

COLD RECEPTORS OF THE SKIN IN PATIENTS WITH CHRONIC TONSILLITIS

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Disturbance of reflex responses of thermoreceptors was found in patients with chronic tonsillitis. These disturbances were particularly marked in patients with complicated tonsillitis, in whom paradoxical responses were frequently observed.

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The study of skin temperature receptor function is a matter of current importance in practical medicine. The skin, being an extensive receptor field, is constantly subjected to the action of various environmental stimuli (cold, heat, tactile, etc.). Its receptors convert the energy of these stimuli into nervous excitation and transmit it to the center. Besides this main function, a number of workers [1, 4, 7, 9, 12-18] have discovered that centrifugal tuning of the skin thermoreceptors can take place, so that they can respond to various temperature stimuli, a property known as functional mobility [12]. As many investigations [1, 4, 6, 12-18] have shown, this functional mobility is based on the partial reaction principle. In accordance with this principle a physiological reserve is created, for use by the corresponding analyzer system with a change in environmental conditions. This faculty reflects the adaptive powers of the body. This explains the biological importance of the phenomenon of functional mobility.

The functional mobility of a receptor is generally determined by studying a number of criteria: the strength, rate, direction, and amplitude of the response and the degree to which it corresponds to the strength of the environment. In other words, all these criteria reveal deviations of the physiological process of mobility from normal. From this point of view the method of determination of functional mobility is extremely valuable for clinical purposes, because it can give precise information despite fluctuations in the adaptive powers of the body.

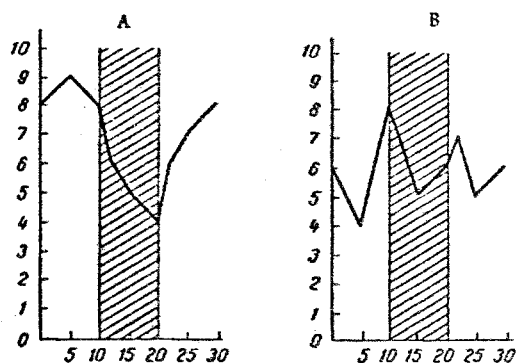


Fig. 1. Character of reflex response of cold receptors of the skin under normal conditions (A) and in patients with uncomplicated chronic tonsillitis (B). Mean data. Ordinate: number of active cold points; abscissa: time (in min). Shaded area indicates period of heating.

Everyday observations and reports in the literature [5, 10, 11] show that thermoregulation by the body is disturbed in patients with chronic tonsillitis. Many authors [8, 9, 10, 16] have described the tremendous importance of skin receptors in thermoregulation. However, little attempt has been made to study the function of cold receptors of the skin in patients with chronic tonsillitis. Yet, to judge from the facts mentioned above, it is here that definite and significant changes may be expected. The examination of these problems is undoubtedly vital to the understanding of the development of the pathological process in this disease.

EXPERIMENTAL METHOD

Observations were made in the Clinic for Diseases of the Ear, Nose, and Throat on 72 patients with chronic tonsillitis, 43 uncomplicated and 29 complicated. The

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age of the patients ranged from 14 to 40 years. A control group consisted of 25 clinically healthy persons of the same age.

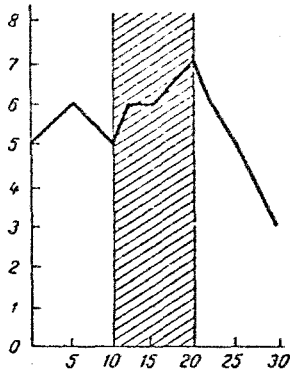


Fig. 2. Character of reflex response of cold skin receptors in patient with chronic tonsillitis complicated by other diseases (mean data). Legend as in Fig. 1.

The functional mobility of the cold receptors was investigated on the basis of the number of cold points (10) previously discovered on the medial surface of the forearm. Changes in the number of active cold points were determined before, during, and after reflex action of the cold stimulus. Heat from an infrared lamp (Infrarouge 500 VG) was applied to the back from a distance of 1 mm for 10 min. The cold point stimulus (the test stimulus) was a double-walled cold esthesiometer, maintaining the temperature of melting ice for a long period. The diameter of the thermoprobe was 1 mm.

EXPERIMENTAL RESULTS AND DISCUSSION

A thermal stimulus producing a reflex action normally causes demobilization of cold receptor points, while the subsequent radiation cooling (after switching off the infrared lamp) causes their mobilization. This was observed in the subjects of the control group. As may be seen in Fig. 1A, the initial background in these subjects was fairly stable, while the response to reflex heating and subsequent cooling possessed adequate amplitude and speed. In the patients with chronic tonsillitis (whether complicated or uncomplicated), on the other hand, the initial background was unstable. During the reflex action of the temperature stimulus, the response was of considerable amplitude but inconsistent in direction (Fig. 1B). A paradoxical response of the cold receptor apparatus of the skin was frequently found (Fig. 2). These disturbances of the thermoreceptor response were particularly marked in patients in whom chronic tonsillitis was complicated by other diseases (nephritis, rheumatic fever, polyarthritis, etc.).

It may be concluded from these findings that the reflex adjustment of the cold receptors of the skin is disturbed in patients with chronic tonsillitis (whether complicated or uncomplicated). However, a difference was noted between these two groups. In patients with uncomplicated tonsillitis the character of the disturbances of the thermoreceptor responses was unstable, indicating disorientation of the temperature analyzer. In patients with complicated chronic tonsillitis, the disturbances of the reflex responses were more severe, the amplitude of the response was considerably reduced, and in nearly all cases the responses to temperature stimulation were distorted.

It may be concluded from these results that in patients with chronic tonsillitis the function of temperature sensation is impaired because of disturbances of the reflex adjustment of the thermoreceptors, and consequently the accuracy of information received by the body concerning temperature changes is lowered. In turn, this disturbs the adaptive responses of the body to cold, which in most cases is an etiological factor in this disease.

Since the thermoreceptor system is the first link in the chain of thermoregulation, this may also account for the observed disturbances of thermoregulation in patients with chronic tonsillitis.

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