

Persian Queens: Pathological and Ultrasonography Evaluation of Ovarian Affections in Egypt

Hoda Eissa¹, Haithem Farghali² and Ahmed Osman^{3*}

¹Veterinary Medicine Directorate of Giza, Egypt

²Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt

³Department of Pathology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt

Abstract

Feline reproduction has not received the quantity of investigation and a spotlight that has been directed at canine reproduction. The result is that fewer data is available both for description of normal reproduction and for management of common problems. Therefore, this study aimed to investigate the role of ultrasonography and histopathological examination as tools for diagnosis of ovarian affections in Persian queens. During the period from (August 2016 to October 2017), 35 queens of different ages (11 months up to 10 years) were examined clinically and by ultrasonography for ovarian lesions then ovariectomy or ovariohysterectomy was performed in diseases queens. Ultrasonographical examination revealed fluid filled cysts with variable wall thickness and size. Gross examination revealed cysts and tumors of varied size and shape distorted the ovarian architecture. Tissue specimens from ovaries were collected for histopathological examination. Histological examination displayed several types of lesions included ovarian remnant syndrome and ovarian cysts which consisted of ovarian follicular cyst, corpora lutea cyst and Paraovarian cysts. Several types of ovarian neoplasm, ovarian serous cystadenomas, ovarian fibroma, granulosa cell tumor, thecoma and teratoma were seen.

Keywords: Persian queen; Ovary; Cysts; Neoplasms; Histopathology; Ultrasonography

Introduction

The female cat is seasonally polyestrous with changes in day length (increasing number of light hours) regulating the seasonality. The presence of mature oocytes in the ovaries and the effect of ovulation induction seem to be dependent on the day of the onset of physiological estrus during the follicular phase [1]. Ovarian cysts, commonly arising from mature or atretic follicles, fail to ovulate and persistently remain on the ovary, thereby inhibiting re-establishment of folliculogenesis and consequently rendering the queen sub fertile. Cystic ovarian disease could be diagnosed based on behavioral signs, ultrasonography and histopathology [2].

In the queen, follicular cysts that arise from mature or atretic follicles are reported to be most common type. Affected queens may be asymptomatic or may exhibit prolonged estrus if cells lining secrete estrogen [3]. Neoplasms arising in the feline ovary are rare may be due to an intrinsic resistance of cat ovaries to tumor development. Epithelial tumors, germ cell tumors, and sex cord-stromal tumors had been reported [4].

The present study aimed to assess the ovarian disorders in female cats at Giza province on the bases of the ultrasonography, gross and histopathological findings.

Materials and Methods

A total number of 35 Persian queens were examined during the period from (August 2016 to October 2017), of different ages (11 months up to 10 years). The cases were admitted to Faculty of Veterinary Medicine Hospital, private Veterinary Clinic, Animal reproduction institute clinic and Veterinary medicine directorate of Giza clinic.

Ultrasonographical examination Ultrasound was performed by using Caris (Esaoite Biomedica, Florence, Italy) with 2.5–3.5–5–7.5–10 MHz sectorial probes [5]. Ovariectomy or ovariohysterectomy was applied for any reproductive diseases.

Ovaries were grossly examined after ovariectomy or ovariohysterectomy. Tissue samples from ovaries were collected and fixed in 10% buffered neutral buffered formalin solution for histopathology. Tissue specimens were processed as followings, dehydrated in ascending concentration of ethanol, cleared in xylene, embedded in paraffin wax and sectioned at 5-micron thickness. Prepared slides sections were stained by hematoxylin and eosin [6].

Results

Ovarian lesions of 35 cases are reported as ovarian remnant syndrome, ovarian & paraovarian cysts and ovarian neoplasm while ovarian follicular cyst is the most common lesions in queens as shown in Table 1.

Ovarian remnant syndrome

Ovarian remnant syndrome (ORS) was detected in three queens (8.57%) previously ovariohysterectomy or ovariectomized. Histologically, ovarian cortical tissue showed typical ovarian structures such as follicles, corpora lutea and interstitial endocrine cells Plate-A (Figure 1).

Ovarian and paraovarian cysts

Cystic rete ovarii: In two queens (5.71%), unilateral cystic of rete

***Corresponding author:** Ahmed Osman, Professor Doctor, Department of Pathology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt, Tel: +201097765488; E-mail: ahosman2007@cu.edu.eg

Received November 14, 2017; **Accepted** November 22, 2017; **Published** November 30, 2017

Citation: Eissa H, Farghali H, Osman A (2017) Persian Queens: Pathological and Ultrasonography Evaluation of Ovarian Affections in Egypt. J Anim Health Behav Sci 1: 108.

