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Short Report

Laboratory Exams, Precipitation Factors of Chronic Diseases

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Abstract

Introduction

Chronic diseases are continuum of new equilibriums in organism compared with careful actions of patients and medical decision Lab is important to investigate underlying mechanisms of progression of these diseases prevention of precipitating factors and successful treatment.

Aim

Theoretical approaches to select laboratory exams, to emphasize advantages and limitations compared with clinical signs, as precipitating factors of most frequently chronic diseases. We shall try to answer this questions: Which is the role of lab exams and why?

Material and Methods

Recent and cited literature

Results

Selection of some laboratory exam as precipitating factors such as, Neutropenia alteration of lipids, anaemia, lab nutritional status (installed obesity or malnutrition), states of hypercoagulability, lab impact of viral diseases (COVID 19 for example), degree of increasing of responsible enzymes referred lab cut off values, are selected as precipitation factors of chronic diseases that emphasize unique importance of laboratory investigation.

Conclusion

Lab results are not only part of diagnostic or prognostic algorithms but irreplaceable in prediction of complication or proper management of precipitating factors during chronic diseases.

Introduction

Chronic diseases, chronic inflammation, or state "low grade inflammation" [1], installs a new status of homeostatic organism [2]. Referring Markov chain matrix [3], concept of long run probability, chronic diseases can evolve some stages due to classifications and known criteria, such as: renal insufficiency, (classification of renal insufficiency due to GFR values), cardiac insufficiency (NYHA), hepatic chronic disease until cirrhosis, obstructive pulmonary disease, until respiratory insufficiency [4]. Every relapse event meanwhile it serves as a heaving prognostic factor (e.g. chronic hepatitis reactivation) [4-6].

Evaluating the universal heaving prognostic factors independently of the existence of any chronic disease (e.g. hemoglobin, lactates, albumin) [7].

Also the evaluating of nutritional status, malnutrition, alcoholism, uncontrolled diets, neglecting of weight (overweight) count as added factors [4,7,8]. So, the disease can evolve from the earliest stages to the last stages, but it can evolve from the first stage, directly to the last stage of the chronic disease or to an instant death (many scenarios available) [3].

Observing and knowing the precipitating factors, prevents degrading of the patient, stops the disease in the current stage, e.g. stage 1, or returns the patient at healthy stage, that can be called stage 0, at the best case [3]. Considering the above and the COVID-19 events, were the main incentive of studying the precipitating factors of the chronic diseases and the importance of the laboratory examinations at this context.

Chronic Diseases Pile Up on Each Other. The Role of Laboratory.

Coexistence of more than one chronic disease usually turns into a challenging case for the patient or the health care professionals. The typical example is the cardio-renal syndrome [9-11].

The concept of the cardio-renal syndrome emphasizes that the renal and cardiac diseases pile up to each other on a positive feedback mechanism [9-11].

Meanwhile the hemoglobin emphasizes as the third partner in crime. In more than 100 years, anemia, the decrease of hemoglobin as the easily reachable laboratory marker, known as the heaving prognostic factor [9-11].

At the relation diabetes - renal and cardiac diseases, dyslipidemia and the value of glucated hemoglobin, valued the prognostic evaluation of the patients [12].

At this point of view, the laboratory evaluation, if there is nephrotic syndrome or nephritic syndrome takes the value of a health professionals to the patient [4,7]. Also the literature emphasizes the importance of the carbamylated hemoglobin at the chronic endurance of the renal impairment of the patients with autoimmune disease, starting from the biochemical mechanism of the carbamylation reactions that need urea acceptance and happen in the direct absence of enzymes.

Insufficiency of Organs

Cardiac Insufficiency

Regarding cardiac insufficiency, as a prognostic heaving factor are the inadequate diet, lack of taking the medicaments or not taking them at all, but also the arrhythmia and the uncontrollable hypertension, and in many studies, pneumonia, respiratory events as well as arrhythmias, serve as the most important heaving prognostic factors [10,12-14].

Do we have a laboratory marker related to the evaluation of the cardiac insufficiency? Yes, it is the natriuretic atrial peptide which is the estimation of the risk of mortality and correspond to the NYHA stages [7].

Renal Insufficiency

Estimation of renal insufficiency such as creatinine GFR (glomerular filtration rate) are algorithms where the main determinant is the laboratory one (it cannot be calculated without determining the albumin or creatinine in biological fluids [12-14].

Hepatic Diseases, Hepatic Encephalopathy and Hepatic Cirrhosis

According to a study of infections, hydro-electrolytic disorders, constipation and gastrointestinal hemorrhage are precipitating factors of the hepatic encephalopathy [15,16].

The laboratory takes care at the estimation of the ascitic fluid, at the observance of the blood red-series parameters to highlight on time possible hemorrhages, at the observance of the septic-inflammatory markers in order to take action early in cases of infection [15,16].

The evolution of cirrhosis is determined with albumin and platelets, to treat and prevent the possible hemorrhages as algorithms part of FIBROMAX [16].

