

“ GOCE DELCEV” UNIVERSITY – STIP

Faculty of Medical Sciences

Study of General Stomatology

Study of General Medicine

**THE USE OF VENOSTASIS TEST FOR EVALUATION OF THE
FIBRINOLYTIC CAPACITY IN THE PERIOPERATIVE ORAL
SURGICAL PERIOD**

doc. d-r Cena Dimova, PhD, MrSci, DDS, DMD*

prof. d-r Nikola Kamcev PhD, DM,**

ass. d-r Kiro Papakoca, MrSci, DDS, DMD***

* associate professor, oral surgeon, Faculty of Medical Sciences, “ Goce Delcev” University – Stip, Head of Study of General Stomatology

** professor, spec. of transfusology and haematology, Faculty of Medical Sciences, “ Goce Delcev” University – Stip, Dean of Faculty of Medical Sciences, Study of General Medicine

*** assist. professor, oral surgeon, Faculty of Medical Sciences, “ Goce Delcev” University – Stip

Correspondence:

doc. d-r Cena Dimova,

Faculty of Medical sciences,

“ GOCE DELCEV” UNIVERSITY – STIP

2000 Stip

0038976487294 mobile

0038970338392 mobile

0032550439 office

Republic of Macedonia

cena.dimova@ugd.edu.mk

cedimova@gmail.com

THE USE OF VENOSTASIS TEST FOR EVALUATION OF THE FIBRINOLYTIC CAPACITY IN THE PERIOPERATIVE ORAL SURGICAL PERIOD

Dimova Cena*, Kamcev Nikola**, Papakoca Kiro***

Summary

The aim of our research was to carry out clinical evaluation of the fibrinolytic capacity during the oral surgical interventions having caused activity of fibrinolysis.

For realization of the aim, 40 oral surgical interventions were executed from the daily casuistry.

In order to realize the aim, first blood sample was taken before the beginning of the test and then the indicated oral surgical intervention was performed. Immediately after the completion of the surgery, the test of venostasis was carried out lasting for five minutes and right after the test, second sample of blood was taken. Using the method of fibrin plates, the level of the activators and inhibitors of the plasminogen was established afterwards.

The average values of the proactivators and inhibitors of fibrinolysis from the venostasis test, in all subjects have shown increased values compared to the same ones in the control group, in all researched relations. Statistically, a significant difference ($p < 0.01$) has been established after the performed interventions.

These findings support the fact of possible damage of the blood vessels endothelium and change of the fibrinolytic capacity in the perioperative period of oral surgical interventions.

Introduction

Many authors in their researches set an aim to evaluate the influence of the surgery stress and the operative trauma over certain parameters of coagulation and the blood fibrinolysis.

According to Grand the acute physical stress as the major surgery is, the insulin induced hypoglycemia and the physical exercises are connected to the acute increase of the concentration of the factor VIII in the circulation as well as increased fibrinolytic activity of the blood. The mechanisms that are included in the production of these answers are partly under hormone control and it's obvious that the changes are mediated by the neurohormones adrenalin and arginine vasopressin.

Kehlet emphasized that the surgery trauma and modified effects of the pain are the reason for start of possible complications as the infections and the hemorrhage. Exactly, as a consequence of the activation of the humoral substances: prostaglandin, kinin, leukotren, interleukin-1, as well as the tumor necrotic factor, it's possible the creation of the mentioned complications. The interleukin-1, as a mediator of an inflammatory reaction and the tumor necrotic factor, lead to pro-coagulation changes in the one-body cells. Here are the synthesis and the secretion of the thromboplastin, antigen activity of F VIII: factor v. Willebrand, then activity of the inhibitor of the plasminogen -1(PAI-1) activator with at same time decreased production and secretion of the tissue type plasminogen activator (t-PA).

In the modern scientific book's knowledge there is an elaboration of accidentally discovered cases with prolonged bleeding after finished extraction ¹⁸, when often rare deficits of some factors of coagulation or of the inhibitors of the fibrinolysis are discovered.

Aim

The basic aim of this research was to carry out clinical evaluation of the fibrinolytic capacity in the subjects, during the oral surgical interventions, having caused activity of fibrinolysis.

Our intention was to estimate the condition of the blood vessels endothelium, before the oral surgical interventions, the influence of the surgical procedures upon the endothelium, as well as, the response of the endothelium after the interventions.

Material and Method

For realization of the aim, we have created a research group of 40 subjects, both male and female, on age between 25 - 35, healthy patients. According to the data of anamnesis, clinical and radiographic examination, indications for operative extraction were set up (roots with different chronic lesions in the molars region). The surgical interventions were done for 35-40 min, and the operative trauma was similar in the examinees, according to the operative protocol. The interventions in the examined group were realized during the morning hours.

The control group was consisted of 35 examinees-blood donors, both male and female, at age between 25 –30, healthy patients, who didn't have any dental intervention.

All examinees agreed to be included in our research.

Having intention to determine the caused activity of fibrinolysis, all the subjects took the test of venostasis. With the help of this test, the fibrinolytic capacity of the subjects is investigated. The test was performed in order to determine the condition of the endothelium before the interventions, the influence of the surgical procedures upon the endothelium, and its response after the interventions. This test measures the global fibrinolytic activity of the plasma, caused by anoxia.

