An abattoir study of genital pathology in cows: I. Ovary and oviduct

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SUMMARY

In the present study, the aim was to investigate the pathologic conditions of ovary and oviduct of cows slaughtered at abattoir in Konya, Turkey. For this purpose, the reproductive tracts of 1113 cows from different breeds were examined and some pathological changes were detected in 67 cases (6.02%). The incidence of the pathological changes in and around ovary were found as 5.21 per cent. These lesions were classified as follows: follicular cyst (1.88%), cystic corpora lutea (2.51%), parovarian cyst (0.72%), cystic bursa ovarica (0.18%), peri ovaritis and adhesions (0.27%), granulosa cell tumor (0.09%); and hemangioma (0.45%). In 9 cases (0.81%) pathological changes were found in oviduct, and these lesions were hydrosalpinx (0.36%), mesosalpingitis - adhesions (0.09%) and salpingitis (0.45%).

KEY-WORDS: ovary - oviduct - pathology - cow.

RÉSUMÉ


Le but de notre étude était d’étudier les anomalies des oviductes et des ovaires de 1113 vaches de différentes races abattues à l’abattoir de Konya en Turquie. 67 anomalies (6,02 %) des ovaires (5,21 %) ou des oviductes ont été détectées. Les anomalies ovariennes ont été réparties comme suit : kystes folliculaires (1,88 %), kystes du corps jaune (2,51 %), kystes paro-variens (0,72 %), kystes de la bourse ovarique (0,18 %), péricystes et adhérences (0,27 %), tumeurs cellulaires de la granulosa (0,27 %) et hémangiomes (0,09 %). Seulement 9 anomalies (0,81 %) ont été décelées sur les oviductes et se répartissaient comme suit : hydrosalpinx (0,36 %), méso-salpingites accompagnées d’adhérences (0,09 %) et salpingites (0,45 %).

MOTS-CLÉS: ovaire - oviducte - pathologie - vache.

1. Introduction

Genital organ disorders are important cause of infertility and sterility. Many studies were performed on these disorders in many countries in the world [1, 2, 6, 13, 14, 19, 20, 21, 23]. In some studies about investigations of reproductive tract disorders in cows, atrophic and hypoplastic ovary, follicular cyst, luteal cyst, cystic corpora lutea, oophoritis and ovarian neoplasms have been reported [2, 3, 7, 19, 20, 23].

ÇALISKAN [6], examined 3034 reproductive tract in Turkey, and found: follicular cyst, cystic corpora lutea, germinal inclusion cyst, tuberculosis, papillary adenoma, granulosa cell tumor and lipid cell tumour in ovaries. DINÇ and GULER [7] examined 1695 female genital organs of cows, and the incidence of ovarium disorders reported as 5.3 per cent. Authors classified these lesions as follicular cyst, luteal cyst, cystic corpora lutea, ova-bursal adhesions and parovarian cyst.

Oviduct disorders may also cause infertility and sterility. The most common and important lesions encountered in the oviduct are salpingitis, pyosalpinx and hydrosalpinx [6, 7, 17].

The present study is based on an investigation of incidence and the macroscopic and microscopic features of ovarian and oviductal lesions in cows slaughtered at abattoir in Konya, Turkey. Lesions of uterus, cervix and vagina in these cows will be presented in the another study.

2. Materials and methods

A) ANIMALS

The material was obtained from an abattoir study in which the genital tracts of 1113 cows and heifers from different breeds (Holstein, Swiss-Brown and native breeds) were examined for female genital tract disorders. Samples were collected between September 1999 to November 2000; pregnant specimens were discarded.
B) EXAMINATION PROCEDURES

The ovaries and oviducts were examined after slaughter procedures and gross abnormalities were recorded. Ovaries and oviducts of each tract were numbered, put in separate plastic bags and brought to the laboratory as soon as possible in order to minimize autolytic changes. Size of follicular cysts and cystic corpora lutea were measured by scale. Tissue samples from affected ovaries and oviducts were fixed in 10 per cent buffered formalin, routinely processed and embedded in paraffin wax. Sections cut at 5 µm thickness were stained with hematoxylin and eosin (H&E), Brown-Brenn, Ziehl-Neelsen, periodic acid Shiff (PAS) and van Gieson methods [15].

3. Results

A) INCIDENCE

During this study, 1113 cows and heifers were examined for reproductive tract disorders and some pathological changes were detected in 58 cases (5.21 %) and 9 cases (0.81 %) in ovarium and oviduct, respectively. The results of examination are summarised in Table I and II.

