APPLICATION OF THERMOGRAPHY IN CURING OVERSWEATING

Goździuk K.[1], Wolski T.[2], Baranowski P.[3], Mazurek W.[3], , Kalisz O.[4], Rojowski A.[1]

[1]Department and Clinic of Surgery of Chest of Medical University in Lublin, Poland
[2]Department and Unit of Pharmacognozy of Medical University in Lublin, Poland
[3]Institute of Agrophysics, Polish Academy of Sciences, Lublin, Poland
[4]II Clinic of Ophthalmology of Medical University in Lublin, Poland

Introduction

Application of thermography in medical sciences is not commonly known or frequently in use. Only several centres in Poland have undertaken the problem of application of this method in medical diagnostics, predicting and monitoring some diseases.

In this paper we made a trial to extend the indication for thermographic examination, taking into consideration unquestionable advantages of this method: non invasiveness and low cost of examination. This imaging examination can occur to be an important compliment to presently used research methods in many disciplines of medicine.

The thermographic examination was performed with the use of VIGOcam v50 by VIGO System SA, working in the range of 8-14 μm. The thermographic system is equipped with CCD camera working in visible range and a laser sight used to localise central point of registration. This system enables to measure the radiation temperature with radiometric sensitivity of 0,08°C. Except from the standard software "THERM" all statistical analyses and thermal image processing were performed using freeware "ImageJ". Radiation temperature measurement were conducted in stable and controlled external conditions. It was done by thermo-stabilisation of the laboratory and installation of air temperature, air humidity and pressure sensors. All the measurements were performed in the temperature of 25°C under relative air humidity of 60% in daily light. The measurements were conducted from the distance of 1m. It was assumed on the base of literature data that emissivity coefficient of skin is equal 0,99.

Methods

A group of 10 patients suffering from skin oversweating were qualified to have thermographic examination. The clinic manifestation of this disease is mainly localised in the area of hands. The patients were examined with thermogarphy before and one month after the surgical treatment, which consists in performing chest sympathecthomy with the use of lightly invasive method of video thoracoscopy. This method consist in cutting out some ganglia of symphathetic nervous system situated paravertebrally on inner wall of chest. Thermographic images were compared applying original computer analysis procedure. Vegetative nervous system is responsible for contractibility of smooth muscles, what manifests with intensity of blood flow through skin and other organs. Therefore, it has direct impact on dynamics of circulation and processes of body thermoregulation. In case of oversweating the domination of the sympathetic system over parasympathetic system leads to increased production and exudation of sweat in spite of the absence of thermic and climatic factors of the surrounding regulating this process in physiological manner. Thermographic map of body created before and after surgery can explain many processes connected with pathology of vegetative system functioning.

The measurement of the distribution of radiation temperature on the surface of body were done in conditions of thermo isolation and heat comfort identical for each patient. Additionally the examination was performed for five healthy patients who created the control group. The results were presented as thermographic maps and tables of temperature distribution in various parts of body. Because results come from preliminary stage of investigations the number of examined patients is not large. However, the homogeneity of this group due to identical type of disease and the same conditions of experiment can confirm the reliability of obtained results.

Results

It was shown that oversweating leads to decrease of body temperature mainly in the regions of hands and feet what can explain increased loss of heat through vaporisation. In post surgery period distribution of body temperature is close to temperature distribution of healthy volunteers. It confirms the effectiveness of surgical treatment.

Conclusions

1. Thermographic examination is non-invasive method which can be used to detect clinical oversweating.
2. Application of thermographic examination in postsurgery period can confirm effectiveness of healing and monitor possibility of diseases recurrence.