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Research Article

New Method of Diagnostics and Surgical Correction of Hipo- And Avitaminosis "C"

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Introduction

Ascorbic acid is an indispensable participant in most metabolic processes [1]. It is passively absorbed in the intestine (diffusion, osmosis) along with water and chlorides, but active transport of vitamin is possible, similar to glucose transport [2]. With the insolvency of the bauhinia valve (NBZ) and the development of the syndrome of excessive microbial colonization of the small intestine, the absorption function of the latter suffers avitaminosis "C" develops. One of the objective and accessible screening methods for the determination of vitamin C deficiency was the formulation of a canned sample for capillary resistance [3]. The occurrence of petechial rash after this test allowed to judge the presence and degree of hypovitaminosis. The appearance of petechiae, their size and shape are determined by the degree of "vulnerability" of the capillary wall of the dermis [4]. In the body there is a strong direct positive relationship between the degree of capillary strength and the level of vitamin "C" in the blood [5]. We have proposed a method for determining the "C" vitamin status by a capillary resistometer. The principle of operation of the device is as follows. When creating negative pressure inside a special nozzle applied to the skin of the forearm, petechiae of various sizes and shapes appear. The size and shape of petechiae are determined by the degree of "vulnerability" of the capillary walls of the reticular layer of the dermis, which, in turn, is closely related to the level of vitamin C in the blood.

Objective

To create a capillary resistometer apparatus for determining the "C" vitamin status in patients with the failure of the bauhinia valve and after its correction.

Materials and Methods

The device we developed (RF patent for useful model No. 87889 "Capillary Resistometer" dated January 19, 2009) consists of the following elements that form a closed medium during operation: a metal nozzle on the skin; differential pressure gauge; discharge system. The characteristics of the nozzle correspond to the characteristics of the glass jar (the inner diameter of the funnel is equal to 15.8 mm), which makes it possible to apply standard data (Table 1) to evaluate the results obtained. An electronic manometer "Testo 506", produced in Germany, certificate No. 23187, registration number 17270-06, measurement range is +/- 2 atm, is used as a differential pressure gauge. The display of the gauge displays the load cell in 6 units of measurement (mm Hg. Art., Mm aq. Art., Atm., Pa, etc.). The pressure gauge is connected via plastic tubes through a tee to the system, followed by pressure measurement during the test. As a discharge system, a Jané syringe and a holding rod are used to maintain a constant level of discharge in the system. The general view of the device and its functional elements is shown in Figure 1. A capillary resistometer is used as follows: when a metal nozzle is applied to the inner surface of the upper third of the patient's forearm, air is sucked out of the closed tube system of the device using a syringe. The degree of discharge is controlled by an electronic differential pressure gauge. At achievement of the necessary pressure in system (240 mm of mercury.) The clip connecting the nozzle and the syringe is imposed. Aged 3 minutes. In case of accidental depressurization of the system (as evidenced by a change in pressure), the nozzle is applied to the skin again. After the exposure time expires, the

vacuum stops, the device is removed from the patient's skin. The result is registered and its subsequent assessment (Table 1). For the objectification of the obtained data and their estimated results, we proposed a processing algorithm that implies:

Table 1: Evaluation results canned samples.

Indicator	The degree of strength of capillaries	Condition C-vitamin nutrition
Up to 15 small hemorrhages	1	Normal
15-30 small and medium hemorrhages	2	Pre- and hypovitaminic
From 30 and more small, medium and large hemorrhages to continuous drain hemorrhage	3	Hypo-and avitaminosis

1. Conducting a sample with a capillary resistometer (Figure 1, Figure 2a & 2b);

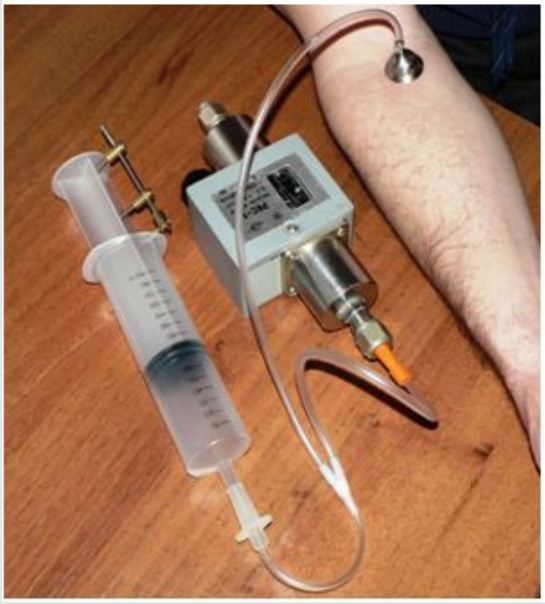

Figure 1: Conducting a sample with a capillary resistometer.

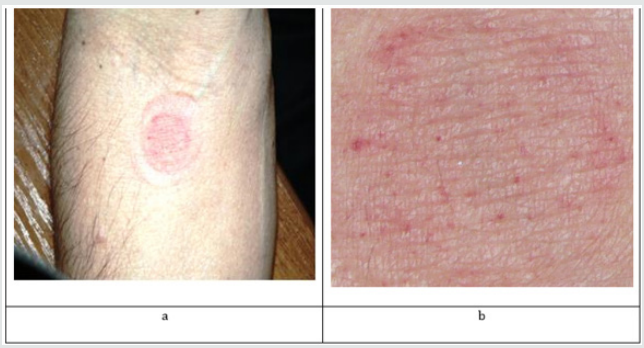

Figure 2: The result of the test: a - the appearance of skin petechiae; b - petechiae at magnification (x15).

2. Morphometry of petechiae obtained using the Image Tool v. 3.0 (Figure 3).

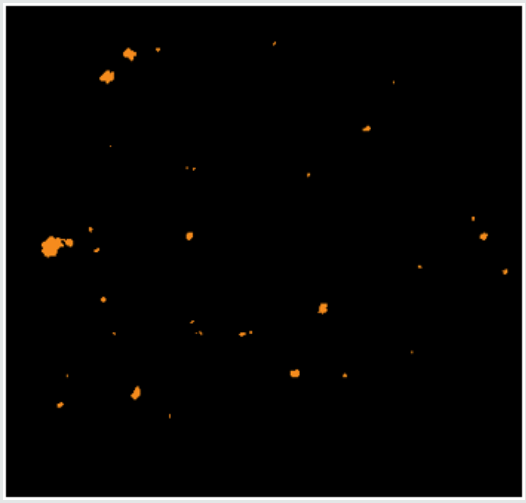

Figure 3: Petechiae morphometry using the Image Tool v. 3.0 (final): result of computer processing of petechiae images.

3. Statistical processing of the obtained results of morphometry

Results

We carried out tests on capillary resistance using the developed device and the scheme in 30 patients with proven NBZ. Hypovitaminosis "C" was detected in all, and in 17 patients the severity of hypovitaminosis "C" was assessed as moderate and severe. We also studied the "C" vitamin status in 14 patients in the long-term (1 to 2 years) after bauginoplasty. In 9 patients hypovitaminosis was absent, in 5 patients had a mild severity.

Findings:

1. "C" vitamin deficiency plays an important role in NBZ, causing manifestation of secondary associated conditions, such as exacerbation of reflux disease, peptic ulcer disease, IBS, vegetative-vascular disorders, bronchial asthma, dermatosis, hemorrhage syndrome.

2. The obtained first results suggest that the operation of Bauhinoplasty, being radical in relation to the functional and anatomical insufficiency of the Bauhinini valve, has a positive effect on the "C" vitamin status of the patient.

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