B) MACROSCOPIC AND MICROSCOPIC FINDINGS

1. Ovary

Follicular Cyst : Follicular cysts were found in 21 cases (one case bilaterally, 20 cases unilaterally). Grossly, the follicular cysts varied in size from 2 to 4 cm, and the cysts had contained clear fluid (Figure 1A). Cystic corpora lutea were also detected in 6 cases out of 21 cows. Microscopically, the follicular cysts were lined by 1-3 layers of granulosa cells. In some cases, degeneration were seen in the granulosa cells (Figure 1B). No ovum were seen in cystic lumen in all cases.

Cystic Corpora Lutea : These cystic changes were encountered unilaterally in 28 cases (17 right-side and 11 left-side). The corpora lutea had an average diameter of 1.5 to 3.5 cm. The diameter of cystic cavity in the center of corpora lutea varied considerably from about 0.5 to 3.2 cm (Figure 2A). Histopathologic examination showed that the cystic corpora lutea had a zone of fibrous connective tissue between the luteal tissue and the cystic cavity (Figure 2B).

Parovarian Cyst : Lentil to hazelnut sized parovarian cysts (Figure 3A) were found in the mesovarium and mesosalpinx in 8 cases (5 right and 3 left). Microscopically, the cavities of parovarian cyst were lined by a single layer of cuboidal epithelium (Figure 3B) and the wall of cyst had smooth muscle fibers.

Cystic Bursa Ovarica : This cystic disorder was detected in 2 cases ; one was oval shaped and 5x2.5x2 cm in dimensions on the right, the other one has lobular appearance, with 3.5x3.5x3 cm in dimensions on the left. Bursa ovarica and oviduct also distended due to accumulation of excess clear fluid (Figure 4A). Microscopic examination revealed that cyst wall lined by single layer cuboidal epithelium. In some areas these cells were showed papillary projections into lumen.

Periovaritis and adhesions : In this study, adhesions between ovarium, periovarial tissue, mesovarium and mesosalpinx were seen in 3 cases (Figure 4B). These lesions were accompanied by chronic salpingitis and parametritis in one, and purulent salpingitis in another case. On histopathologic examination, thickness in ovarian serosa was seen due to infiltration of mononuclear cells and increase of connective tissue. In one case, necrosis and neutrophil granulocyte infiltrations were also found.

Granulosa Cell Tumor : This tumor were found in 3 cases (2 left-side and 1 right-side). In one case, on the left side, ovary was 12x10.5x6.5 cm in dimensions and the capsula has stretched appearance (Figure 5A). On the cut surface of these case, cystic structures varied from chick-pea to walnut size, containing reddish-yellow colored fluid and sometimes with blood clot, were seen. In the other case, a cyst 2.5 cm in diameter with yellowish wall were observed in the ovary. In the right-side case, no macroscopic changes were found about the tumor. Microscopic examination showed cystic cavities were lined by 3-4 layers of granulosa cells and contained pink color fluid. In some sections, small rosette formation including pink color fluid, like as ovum, referred as Call-Exner bodies, were observed (Figure 5B). In the right side case, which has no microscopic findings, rosette formation constituted granulosa cells were detected. In one of three cases, granulosa cell tumor was accompanied by endometrial glandular hyperplasia, focal cervical squamous metaplasia and chronic vaginitis.
Degeneration and desquamation in the lamina epithelialis mononuclear cells were observed in the lamina propria. Epitheloid and Langhan’s type giant cells and zone of tuberculosa, granuloma consist of necrotic centre surrounded by epithelial and Langhan’s type giant cells and zone of mononuclear cells were observed (Figure 6B). In some sections, thick wall vessels with thrombosis were also detected.

2. Oviduct

In this study, some pathologic changes were detected in 9 cases (0.81 %) out of 1113 reproductive tracts. The results are shown in Table II.

Hydrosalpinx: Four cases were found unilaterally (2 cases on the right, 2 cases on the left). In these cases, dilatation of oviduct due to clear fluid accumulation were detected (Figure 4A). Hydrosalpinx was accompanied with cystic bursa ovarica (2 cases), parovarian cyst (one case) and segmental aplasia of uterus (one case). Microscopic examination showed mucosal atrophy and dilatation of oviduct lumen.

Mesosalpingitis and adhesions: In one case, bilateral mesosalpingial adhesions were detected. Oviduct had thickened and curled appearance in the mesosalpinx. On microscopic examination, thickness in serosa of oviduct was seen due to increase of fibrous connective tissue, infiltration of neutrophil granulocyte and mononuclear cells. This case was accompanied by adhesions between ovary and periovarial tissue and purulent salpingitis.

