications at systemic level, affecting other organs. In most cases, the patient must turn to surgery (12). Clinical manifestations of cardiac echinococcosis include arrhythmias, myocardial infarction, cardiac tamponade, pulmonary hypertension, syncope, purulent pericarditis, which are very often life threatening. In the case of pericarditis with hydatid cyst, in terms of arrhythmias, there are atrial arrhythmias - sinus tachycardia, atrial fibrillation, atrial flutter, PSVT, junctional ectopic tachycardia, but also ventriculary- ventricular fibrillation and ventricular tachycardia (1) (2), (3), (11), (12). In the E. granulosus associated myocarditis there are to be found mainly ventricular arrhythmias, but also atrialarrhythmias - sinus tachycardia and in the case of hydatic endocarditis, ventricular tachycardia prevails, therefore: ventricular arrhythmia. The diagnosis is made by positive serological testing for hydatid cyst and by radiological laboratory investigations. In the laboratory examinations, echocardiography ranks first in the detection of possible cardiac complications based on a hydatid cyst. Symptoms of cardiac echinococcosis include: palpitations, chest pain, headache, bloody sputum, fever, anxiety, panic attacks (4).

7. **PREVENTION AND TREATMENT**: Prevention of such parasites with increased risk of worsening systemically and multifunctionally must prevail, but most of the times, advanced stages of pathology are reached, when the patient presents symptoms listed above and the specialized treatments, both medical and surgical, become indispensable. Educational programs onraising awareness, both of the affected and the unaffected population, were carried out in the USA, but also in less developed countries through international projects such as *Medicins Sans Frontieres*, but the number of these types of parasite caused diseases appears not to be under appropriate control. In the case of echinococcosis, as a drug therapy, albendazole or mebendazole are prescribed for a period of 3-6 months (1), (2). The response to therapy should be monitored by serology and radiological investigations after this period. For Chagas disease, prevention is achieved by reducing the healthy population visits in endemic areas, using anti-insecticide sprays for interrupting transmission of vector pathology and initiating programs for the blood screening for transfusions in some of the circumstances. As a treatment, benznidazol and nifurtimox are to be used (9). In the treatment of trichinosis, the treatment consists in albedazole or mebendazole, associated

with steroid medication in severe cases. Toxoplasmosis is treated based on a drug combination of pyrimethamine and sulfadiazine or pyrimethamine and clindamycin (1), (2).

8. **PSYCHOLOGICAL IMPLICATIONS** : Given the clinical and symptomaticpicture presented for each cardiac parasitic infection, it is notices that the prevailing symptoms are: palpitations, chest pain, fatigue, headache, syncope episodes, panic attacks, anxiety, common elements when we consider the induced arrhythmia of these parasites. The arrhythmic patient is usually anxious and suffers from depressive episodes, from panic attacks, caused by the lack of sleep and also by palpitations and syncope. Daytime sleepiness is another effect of a restless sleep. Psychological therapy with appropriate medication is the key to success for such patients to be reintegrated into society, regardless of origin (North America or poorer areas of underdeveloped countries). During this type of therapy, the patient was allowed to talk about their symptoms and anxieties experienced in their condition; recreational activities in open air and social reintegration programs are to be deployed as well (4), (5).

9. **THE BIOETHICAL ASPECT** : Medical consultation must therefore be accompanied by parallel sheets ("parallel files" or "interpersonal discussion") which make reference to a specialized psychologist having the competence to work with this type of underprivileged individuals, most often, but also with inhabitants of developed countries. In the latter case, psychotherapy is a productive tool that has developed a lot over the past decades and which is used in such cases, with a learning, healing and reintegration purpose (5). The population affected by these parasitic diseases has reached a high degree of vulnerability, and this should be covered by specific international programs for prevention and information. Within the patient-physician relationship which should be informational and deliberatively, in this type of complex medical situations, the patient must find a solution together with the doctor in order to be aware which are the steps to be taken subsequently. The patient should be compliant with the regimen and return for check after the prescribed period. Confidentiality is an important and a necessary component in these kind of situations, considering that those suffering from a parasitic diseases often consider the disease as a rare pathology, searching for information on it online. Due to the simple ways of transmitting infections by way of contamination of different food items, they are reluctant to tell their colleagues, family and friends about their infectious pathology so as to avoid their own discrimination and stigmatization. (5)

10. COMMUNITY RELATED, ECONOMIC AND SOCIAL ISSUES: The rehabilitation and reintegration of patients with cardiovascular pathology of arrhythmic type, of a parasitic causeis a multi inter-disciplinary effort requiring a team consisting of a physician (general practitioner, cardiologist, parasitologist, internist etc.), a psychologist, nurses, radiologists, medical residents and students anchored in rehabilitation and prevention projects on the set ypes of infections. The costs for carrying out such projects at international level, as well as covering the issues either

directly, on site or electronically, througharticles, blogs, websites and social networks are often supported by NGOsin cooperation with medical clinics (5).

11. **CONCLUSIONS** : The heart pathology of a parasitic origin must be taken into accountas an important element in causing aggravated psychological conditions, where as prevention in an international context, by way of special medical programs and multi-inter-disciplinary tackled, takes into account a complex clinical picture.

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