RELATIONSHIP BETWEEN OVARIAN CYSTS AND CHANGES IN MUCOSA OF THE OVIDUCT AND UTERUS IN SOWS

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Abstract

The aim of the study was a histological evaluation of mucosa of the oviduct and uterus, regarding cystic ovarian degeneration in sows. Materials for the evaluation were received after the slaughtering of 294 sows at the age of two to five years. The sows were eliminated from breeding and culled due to disorders such as: anoestrus after weaning of piglets, return of oestrus, small litter size, high number of parturitions, bad condition after lactation, and age. Twenty of the 294 sows (6.8%) had cysts on the ovaries. The sows were divided into two groups: group 1 (12 sows) with polycystic ovaries and group 2 (8 sows) with simple cysts, which occurred unilaterally (3 sows) or bilaterally (5 sows). The studies demonstrated different kinds of ovarian cysts and structural changes in ovarian cortex, such as decreasing number of ovarian follicles of all generations and increase in follicular atresia. The histological state of tissues and changes of mucosa of the oviduct and uterus, regarding polycystic ovaries or single cysts on ovaries were compared. The single follicular cysts were not accompanied with important changes in the reproductive system. In the case of polycystic ovaries, the presence of cyst was connected with the occurrence of morphological changes in the endothelium of the oviduct and uterus, which could have been a reason of persistent infertility in pigs. An increase in the number of secretory cells with simultaneous decrease in ciliated ones, both in the ampulla and isthmus and covering the epithelium by secretions were observed in the oviduct. In our studies, we observed increasing proliferation of both glandular epithelium and surface epithelium. The terminal portion of the uterine glands was cystic dilated with remaining secretions. Hypersecretion of superficial epithelium was noted.

Key words: sow, ovarian cysts, oviduct, uterus, histological analysis.

Fertility disturbances lead to the culling of sows, which results in reduced production. Reproductive performance of sows is difficult to examine clinically under field conditions. Therefore, slaughterhouse material is a potential source of information concerning porcine fertility problems (4).

Reproductive organs of the sow and their physiology depend upon a complex sequence of events both of endocrinological and neuroendocrinological nature, disturbances of which may lead to infertility (6). The ovarian cysts, as a reason for infertility, is still a serious problem in the breeding of pigs (11). There are usually no pathognomonic signs of cystic ovaries in sows except for an irregular or prolonged oestrus cycle, permanent anoestrous, and infertility. Generally, ovarian cysts in swine offer no clinical problems for pig farms except for a decrease in sow fertility (2). By assessing the incidence of ovarian cysts in culled animals, it was observed that ovarian cysts are present in approximately in 10% of sows that were culled for fertility problems (1). Because cystic ovarian disease is mainly an endocrine disorder, the hormonal milieu could create a favourable environment for the development of changes in the proliferation and secretory activity of cells of the oviduct and uterine mucous membrane. The endocrinological status of cystic ovarian disease affects the function of these organs (11). The purpose of the present study was to investigate the changes in the oviduct and uterus, regarding cystic ovarian degeneration and to evaluate whether there are any relationships between the presence of different types of ovarian cysts and changes in the tunica mucosa of the oviduct and uterus.

Material and Methods

Reproductive organs from 294 two to five-year-old multiparous sows were collected in a slaughterhouse. The sows were culled due to disorders such as: anoestru after weaning of piglets, return of oestrus, small litter size, bad body condition after lactation, high number of parturitions, and age. The organs, especially ovaries, were examined macroscopically. The histological examination was conducted on reproductive organs in 20 out of the 294 sows (6.8%) in which the presence of cysts on the ovaries was diagnosed clinically. The cystic females were divided into two groups, group 1 (12 sows) with polycystic ovaries, and group 2 (8 sows) with simple cysts, which occurred unilaterally (3 sows) or bilaterally (5 sows). Evaluations of the ovaries were conducted
The specimens of the ovaries, oviducts, and uterus were fixed in 4% formalin for 48 h and 7 µm paraffin sections stained with haematoxylin and eosin were prepared.

