

# MEDICAL CONSIDERATIONS REGARDING HEART FAILURE

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## Keywords:

cardiovascular system, heart failure, standard chest X-Ray, structural aspects, liver

**Abstract:** *The increased incidence of cardiovascular diseases among adults causes interests in the study of pathologies of this functional system. In this context, it is envisaged that cardiovascular diseases, in addition to the clinical aspect, draw attention from a medical standpoint to the involvement of other organs belonging to other apparatus and systems. From this perspective, this study highlights the imagistic and structural aspects of cardiovascular disease and structural aspects of the disease prior to its installation, focusing on the organs involved with cardiovascular diseases. This study refers specifically to the conventional imagistic features that suggest heart failure and its evolution with possible decompensation. In order to extend this study, references to the normal structural aspects were made, regarding the organs and systems involved in the pathology of previously mentioned pathology, with their integrity before the onset of the disease.*

## INTRODUCTION

The impact of cardiovascular pathologies on adult citizens is increasing. This is due to several contributing factors and determinants. In this context, personal history, family history, genetic factors, smoking related diseases are taken into account.(1,3,4) In relation to these factors, studies mainly refer to organs belonging to the cardiovascular system and also to tissues and organs that belong to other apparatus and systems, which are similarly affected morphologically. This is both in terms of biomolecular and pathophysiological mechanisms.(5,12,13) Since the diagnoses of heart failure are established by clinical criteria and confirmed by laboratory tests, this study is limited to the conventional radiological aspects that are suggestive to this kind of pathology.(2,7,17) In addition to conventional radiography and computed tomography, imaging examinations of heart failure also include magnetic resonance imaging, electrocardiogram, echocardiography, cardiac catheterization.(6,16) In the current study, symptomatic patients displaying signs and symptoms of cardiovascular disease were analysed by specialized doctors and examined objectively in terms of clinical and laboratorial investigations.(10,11,17)

Regarding the laboratory tests useful for diagnosis, we highlight the B-type natriuretic peptide (BNP) and N-terminal of the prohormone brain natriuretic peptide (NT-proBNP), troponin, CK (creatin kinase), CK-MB (Creatine Kinase, Muscle and Brain), troponin, creatine kinase (CK) and the isoenzyme MB (CK MB).(8,14) In this context, the study refers to the substances secreted by the ventricular muscle, in response to increased intracardiac pressure. Here, it is important to emphasize BNP and NT - proBNP. At this stage, the study noted that initially, a precursor is secreted (proBNP108), which is proteolyzed subsequently in NT-proBNP being biologically inactive, and the active form – BNP.(9,15)

## PURPOSE

This study highlights some aspects of conventional imaging in patients who were investigated by practitioners in

order to assess their symptomatology. In the context of this particular pathology, structural aspects of the tissues and organs that belong to systems that are involved in the occurrence of this disease preceding the onset and diagnosis of heart failure, are also presented.

## METHODS

This study included a group of 10 patients aged between 65-75 years old. This population segment is considered to be one commonly diagnosed with cardiovascular diseases. It is additionally a population segment that has been directly involved in many daily activities, with a high degree of complexity.

For this study, patients who came to specialized physicians were selected. Standard chest X-rays were carried out. In the group of patients, chest radiographs were performed in standard and profile incidence that were considered suggestive and showing the evolutionary aspects of the disease.

To expand the medical context of this study, there were also references on the structural aspects of normal tissues and organs involved in the decompensation of heart failure.

Imaging investigation was undertaken using the Swiss-ray DDR model. Structural aspects that came with the study were carried out using heart and liver sections stained with Haematoxylin-Eosin staining and special stains.

## RESULTS

Following this study, we selected suggestive radiological images. Figure no. 1 presents the radiologic appearance of a 75-year-old patient. Standard chest radiography performed both in postero-anterior incidence as well as in right profile illustrates the appearance of the enlarged heart, with no signs of cardiac decompensation.

From this perspective, radiologic appearance can be considered standard for enlarged cardiac silhouette, the stage of the disease being eloquent only for this fact, this without

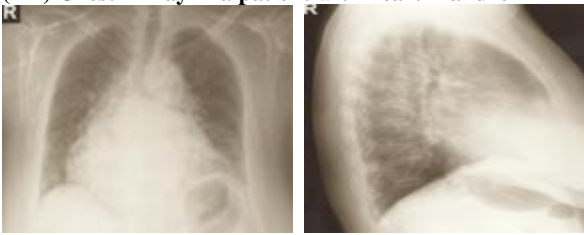
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Article received on 08.12.2014 and accepted for publication on 02.02.2015  
ACTA MEDICA TRANSILVANICA March 2015;20(1):39-41

## CLINICAL ASPECTS

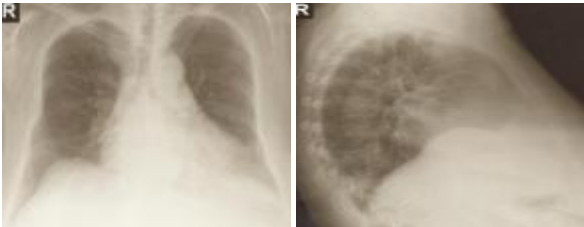
pathological damages to other organs (figure no. 1).

