

STUDY OF THE OXIDATIVE STRESS IN DUPUYTREN'S DISEASE PATIENTS

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Summary

Reactive oxygen species are a concrete reality and their excessive formation accompanies tissue damage of most human disease. The purpose of this research is the study of total antioxidant status in patients with Dupuytren's disease. Plasma levels determination was performed on a total of 35 patients with Dupuytren's disease, aged 50-65 years, male, admitted to the Plastic Surgery Clinic of Constanta County Emergency Hospital from January 2009 - December 2011. Total endogenous antioxidants are significantly decreased in test group compared with witness group (20 healthy people) which confirm the presence of systemic oxidative stress and antioxidant defense depletion in these patients. Oxidative stress is an important trigger in the complex chain of events leading to the development and spread of Dupuytren's disease.

Keywords: Dupuytren's disease, antioxidant, oxidative stress

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Introduction

The Dupuytren disease is a condition that occurs on the palms and fingers level and consists in the retraction of the palmar aponeurosis (palmar fascia) with the emergence of "fibrous strings" in the blood that will "pull" and set fingers to palm.

The first signs of disease are given by the appearance of nodules in the palm, progressing to the formation of retractile clamps.

The international statistics show that the disease is more common in men (80%) than women. Age appearance of lesions is 40-60 years. More frequently, there are affected both hands (65%).

Several etiopathogenetic theories have been issued but none met the general knowledge; there is still, an agreement over the existence of predisposing factors for the appearance disease (Rayan, 2007).

If you do not know what exactly is Dupuytren disease, we know for sure that there is not a collagen disease (no disease-

system evidences, no sanguine, biochemical and pathological changes to to evoke collagen); it is not a rheumatic diathesis (it exists, in many cases, except rheumatic and arthritic changes in the elderly, not ever shows under microscopic examination any typical inflammatory picture); it is not avitaminosis (large vitamin doses administered chronically did not alter the course of the disease); it is not neurological caused.

Many studies incriminated a range of risk factors for Dupuytren disease occurrence, such as: geographical area, patients' sex, ageless, heredo-collateral antecedents, alcohol, smoking, physical strain, antecedents of traumatism, elevated serum lipid levels (Bordeianu, 2010).

Reactive oxygen species are a concrete reality and their excessive formation accompanies tissue damage of most human disease (Murrell, 1987).

The purpose of this research is the study of total antioxidant status in patients with Dupuytren's disease.

Material and methods

This study aims to investigate the relationship between mechanisms of oxidative stress and Dupuytren disease.

Plasma levels determination was performed on a total of 35 patients with Dupuytren's disease, aged 50-65 years, male, admitted to the Plastic Surgery Clinic of Constanta County Emergency Hospital from January 2009 - December 2011.

In our study, we evaluated in patients with Dupuytren's disease the degree of oxidative stress, reflected by modifying the activity of antioxidant systems, and the appreciation of these values compared to values obtained from a control group (18 healthy people).

Test group patients presented pathognomonic lesions of Dupuytren's disease and biochemical aspects (slight increase in serum transaminases) and echography of liver steatofibrosis by chronic alcohol consumption (they excluded patients presenting cirrhosis).

TAS (Total Antioxidant Status) was determined from heparinized plasma. Blood collected by venipuncture was centrifuged for 10 minutes at 3000 revolutions/min to obtain plasma which was stored at -20°C for 14 days. TAS determination was performed by using reagents provided by Randox Laboratories Ltd. Measurement of total serum antioxidant compounds is based on their property to inhibit a specific enzymatic oxidation reaction. ABTS[®] (2,2'-Azino-di-[3-ethylbenzthiazoline sulfonate]) is incubated with peroxidase (metmyoglobin) and H_2O_2 producing radical-cation ABTS^{®+}. It has a teal color, relatively stable, which is measured at 600 nm. Antioxidants found in the sample used induce suppression of this color, to a degree proportional to their concentration level.