Copyright: © 2017 Eissa H, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Ovarian lesions	Number of affected case	% of affections
Ovarian remnant syndrome	3	8.57
Ovarian and paraovarian cysts		
Cystic rete ovarii	2	5.71
Ovarian follicular cyst	11	31.42
Corpora lutea cyst	7	20
Paraovarian cysts	2	5.71
Ovarian neoplasia		
Ovarian fibroma	1	2.86
Thecoma	1	2.86
Cystadenofibroma	2	5.71
Granulosa cell tumor	2	5.71
Teratoma	1	2.86
Interstitial cell hyperplasia	1	2.86
Miscellaneous conditions		
Ovarian hemangioma	1	2.86
Ovarian mineralization	1	2.86

Table 1: Ovarian lesions of Persian cat ovary.

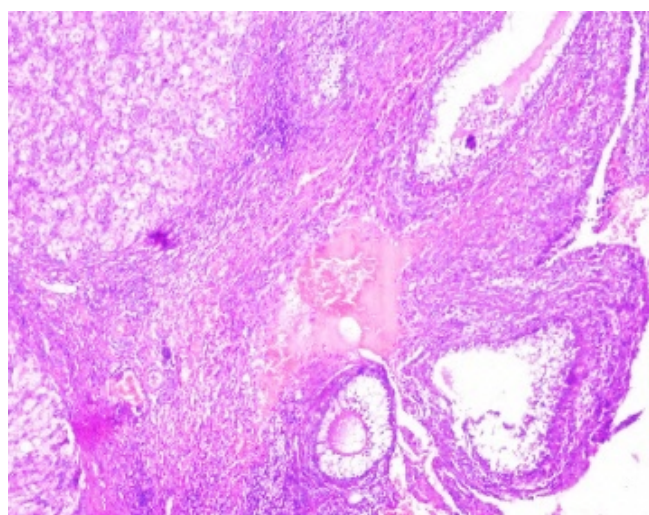


Figure 1: Ovarian cortical tissue showing remnant ovarian structures such as follicles and corpora lutea (H&E×200).

ovarii that was seen which characterized macroscopically by variable size cysts filled with clear fluid. Microscopically, cysts were lined by single flattened layer of epithelium. As cystic distention of the rete tubules increased, the cortex of the ovary became compressed Plate-A (Figure 2).

Ovarian follicular cyst: Ovarian follicular cyst was seen in 7 unilateral and four queens bilateral (31.42%). Ultrasound transverse scan image of this case showed multilocular anechoic content of the enlarged ovary Plate-A (Figure 3a).

Grossly, it varied in size but is larger than a normal preovulatory follicle and may be single or multiple. The cystic follicles can be up to 7 mm diameter.

Histologically, these cysts are thin walled and filled with pale acidophilic residue contained cell debris. These follicles are lined by one to four layers of cuboidal granulosa cells, and there is no luteinization. Some larger cysts may be lined by a single layer of flattened cells resting on a thin fibrous capsule Plate-A (Figure 3b).

Corpora lutea cyst: Corpora lutea cyst were seen in five unilateral

and two queens bilateral (20%). Ultrasound transverse scan image showed hypoechoic enlarged left ovary Plate-A (Figure 4a).

Grossly, it appeared larger than a normal corpus luteum and distorted the ovarian architecture.

Histologically, the cyst wall composed of several layers of polygonal luteinized granulosa cells, with eosinophilic cytoplasm, foamy vacuolated luteal cells. The lumen contained acellular eosinophilic material within the cystic cavity Plate-A (Figure 4b).

Paraovarian cysts: Paraovarian cysts were seen in two queens (5.71%) likely arise from vestigial remnants of the mesonephric and paramesonephric ducts. Paraovarian cysts are lined by flattened epithelium supported by smooth muscle in its wall contained pale stained eosinophilic fluid Plate-A (Figure 5).

