

PARADOXICAL REACTION OF THE MAMMARY GLAND TO OXYTOCIN IN WOMEN WITH PERSISTENT LACTATION

(UDC 618.73-008.1-072.7)

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(Presented by Member of the Academy of Medical Sciences, USSR, V. G. Baranov)

Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 59, No. 6,
pp. 53-55, June, 1965

Original article submitted March 11, 1964

Activation of the mammary glands is observed in a number of endocrine disorders, as well as in central disorders with hypothalamic localization. The spontaneous secretion of milk, sometimes even unrelated etiologically to pregnancy and birth, is encountered in acromegaly, Chiari-Frommel syndrome, retractor tumors, and certain other endocrine disorders with obscure etiology. Such persistent lactation sometimes lasts for years and is difficult to treat. A more detailed investigation of this phenomenon may be of additional value for evaluating the endocrine status of a patient, since a knowledge of the functional state of the mammary gland would make it possible to draw a conclusion in each concrete case on the nature of the complex of hormones that gives rise to the development and maintenance of the mammary gland secretion.

And yet, thus far little attention has been paid to this aspect of the question in casuistic descriptions of persistent lactation [1, 2, 6]. Moreover, the methods of functional evaluation of the mammary gland have been insufficiently developed, and a morphological investigation (biopsy) is far from always possible.

We made a complete study of the process of milk secretion in four patients with persistent lactation, who were at the Clinic of Nonoperative Gynecology and the Department of Endocrinology of the Institute of Obstetrics and Gynecology of the Academy of Medical Sciences, USSR for examination and treatment. In three patients, in addition to galactorrhea, persistent amenorrhea was observed, while one exhibited substantial dysmenorrhea.

PROCEDURE AND RESULTS OF INVESTIGATIONS

The reaction of the mammary glands to the injection of exogenous oxytocin, determined by the method of elastometry, served as a criterion for evaluating the state of the mammary glands [1]. This method permits the recording of changes in the pressure within the gland arising under the action of the hormone. As has been shown earlier [1], oxytocin produces a rise in the pressure during normal lactation. A nonlactating gland does not react to the injection of the hormone (Fig. 1). In all the cases that we studied, the reaction to oxytocin was sharply reduced. When the usual dose of the hormone (1.5 ME) was administered, the pressure in the gland not only did not increase, but, on the contrary, decreased substantially for 2-3 min after the injection. After 10-15 min, it returned to the initial level, just as in normal lactation (Fig. 2).

Patient K was especially interesting. Combined treatment with testosterone propionate and estrogens gave a quite favorable effect, producing a sharp reduction of her milk secretion and involution of the parenchyma of the gland. In this case, the reaction to the injection of oxytocin disappeared entirely, and the general turgor of the gland also was reduced, evidently in connection with the involution of its parenchyma (Fig. 3).

The essence of such a paradoxical reaction to oxytocin may be understood on the basis of the physiological mechanism of its action. As is well known [3], oxytocin produces a contraction of the myoepithelial cells of the alveoli, as a result of which the pressure in their cavities is increased. This also lies at the basis of the mechanism of the expulsion of milk (milk secretion) during the act of lactation, when oxytocin is secreted by a reflex mechanism,

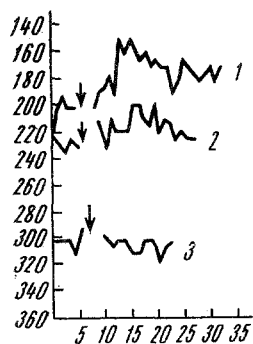


Fig. 1. Change in the tension of the mammary gland after the injection of oxytocin. 1) In a lactating woman with a great degree of filling of the gland; 2) in the case of a lesser degree of filling of the gland; 3) in the absence of lactation. Along X-axis—time from beginning of experiment (in min). Along Y-axis—tension of the gland (in arbitrary units—millimeters of deviation of the pointer on the galvanometer scale. In this method of expression, the degree of the tension is inverse to the deviation). Arrows—moment of injection of the hormone.

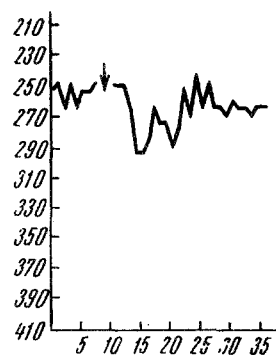


Fig. 2. Reaction to the injection of oxytocin in patient B. Arbitrary notations the same as in Fig. 1.

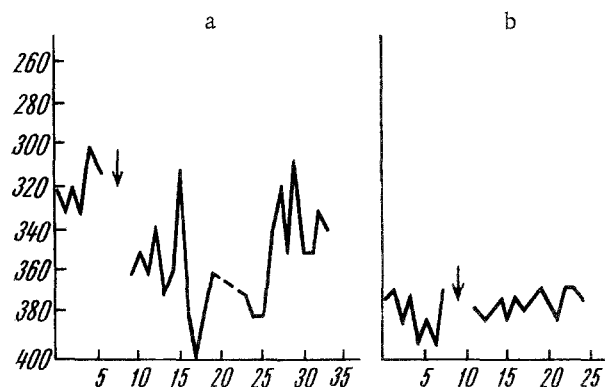


Fig. 3. Reaction to oxytocin in patient K. a) Before treatment; b) after treatment with estrogens and testosterone propionate. Remaining notations the same as in Fig. 1.

under the influence of stimulation of the sucking receptors. But at the same time, the myoepithelium in the fine ducts of the gland, the branches of which are oriented along the longitudinal axis of the ducts, is simultaneously contracted. As a result, the ducts are shortened, which leads to their dilation, and evidently to a decrease in the pressure existing in them [4, 5]. In this case, the resistance of the ducts is reduced and the passage of milk from the alveoli into the sinuses of the gland is facilitated.

The paradoxical reaction to oxytocin in the cases that we studied permits us to assume the presence of deviations from the normal development of the mammary glands. Evidently the growth of their parenchyma is due not so much to the development of the alveoli as to the proliferation of the ducts, which are also capable of secreting milk under definite conditions [5]. The dilation of the mass of ducts of the gland that occurs under the influence of exogenous oxytocin led to a reduction of its turgor, as well as to a decrease in the pressure in its cavities. In the patients that we observed, no biopsy was performed. There are data [16] that indicate in cases of persistent lactation analogous to ours, the alveolar apparatus actually is underdeveloped, while the structure of the duct apparatus does not differ significantly from the norm. Thus, there is some basis for believing that mammagenesis during persistent lactation is accomplished as a result of the influence of a sharply changed complex of mammagenic hormones. As is well known, the normal development of the mammary glands, the appearance of lactation after birth, and its further maintenance require the presence of estrogens, progesterone, lactogenic and somatotrophic hormone, and ACTH, whereupon their optimum ratios for various stages may vary substantially.

The question of precisely which disturbances of this complex occur in persistent lactation will require further investigation. However, the presence of some sort of changes in the usual ratios of estrogens and progesterone, which are extremely important for the harmonious development of the alveoli and ducts of the glands, may already be as-

sumed. The underdevelopment of the alveolar apparatus of the mammary gland may be due to a disturbance of this ratio, toward a predominance of estrogenic factors, with a relative reduction of the influence of progesterone.

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