Values between 1.30–1.77 mmol/l plasma are considered normal. TAS plasma level obtained from patients in the test group was compared with reference values from a control group, consisting of 18 clinically healthy patients aged 40 – 55, who participated voluntarily in this study.

All patients (those that were part of the test group and patients who volunteered, in order to complete control group) were informed about their enrollment in the study and gave written consent by signing the consent form wittingly expressed.

Results and discussions

In order to assess the significance of the values, we used "t"-Student test on the basis of determination of the arithmetical mean and the standard deviation (SD) of the values. The parameter P(t) have been considered statistically significant for a value of 95% ($\alpha < 0,05$).

The results of plasma levels of TAS in patients in the control group and test group are shown below (Table 1 and Figure 1).

The role of oxidative stress in various disease physiopathogenics has been studied for a long time. But research on Dupuytren's disease is only just beginning. There is a limited number of studies dedicated to this topic in literature. The first comparative studies on a group showing Dupuytren's contracture and on a control group suggested the involvement of free radical production in the etiopathogenesis of Dupuytren's disease (Dasgupta, 2006).

Total endogenous antioxidants are significantly decreased in test group compared with witness group (18 healthy people) which confirm the presence of systemic oxidative stress and antioxidant defense depletion in these patients.

Decreased plasma level of TAS in test group patients show severe damage of antioxidant systems of the body which are unable to counteract oxidative stress.

Field research shows the involvement of superoxid radicals in DD pathogenesis, by the effects they exert on fibroblasts (Weinstein, 2011). During ischemia, adenosine triphosphate molecule (ATP) is converted to hypoxanthine and xanthine. Endothelial xanthine dehydrogenase turns in xanthine dehydrogenase, process favoring the presence of alcohol, explaining the correlation between Dupuytren's disease and alcohol consumption (Gu, 2001). In vitro

experiments confirmed the proliferative effects of free radicals on fibroblasts. Also, the same experiments have confirmed the ability of fibroblasts to release their quantities of oxygen free radicals (Yi, 1999).

A recent study reveals that 90% of patients with DD had a mutation in the mitochondrial area 16s rRNA, showing the possible involvement of mutation in the pathogenesis of DD (Bayat, 2005). Latest proteomic studies have showed the involvement of various molecular processes in the progression of DD, intra and extracellular signaling, oxidative stress, skeletal changes, alterations in cellular metabolism (Kraljevic, 2009).

Conclusions

Total antioxidant status is a critical tool for assessing redox status of the body. Oxidative stress is an important trigger in the complex chain of events leading to the development and spread of Dupuytren's disease. Total antioxidant status is a critical tool for assessing redox status of the body. Antioxidant status or related antioxidants may play an important role in protecting the body against free radical-mediated lesions, minimizing the damage induced by reactive oxygen species (intensively released during periods of ischemia–reperfusion accompanying repetitive hand micro-trauma).

This study proves that patients with Dupuytren's disease (associated with toxic-ethanol chronic hepatopathy) have a deficient antioxidant defense system; oxidative stress may have multiple roles in the initiation and progression of the disease in these patients.

Table 1 Serum values of Total Antioxidant Status (TAS) in control group patients compared to test group patients

TAS (mmol/l)	Control group	Test group
Average	1.5450	0.8824
Standard deviation	0.1860	0.2468
pT		<0.0001

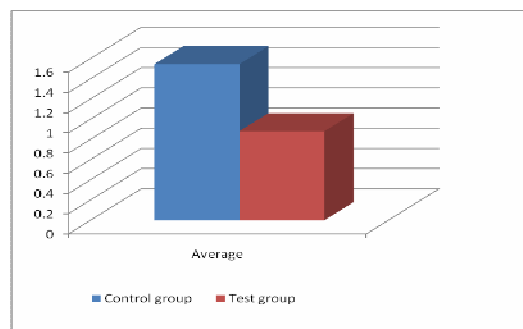


Fig.1 The comparative average values analysis of Total Antioxidant Status (TAS) in control group patients compared to test group patients

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