Salpingitis: This lesion was found in five cases (one case on the right side and four cases on both sides). Macroscopic lesions consisted of oedematous appearance and thickening of oviduct (two cases), adhesions between mesosalpinx and perisalpingial tissues (one case) and accumulation of yellowish green pus within oviductal lumen (one case). The other case, diagnosed as tuberculosis which was characterised with severe thickening of oviduct and 1-2 mm nodules scattered on the mucosal surface. In this case, endometrial tuberculosis was also observed.

Histopathologically, salpingitis was classified as chronic salpingitis (3 cases), purulent salpingitis (one case) and tuberculosis (one case). Chronic salpingitis characterised by degeneration and desquamation of the mucosal epithelium and lymphocytic-plasmacytic infiltrates with increase of connective tissue in the lamina propria. In purulent salpingitis, the lumen of oviduct was filled with extensive neutrophils accumulation and desquamated epithelial cells. Severe neutrophil accumulations and scattered lymphocytic-plasmacytic infiltrates throughout oviductal wall, and sometimes necrosis were also detected (Figure 7A). In the salpingitis tuberculosa, granuloma consist of necrotic centre surrounded by epitheloid and Langhan’s type giant cells and zone of mononuclear cells were observed in the lamina propria. Degeneration and desquamation in the lamina epithelialis were also seen (Figure 7B). Ziehl-Neelsen stained sections revealed the presence of clumps of acid-fast bacilli.

4. Discussion

Genital abnormalities play an important role in animal breeding either by causing infertility or sterility, and thus inflict heavy economic losses to the livestock owners. Many cows with reproductive problems and low milk production have been sold or sent to slaughterhouse. For minimisation of these losses, the importance of disorders of genital organs and their incidence must be defined.

In this study, the incidence of ovariun disorders were determined as 5.21 per cent, which is close to 5.3 per cent reported by DINÇ and GULER [7] in cows. This incidence was lower than ranging from 7 to 24.29 per cent reported by some researchers [2, 20, 21, 22], and was higher than data reported by SUMMERS [23] as 1.26 per cent and ÇALISKAN [6] as 3.61 per cent.

It is reported that follicles in the ovarium in cows are greater than 2 cm [16, 23] and 2.5 cm [10, 19] have been evaluated as follicular cyst. In the present study, the diameter of follicular cysts were ranging from 2 to 4 cm. Macroscopic and microscopic findings of this cysts are similar to previous reports [3, 4, 10, 12, 16]. MILLER and CAMPBELL [17] and McENTEE [16] reported that along with follicular cysts, some extra-ovarian lesions such as: cystic Gartner’s duct, cystic Bartholin’s glands, metaplasia of cervix, cystic endometrial hyperplasia, hydrometra and mucometra may be seen. Similarly, in this study, follicular cysts were accompanied with glandular endometrial hyperplasia (8 cases), mucometra (one case), cystic corpora lutea (6 cases), cystic Gartner’s duct (one case) and hydrometra (one case). It is suggested that this lesions may be occured due to excess secretion of oestrogen from follicular cysts.

In the present study, the most common lesion in the ovariun was cystic corpora lutea (2.51 %). MILLER and CAMPBELL [17] stated that the cyst size varies from 1 to 32 mm, but it has been argued that cysts of less than 10 mm are non-pathological and perhaps normal. MYLREA [19] reported that the diameter of cystic corpora lutea was ranging from 2 to 3 cm with 0.3-2.5 cm sized central cystic cavity. In this study, it was shown that cystic corpora lutea was 1.5 to 3.5 cm in diameter, and the diameter of cavity ranging from 0.5 to 3.2 cm. It has been reported that cystic corpus luteum develops following ovulation and ovulation papilla or bulge is present, and this differentiates a cystic corpus luteum from a luteinized cyst [5, 16, 17]. In addition to this, on the microscopic examination, corpus luteum has a zone of fibrous tissue between the luteal cells and the cystic cavity [16]. In the present study, similarly, ovulation papilla and zone of fibrous tissue between the luteal cells and the cystic cavity were detected in all cases. It has been reported that cystic corpora lutea occur frequently in cattle, and generally with sufficient progesterone production to initiate and maintain pregnancy. When progesterone production is inefficient fertility may be negatively affected, therefore ; no adverse effects of the cystic corpora lutea on reproductive function [16].