Before the beginning of the test, first blood sample was taken and then the indicated oral surgical intervention was performed. Immediately after the completion of the surgery, the test of venostasis was carried out lasting for five minutes and right after the test, second sample of blood was taken. Using the method of fibrin plates, the level of the activators and inhibitors of the plasminogen was established afterwards.

The subjects from the control group were taken two blood samples: before and after the test, without any kind of dental procedures performed.

The activators and inhibitors of fibrinolysis were measured using the method of fibrin plates. Blood samples were distributed and analyzed at the Department of hemostasis and thrombosis at the Republic Institute of Transfusiology, Medical Faculty–Skopje.

Results

1. Results from the average values of the venostasis test, before and after the oral surgical interventions are displayed in Table 1 and Fig 1.

Comparing the values of the activators and inhibitors from the venostasis test (measured using the method of fibrin plates), in all subjects, before and after the oral surgical interventions, we have obtained results that have shown high statistic significance in all relations, except in the analysis of the values of the inhibitors before/after the intervention.

The values of the activators from the venostasis test before (74.67%) and after (54.9%) the operative intervention, analyzed with the “t”-test, point to relation with high statistically significant difference (t=6.30 and p<0.01). The average values of the inhibitors after (72.25%) the operative intervention, compared to the average values of the inhibitors before (73.52%) the operative intervention, have shown that there is no statistically important difference (t=0.29 and p>0.05).

Table 1. Display of the average values from the venostasis test, before and after the oral surgical interventions

Parameters (%)	Subjects with operative interventions No=40			
	\bar{X}	SD	t	p
activators-before	74.67	18.98	6.30	p<0.01**
activators-after	54.9	9.95		
inhibitors-before	73.52	21.14	0.29	p<0.05*
inhibitors- after	72.25	22.96		

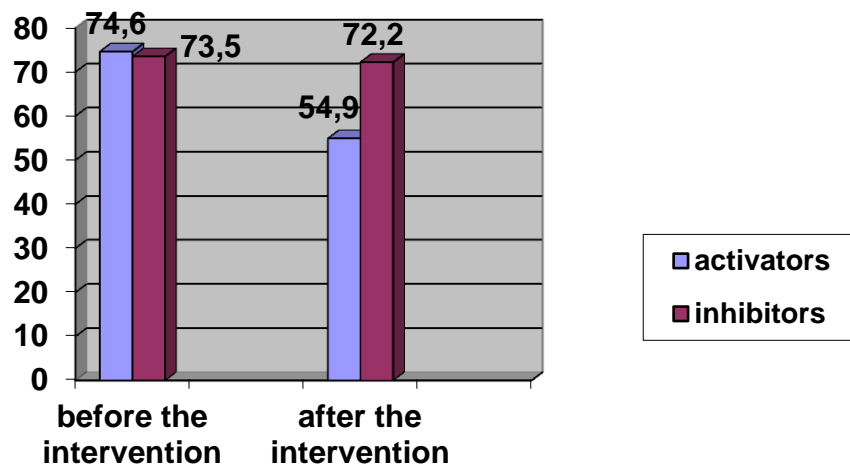
\bar{X} -average (arithmetic) value

p<0.05* - low statistic significance

SD -standard deviation

p<0.01** - high statistic significance

Fig 1. Display of the average values from the venostasis test, before and after the oral surgical interventions



2. Analysis of the differences of the average values from the venostasis test in the control and the research group.

The analysis of the values of the activators from the venostasis test, before and after the oral surgical intervention, compared to the values of the activators of fibrinolysis in the control group, are significantly higher in all relations, and have shown high statistical significance.

The analysis of the results from the venostasis test are displayed in Table 2 and Fig 2. The differences of the average values of the activators and inhibitors are tested, before and after the oral surgical interventions with the same parameters in the control group.

The analyses of the average values of the activators of fibrinolysis from the venostasis test, before (74.67%) and after (54.90%) the oral surgical intervention, and the average values of the activators of fibrinolysis in the control group, have shown high statistical significance in both researched relations ($t=15.75$; $t=16.73$ and $p<0.01$).

The average values of the inhibitors before (73.52%) the intervention in the research group, significantly differ from the average ones in the control group (41.60%), and the analysis has shown high statistically significant difference ($t=7.56$ and $p<0.01$). The average values of the inhibitors of fibrinolysis, after (72.25%) the intervention, also significantly differ compared to the average values of the inhibitors

of fibrinolysis in the control group (41.60%). The “t”-test has shown high statistical significance (t=6.83 and p<0.01).

The acquired results have logical connection, if we consider that the values of the activators and inhibitors of fibrinolysis from the venostasis test, before and after the interventions, compared to the values in the control group, are within the limits of normal values (60-100%). Still, from these results can be clearly noticed, that the oral surgical interventions have had statistically significant influence upon the researched parameters of the fibrinolytic system.