**Figure no. 1. Posterior-Anterior (PA) and Right Lateral (RL) Chest X-Ray in a patient with hearth failure**



On another standard chest X-ray image standard and profile, elements advocating for heart failure decompensation are remarkable. Thus, in this image, besides enlargement of the transverse diameter of the heart to the left, we also observe the standing out of the right hemidiaphragm. This last change, confirms the hepatomegaly attesting liver damage that occurs in heart failure decompensation. No pleural effusion as a sign of major cardiac decompensation is noted (figure no. 2).

**Figure no. 2. PA and RL Chest X-Ray in a patient with heart failure**

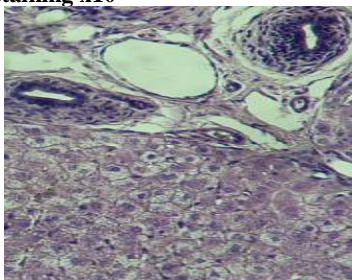


Because any pathology occurs due to damages at biomolecular and pathophysiological level, initially, then normal tissues, organs, apparatus and systems as histological images will be presented. From this point of view, we present the normal appearance of the heart, noting its wall with characteristic muscle tissue, using Haematoxylin-Eosin staining (figure no. 3).

**Figure no. 3. Heart. Transverse section. Haematoxylin-Eosin staining x10**



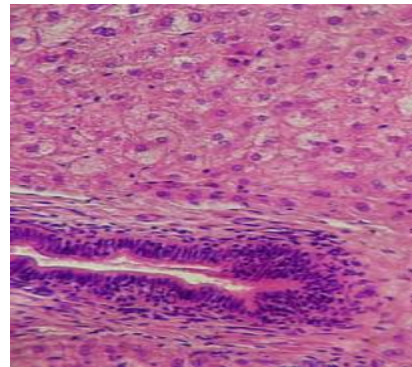
**Figure no. 4. Liver. Transverse section. Iron Haematoxylin Heidenhain staining x10**



There are also some liver aspects. Here, digestive gland annexed to the digestive tube, involved mainly in decompensation of heart failure, is presented. The image was performed in transverse section, showing both hepatocyte cords as well as elements situated in the Kiernan space represented by a branch of hepatic artery, portal vein and a ram of the bile canaliculi, identified by their structural features (figure no. 4).

Structurally, normal liver before installing of the studied pathology is observed in figure no. 5, where we can observe the cords of hepatocytes and the wall of hepatic artery ram belonging to Kiernan space.

**Figure no. 5. Liver. Transverse section. Haematoxylin Eosin staining x10**



## DISCUSSIONS

Nowadays, the cardiovascular disease is characterized by an increased incidence. This fact allows a diverse range of studies to be performed. From this point of view, given the fact that symptomatic patients who come to specialized physicians, are being complexly investigated, a short or extended care analysis can be carried out.

Following the philosophy of this study, every symptomatic patient with cardiovascular pathology, is under conventional imaging investigation. In this context, the study focuses on highlighting some aspects of conventional radiological characteristics of heart failure. Thus, in addition to illustrating imaging showing evolutionary aspects of heart failure, we considered to present some imaging features showing signs that are suggestive in cardiac decompensation or hepatomegaly. The group included in this study does not have patients with pleural effusion as a major sign of decompensation.

Certainly, the pathophysiological mechanisms leading to the installation of this pathology and biomolecular aspects in context, allows the illustration, from a structural point of view, of the organs involved in heart failure. This gives a slightly extended medical image on this disease, taking into account the patient's disease history and the context of the non-pathological aspects of the organs, before the onset of the studied pathology.

## CONCLUSIONS

By the increased incidence among adults, heart failure is a pathology of the present. This pathology affects both genders equally and is found both in the patients living in urban and rural areas.

However, the presence of symptomatic patients at the specialized clinics, requires the physicians to perform complex investigations, both clinically and in terms of laboratory tests.

Data from the investigations enables establishing of the diagnosis and instituting of an appropriate treatment in order to improve symptoms.

To create an overview on the present medical data and

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medical data regarding the medical history of the disease, studies can be performed in a more general way, presenting data on the structural integrity of the organs that are affected in heart failure. The study outlined in this paper presents the beginnings of such an approach.

Given the fact that in this study we have a lack of a group of patients with cardiac decompensation with pleurisy, the research can be continued by selecting patients who are in advanced stages of heart failure. Certainly, the study may continue in another manner, gathering medical information of the underlying diagnosis.

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