In some abattoir surveys, the reported incidence of parovarian cysts were ranged from 0.41-2.3 per cent [2, 7, 22]. In...
our study, the incidence of parovarian cyst were detected as 0.72 per cent. Macroscopic and microscopic findings are agree with previous studies [5, 11, 16, 24]. ALAM [2] and LONG [14] stated that parovarian cysts do not usually interfere with reproductive performance of the animal. However, large parovarian cysts which caused stenosis of oviductal lumen due to compression may affect fertility. In this study, no compression of the oviduct lumen caused by parovarian cysts was seen in all cases.

In the present study, cystic bursa ovarica were observed in 2 cases (0.18 %), and macroscopic and microscopic findings were similar to reported by BUERGELT [5] and McENTEKE [16]. Cystic distension of the ovarian bursa may develop due to adhesions following enculement of the corpus luteum in cattle.

In our study, periovvaritis and periovvarial adhesions were found in 3 cases (0.27 %). It has been reported that these lesions may negatively affect fertility [9] and hydrosalpinx may develop in some cases [1]. SUMMERS [23] stated that unilateral ovarian-oviductal adhesions did not seriously affect pregnancy. Author observed pregnancy in 6 cows with unilateral adhesions between ovarium and oviduct. Periovarial adhesions with chronic salpingitis and purulent salpingitis seen in the present study may seriously affect fertility.

The incidence of granulosa cell tumor in cows have been reported as 0.85 per cent by ÇALISKAN [6] and 0.04 per cent by LAGERLÖF and BOYD [13]. In this study, the tumor were detected in 3 cases (0.27 %). In one case, glandular endometrial hyperplasia and squamous metaplasia of cervical epithelium were also detected. These changes may be resulted from excess secretion of oestrogen from tumor cells.

Hemangiomia in the ovarium was found in one case (0.09 %), in our study. Macroscopic and microscopic findings in this case are similar to previous reported data [5, 16, 18].

In the present study, some pathological changes in the oviduct were observed in 9 cases (0.81 %). Hydrosalpinx were seen in 4 cases (0.36 %). This change was accompanied with unilateral hydrosalpinx had pregnancy, but, none of the cows with bilateral hydrosalpinx were pregnant.

In the present study, salpingitis were observed in 5 cases (0.45 %). Most infectious agents enter the uterine tube via the uterus [16]. Salpingitis may also occur after rectal palpation of ovarium and oviduct [8]. In this study, along with salpingitis in all cases, inflammatory changes were also observed in the uterus, cervix and vagina. In these cases, salpingitis may result from inflammation of uterus. MILLER and CAMPBELL [17] claimed that two common sequel to salpingitis are hydrosalpinx and tubal adhesions to the bursa or ovary or to other parts of the perisalpingal tissue. Similarly, in the present study, along with salpingitis, periovvaritis and adhesions and mesosalpingitis with adhesions were also found.

Mesosalpingitis and adhesions with perisalpingal tissue were seen in one case (0.09 %). This change may cause infertility by restriction the oviductal movements.

In conclusion, the incidence and pathologic features of ovarian and oviductal lesions in cows were determined. The incidence of ovarian disorders were found as 5.21 per cent, and the most common lesions were cystic changes. The incidence of oviductal lesions (0.81 %) was lower than the ovarian disorders.

5. References

FIGURE 1. — A. Macroscopic appearance of follicular cyst on the right ovary. B. Microscopic appearance of follicular cyst lined by degenerative granulosa cells and fluid accumulation in the lumen, H&E X 87.

FIGURE 2. — Cystic corpora lutea. A. Cystic cavity in the centre of corpus luteum with ovulation papilla (arrow). B. Zone of fibrous (F) tissue between luteal cells and the cystic cavity, H&E X 35.


FIGURE 4. — A. Cystic bursa ovarica. Distension of bursa due to clear fluid accumulation (thick arrow) and hydrosalpinx (thin arrow). B. Periovaritis and adhesions. Note adhesions of periovarial tissue and salpingitis (arrow).

FIGURE 5. — Granulosa cell tumor. A. Gross appearance of tumor mass on the left ovary. B. Roset formation of granulosa cells with Call-Exner bodies (arrows), H&E X 165.

FIGURE 6. — Hemangioma. A. Macroscopic appearance of tumoral mass on the right ovary. B. Large vessels filled with erythrocytes separated by bands of connective tissue, H&E X 30.

FIGURE 7. — A. Purulent salpingitis. Neutrophil granulocytes and desquamated epithelial cells in the lumen of the oviduct, H&E X 35. B. Tuberculosis of oviduct. Necrotic centre surrounded by mononuclear cells and Langhan’s type giant cells (arrows), H&E X 35.