CYTOLOGICAL AND STEREOLOGICAL STUDY
IN ENDOCRINE PLURIGLANDULAR SYNDROME
AFTER SOW GELDING

Cadar Mirela-Emilia, I. Cornoiu

Key words: microscopic structure, adenohypophysis, thyroid and adrenal glands, gelded sows

Abstract. We proposed to study the microscopic structure of adenohypophysis, thyroid and adrenal glands in gelded sows, by cytological qualitative and quantitative techniques. The surgical gelding act, practiced in young sows, releases an acute postoperative stress syndrome ("postoperative disease"), which continues in time with a less evident syndrome -the chronic stress syndrome. The sudden and total suppression of ovary endocrine function has as effect the change of interrelations of the other endocrine glands.

INTRODUCTION

The surgical gelding act, practiced in young sows for technological reasons, releases an acute postoperative stress syndrome ("postoperative disease"), which continues in time with a less evident syndrome -the chronic stress one. Concomitantly, the sudden and total suppression of ovary endocrine function has as effect the change of interrelations of the other endocrine glands, either on direct ways or indirectly by feedback lack of poise, via by hypothalamus-hypophysis system.

In time, the settled endocrine pluriglandular syndrome will surpass the endocrine domain, stimulating significant metabolic changes, some of them with real economical importance [3].

We proposed to study the microscopic structure of adenohypophysis, thyroid and adrenal glands in gelded sows, by cytological qualitative and quantitative techniques.

MATERIAL AND METHODS

The biological samples were proceeded from 20 sows of Large White breed, from which 10 young sows were gelded at 5 months age and the other 10 sows served as control group. The slaughtering of both groups was done at 11 months age. Immediately after slaughtering, were proceeded the adenohypophysis, the right lobe of thyroid gland and the adrenal gland from body right side.
The samples were fixed in Helly mixture, included in paraffin and sectioned by routine procedure. The adenohypophysis sections were done in sagittal plane and were retained sections both from lateral zones and from median side of lobe. The adenohypophysis sections were stained by Herlant method [9] that puts into evidence clearly enough the chromophil and chromophobe cells. On adjacent sections, was practiced the reaction with periodic acid and Schiff reagent or Periodic Acid Schiff (PAS) reaction.

The sections through thyroid and adrenal glands were stained by Hendenhain method with haematoxylin-eosin and by Masson trichromic method, Goldner variant [12].

On sections through adenohypophysis was done the identification of acidophile cellular type (STH, LTH), basophile ones (FSH/LH, TSH and ACTH) and of chromophobe ones, concomitantly with their percentage evaluation with network ocular. On each section were counted 1,000 cells on fields from all section zones. On thyroid sections were effected measurements by ocular micrometer method. The sections through adrenal gland were stereologically evaluated, establishing the relative areas of gland histoarchitectural zones by “Point’s counter method”.

RESULTS AND DISCUSSIONS

The observations concerning descriptive cytology and cellular type distribution in controls’ group adenohypophysis gland are, in general, in accordance with comparative histology known data [1, 4, 5].

In gelded female group were observed specific aspects of gonadotrophic cells (FSH/LH), which became hypertrophic and loaded with secretion granules. In some of them, by degranulation, are formed chromophobe beaches with vacuole aspect. When these vacuoles fuse, the nucleus is peripheral and the cell takes the aspect of “signed ring cells”. Also, only in gelded female group was observed the presence of some corticotrophic cells (ACTH) with peripheral accumulated granules, aspect known as “Crooke’s hyaline change”. As concerning the chromophobe cells, we observed that in gelded female group, especially in proximity of intermediate lobe, the cystic formations are bigger and more numerous with colloid and are delimited by follicular chromophobe cells.

On sections treated by PAS reaction, only the basophile chromophil cells (gonadotropic, thyreotropic and corticotropic ones) were PAS-positive.

The averages of percentage values, resulted from cellular type counting in adenohypophysis gland, are presented in Table 1.

<table>
<thead>
<tr>
<th>Cellular type</th>
<th>Control sows’ group</th>
<th>Gelded sows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromophil cells</td>
<td>Acidophile: 62.2%</td>
<td>Acidophile: 46.8%</td>
</tr>
<tr>
<td></td>
<td>Basophile: 37.8%</td>
<td>Basophile: 53.2%</td>
</tr>
<tr>
<td>Chromophobe cells</td>
<td>45.7%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

Table 1

Averages of percentage values of adenohypophysis cellular types
<table>
<thead>
<tr>
<th></th>
<th>STH cells</th>
<th>LTH cells</th>
<th>FSH/LH cells</th>
<th>TSH cells</th>
<th>ACTH cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>53.4%</td>
<td>8.8%</td>
<td>8.5%</td>
<td>5.6%</td>
<td>23.7%</td>
</tr>
<tr>
<td></td>
<td>38.6%</td>
<td>8.2%</td>
<td>18.2%</td>
<td>9.6%</td>
<td>25.4%</td>
</tr>
</tbody>
</table>

In microscopic structure of thyroid gland from control sows appear globular thyroid follicles of reduced sizes, with 130 µm average diameter. Cubical epithelial cells, 20 µm tall, form the secretory epithelium and have in apical cytoplasm small resorption vacuoles filled with colloid. The follicles’ lumen contains an acidophile colloid partially resorbed.

In gelded sows, the thyroid follicles are much bigger with 320 µm average diameter and polygonal shape. The follicular epithelial cells are short, only 10 µm high, with no resorption vacuoles. The follicle lumen is completely filled with dense, basophile colloid.

On sections through adrenal glands, by stereological estimation we observed that in control group the relative area of adrenal medulla zone represents 28.8% and that one of adrenal cortex zone represents 71.2% from the section area, while in gelded sows the gland section surface is in average bigger with 20%, the adrenal medulla zone represents 21.8% and adrenal cortex zone 78.2%.

CONCLUSIONS

The adenohypophysis cells proportion established by us on control sows’ group do not differ significantly of that observed by other authors [4, 8,14]. In gelded sows’ group, the most substantival cell change is “the basophile change of color” by proportion increasing of basophile cells, PAS-positive cells, more marked in gonadotropic cells.

Estrogenic secretion suppression, by gelding, has a negative estrogenic feedback effect to hypothalamic level, ended with gonadotrophine releasing hormone secretion (GnRH), which stimulating for long time the gonadotropic cells will determine their hypertrophy and proliferation [11, 13].

The cells’ proportion increasing is a results of chronic stress state induced by ovary extirpation. In such situations, occurs a stimulation of corticotropic cells by a corticotrophine releasing hormone (CRH) that will proliferate and hypertrophy, some of them presenting cytoplasmic alterations of “Crooke’s hyaline change” type. Peripherically, the ACTH hypersecretion determined adrenal mass increasing, especially based on adrenal cortex zone and glucocorticoid hypersecretion, mainly of cortisol [7, 2].

The thyreotropic proportion increasing is a result of thyroid inhibition by cortisol excess and by absence, almost total, of estrogens [6].

The aspect of “cumulative thyroid” observed in gelded sows corresponds, functionally, to a temperate hypothyroidism state, a syndrome in which occurs a lipidic percentage increasing of body, and lipolysis in the adipose tissue is reduced in thyroid hormone hyposecretion [10].

BIBLIOGRAPHY

2. Bernard K., B. Ashley, 2004, Normal physiology of the hypothalamus and anterior pituitary in man, Internet: [www.endocrine_source.com/neuroendo/neuroendo1htm](http://www.endocrine_source.com/neuroendo/neuroendo1htm);