Table 2. Display of differences of the average values from the venostasis test, before and after the interventions in the research group and the control group

Parameters (%)	Subjects with operative interventions/ control group No=40 / No=35			
	\bar{X}	SD	t	p
activators-before I gr./ cont. gr.	74.67/21.08	18.98/7.07	15.75	p<0.01**
activators-after I gr./cont. gr.	54.90/21.08	9.54/7.07	16.73	p<0.01**
inhibitors-before I gr./ cont. gr.	73.52/41.60	21.14/14.15	7.56	p<0.01**
inhibitors-after I gr./ cont. gr.	72.25/41.60	22.96/14.15	6.83	p<0.01**

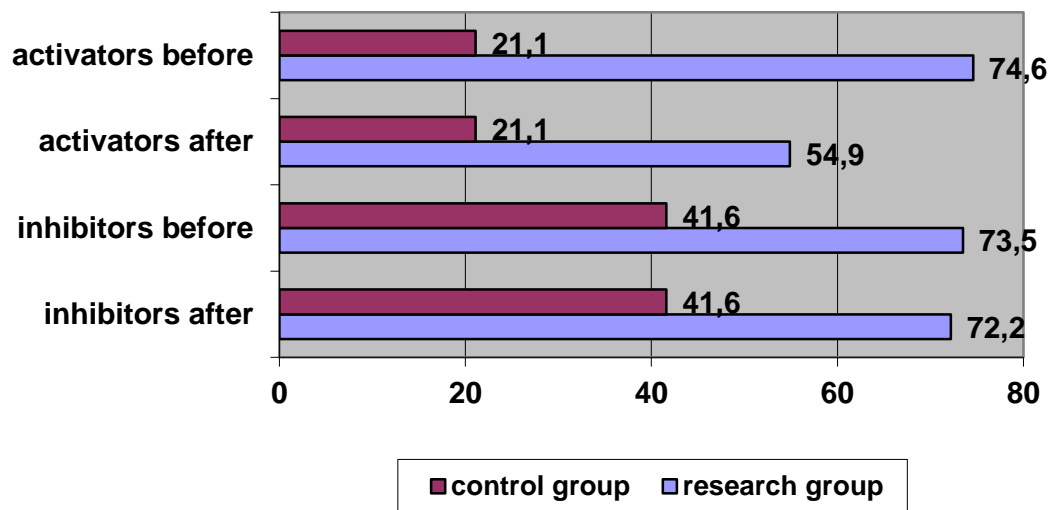
\bar{X} -average (arithmetic) value

SD -standard deviation

p<0.05* -low statistic significance

p<0.01** -high statistic significance

Graph 2. Display of the differences of the average values from the venostasis test, before and after the interventions in the research group and the control one



Discussion

The maintenance of the haemostatic homeostasis is one of the most dynamic processes in the human organism. As a result of that constant balance between the blood coagulation mechanisms and the ones that prevent it, uninterrupted circulation of the blood is enabled.

The liquid state of the blood and its circulation in a closed heart-vessels system are restricted by the mutual harmonious action of the blood vessels, the thrombocytes, the factors of the blood coagulation, and the fibrinolytic process.

In the researches of most authors from the contemporary scientific literature (Sindet-Pedersen, Ramström et al., Sharma et al., Shimada et al.), essential role is given to the fibrinolytic system in the process of hemostasis. The influence of the surgical stress and the operative trauma upon the activators and inhibitors of fibrinolysis, are analyzed in their researches.

The test of venostasis (venous stasis) was introduced by the Swedish researches from Malmö: Nilsson I.M. and Robertson B. in 1968. It is considered that after the venostasis, half of the fibrinolytic activity of the blood is owed to the activity of the tissue activator, referring to the external route of activation of the fibrinolysis, and the second half belongs to the internal activation that dominates while still. In fact, the local stimulation of fibrinolysis is dosed with this test.

Bachmann explains the mechanism of releasing the activators of fibrinolysis, as a consequence of distension of the blood trough, and/or the neuroreflex or the metabolic mechanism.

At first, the test of venostasis was carried out lasting for 20 minutes, but further on, because of severe pain caused by anoxemia, most authors had investigated with various and shorter time, and had concluded that the same effect gained in 20 minutes could be obtained also in 5,10, 15 minutes.

It should be stressed out, that the comparison of the results from the test is very difficult and sometimes impossible, because of the variety of criteria concerning the type of responders, the time of the stasis and the method used for the evaluation.

Still, most of the authors agree with one thing: this test should have diagnostic value. In case of existing thrombosis or exhausted reserves of endothelium, it can show lower fibrinolytic activity, or it can have prognostic importance - to predict the possible risk of occurrence of a thrombotic insult, if the patient is out of a thrombotic episode.

Conclusions

- The oral surgical interventions have influence upon the fibrinolytic capacity with the release of proactivators and inhibitors of the fibrinolytic system.
- The test of venostasis has shown increase in the values of the proactivators of fibrinolysis in the subjects, which is probably owed to the larger release of the blood vessels endothelium.
- Statistically, after the completed procedures in the research group, high significant difference is confirmed which also points to the stage of possible damage of the blood vessels endothelium and the fibrinolytic capacity during the oral surgical interventions.

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