Results

On the basis of macroscopic examinations of the reproductive organs from 294 sows, 20 sows (6.8%) were found to have ovarian cysts. The cysts occurred on one or both ovaries. Bilateral cysts were seen more often (85%) than unilateral (15%) ones. Histological examinations of the collected tissues demonstrated mostly two different kinds of cysts and the third kind only sporadically. In the majority, there were distinguished follicular cysts (Fig.1) and follicular theca-lutein cysts (Fig.2). Follicular lutein cysts and corpus luteum cysts (Fig.3) occurred very seldom. The corpus luteum cysts developed mostly from the haematoma of the corpus luteum in a way of gradual blood resorption. Then the cavity of enlarged corpus luteum was filled with the serous fluid. In vesicular cysts, membrana granulosa is visibly thinner than in mature follicles. The theca-lutein follicular cysts are structures with the wide tunica interna cells of which undergo luteinisation. In follicular lutein cysts, the complete wall of a follicle underwent luteinisation (Fig.3). Both in the ampulla and isthmus of the oviduct, and in oviductal mucosa, there was an evident increase in the number of secretory cells with simultaneous decrease in ciliated cells. The oviductal epithelium was covered by secretions (Fig.5). The main changes in the uterus were seen in the mucosal epithelium and terminal portion of the uterine glands. Secretory segments were cystic dilated with remaining secretions. In the epithelium of uterine mucosa, the significant changes in the proportion of cells and numerous secretory segments were also noted. The increasing proliferation of both glandular epithelium and surface epithelium was evident (Figs 7, 8, and 9). The single follicular cysts were not accompanied with any significant changes in other organs of the reproductive system (Figs 4 and 6), so we could suspect that they were endocrinologically little active.
Fig. 5. Epithelial cell proliferation of oviductal mucosa in case of follicular theca-lutein, follicular lutein, and corpus luteum cysts, HE, 400x.

Fig. 6. Uterine mucosa in case of single follicular cyst, HE, x 400.

Fig. 7. Epithelium of uterine mucosa in case of the presence of follicular theca-lutein and follicular lutein cysts, HE, 200x.

Fig. 8. Glandular proliferation zone in case of the presence of follicular theca-lutein and follicular lutein cysts, superficial stratum of endometrium.
Fig. 9. Uterine mucosa in case of the presence of follicular lutein and corpus luteum cysts, glandular proliferation of endometrium, HE, 400x.

Discussion

The presence of cysts cause structural changes in the ovarian cortex, such as decreasing numbers of ovarian follicles of all generations, and the increasing of follicular atresia especially of developing and mature follicles. According to Kuryszko (7, 8), these morphological changes within ovaries were similar to the changes in the oviduct and uterus, especially regarding polycystic ovaries, which have a real endocrinological effect on the reproductive system, because their presence is connected with the occurrence of morphological changes in the mentioned organs. These changes could have been a reason of persistent infertility of culled pigs.

The fertilisation and first stage of embryogenesis takes place in the oviduct. In the ampulla of the oviduct, the place of the fertilisation, ciliated cells dominate. The cilia of these cells move an ovum along the oviduct. The first stages of embryogenesis takes place in the isthmus. The decisive condition for these processes is the proper state of mucosa. The secretory segments were cystic dilated with remaining secretions. We observed increasing proliferation of glandular epithelium and surface epithelium (Figs 7, 8, and 9). The hypersecretion of superficial epithelium was noted as well. The secretion covered the epithelial surface thus preventing the outflow of fluid from uterus (8). During the oestrus cycle, the porcine uterus and especially its endometrium undergoes proliferation and differentiation in response to changes in sex steroid hormone levels (4). The mammalian uterus is a truly remarkable organ. Its physiological and morphological characteristics change not only within, but also between reproductive cycles. The majority of these changes in uterine structure and function are attributable to ovarian hormones (5). Surface and glandular epithelia consist of functionally different cell populations, regarding their morphology and secretory activities. Endometrial glands synthesise, transport, and secrete substances that are essential in pigs for conceptus survival and development. Proliferative activities showed significant differences between stages of the oestrus cycle only in the glandular epithelium. The high proliferative rate of uterine glands can be explained as a preparation for secretory activity and growth during the establishment of pregnancy. The endometrium creates an appropriate environment for the growing embryos (10). One reason for very early embryonic death is non-parallel development of conceptuses and endometrium (5). The proliferative and secretory changes are primarily controlled by ovarian steroid hormones. The endometrial epithelium cells respond to hormones and in this way play a significant role in endometrial physiology and pathology (9). The endocrinological abnormalities in cystic ovarian disease may have complex effects on the endometrium, which is a steroid hormone-dependent tissue, whose cellular components and tissue growth and remodelling respond to changes in circulating hormones (3).

The mentioned changes in the ovaries like a decrease in the numbers of ovarian follicles and
intensification of atresia are the consequence of the presence of ovarian cysts and correlate with changes in oviductal and uterine mucosa. There is an essential relationship between the presence of ovarian cysts and increased number of secretory cells in both the ampulla and isthmus of the oviduct. The relationship between the presence of ovarian cyst and increased number of secretory cells in superficial epithelium of uterine mucosa and proliferation of secretory segments of uterine glands has also been observed. The morphological changes in the ovaries, oviducts, and uterus cause reproductive organ dysfunctions. If this state lasts a long time, it may lead to permanent changes in the mentioned organs and, consequently, cause persistent infertility and culling of the females.

References