Bicytopenia and pancytopenia can be accompanied by other consequences such as gathering of the infections and hemorrhages such as epistaxis.

At electrophoresis can be seen the presence of βγ bridge [4,6,7]. Functions of the albumin impose periodic estimation in order to receive the replacing therapy of albumin [4,6,7].

Arterial Hypertension

Badly-observed hypertension and not taking the medicine regularly can act as precipitating factors of hypertension [17]. Lab evaluation by stages of hypertension and complications or MEN II Syndrome management can make laboratory determinations such as ACTH and hormonal specific data very important for medical decisions [17].

Cancer

The on-going of the immune inflammatory and hyper-coagulation, of the cancerous process brings the necessity of the determination of these factors [18]. The estimation of the hyper-coagulation state with laboratory markers shows the importance of the prognostic estimation through determination of D-dimer, ESR, and fibrinogen at these patients [18].

The way the examinations are taken refers to the biochemical events (pathways, the place they are produced and the plasmatic half-life [7].

A classic case of precipitation factors of a chronic disease are viral or bacterial diseases, which come with strikes for immunity system and degrading as a result of high temperature, dehydration and hydro-electrolytic disorders in the body [5].

Chronic Diseases and Viral Diseases as Precipitating Factors. COVID-19

Viral Diseases as a Precipitating Factor and Importance of Laboratory

The classic case of heaving of chronic diseases are viral or bacterial diseases, which are accompanied with strikes to the immunity system or systematic response as a result of high temperature and dehydrations or hydro-electrolytic disorders [4].

The damaging role of viruses to the immunity system, brings installation of viral, parasite, bacterial and mucous infections, and a classic case is the atypical pneumonia for example, from pneumocystis carinii complication to the HIV/AIDS patients. The classical oriented diagnostic markers are the presence of virocytes in peripheral smear coloring with Giemsa-Romanovski, mononucleosis like syndrome caused by the hepatotropic viruses with an alteration of the hepatic enzymes [5].

Today, the determination of the viral load is an important laboratory choice at the prognostic estimation of these patients [7].

The on-going of these patients depends if these viruses are aggressive, and if they tend to have the multi-organs lesions or may progress with a septic-inflammatory state [5].

In this case, the laboratory parameters are part of the algorithms for medical purposes, such as SOFA score [19,20].

A recently estimated important algorithm is the one that differs bacterial early events from the viral ones and it is TRAIL, IP-10, C-Reactive protein [21].

The main problem is how to include these laboratory parameters in the validation process, these easily examined parameters, also easily transmitting and applicable in the diagnostic oriented status [5,16]. The comparability of COVID-19 and hepatitis B or tuberculosis serves as the main purpose of this [4,5,7,16].

COVID-19 and Laboratory Parameters as Orienting-Diagnostic or Prognostic Factors

COVID-19 has many insecurities and the doctors are challenged, certainly, it is not the first time, also the laboratory and the imaging are a good friend of the clinic and medical services.

Viruses can only be seen with an electronic microscope (specificity) [4]. When it is impossible we detect traces of viruses (as in hepatitis B) but with variable specificity and sensitivity. e.g. ELISSA method [4,7].

Referring these cases with a negative TBC extra-pulmonary sputum exam that helps is measuring of activity of ADA (adenosine deaminase) [22,23]. During COVID-19 case, we don't have any examinations or suspicion of a similar enzyme with low cost examination.

Very oriented exam is neutrophil lymphocyte ratio [24,25]. When was the sputum microscopy challenged at tuberculosis? Can LAMP or its variants be used for coronavirus? [26] Of course, it can.

At the impossibility of this method, the procedure in our country and the early detection gets harder [19,20,27]. The dynamic CT (scan) with the characteristics of atypical pneumonia and the diagnostic power(specificity) will increase with the lab orienting examinations, C reactive protein, D-dimer, lactate, which have much more prognostic value together with other septic-inflammatory and hyper-coagulation indicators, or lactic acidosis (type A) factors [19,20,27]. Using of medication can lead to lactic acidosis type B or attention of intensive care unit, estimated according to acidic-basic or puls-oximetry equilibrium parameters [19,20,27].

Moreover, if there are cardiac and hepatic implications SOFA score is important. (The fact that albumin and lactates are universal prognostic factors (in this case D- dimer and troponin) is well known [18,20].

D-dimer remains important in preventing of fatal implications or differential diagnose of pulmonary thromboembolic with other pathologies and on-time treatment with coagulants. Ferritin-anemia and reactive protein C remain important and more sensible in prognostic evaluation of the patient, and together with the scanner at the state of the disease [7,18-20].

Early Detection

The challenge is the finding of the applicative routes of the laboratory parameters of the early detection of HIF-1 alpha [28], GDF-15, or other factors of chronicity or hypoxia or accompanying phenomena [29-33].

Results and Conclusion

Lab results are not only part of diagnostic or prognostic algorithms but irreplaceable in prediction of complication or proper management of precipitating factors during chornic diseases.

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