Ovarian tumors

Ovarian fibroma: This type of tumor was recorded in one queen (2.86%) which raised from ovarian stroma. Grossly, the tumor appeared solid white mass with smooth bossellated surface. The cut surface revealed yellowish-white and whorled. Microscopically, the tumor

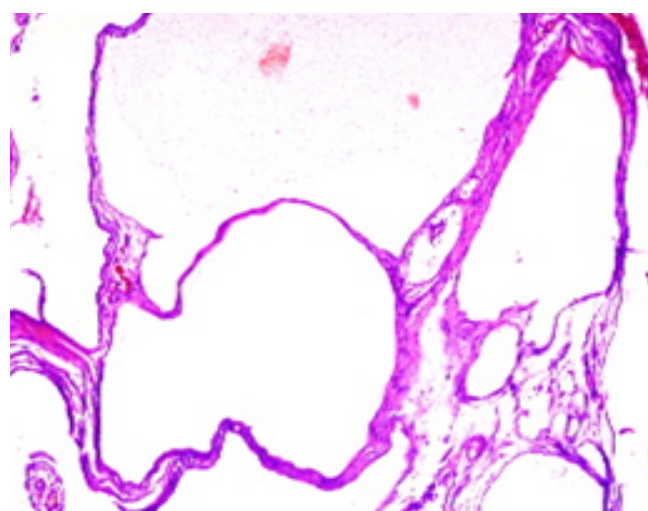


Figure 2: Ovarian tissue section showing multiple cyst lined by single flattened layer of epithelium (H&E×200).

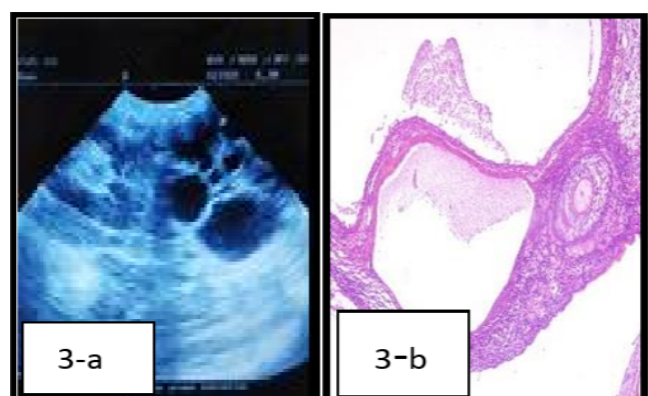
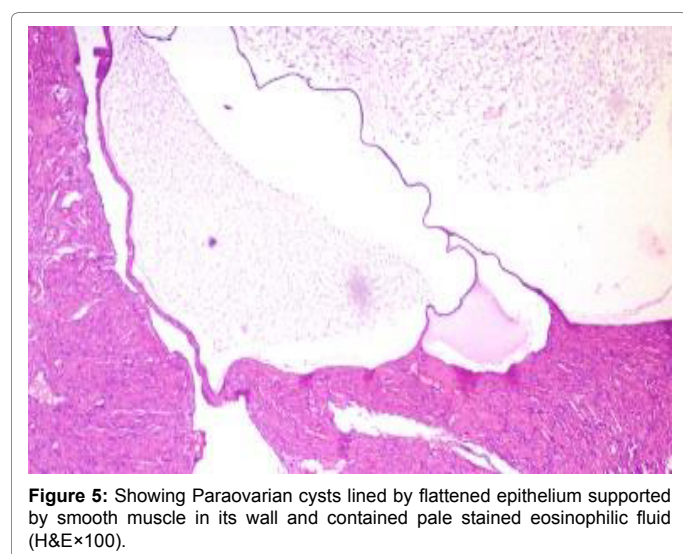
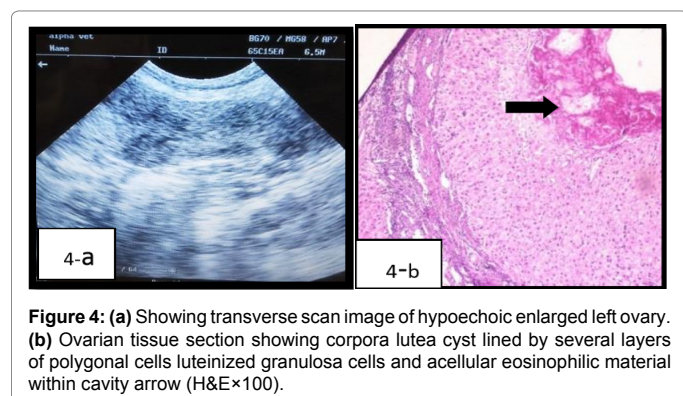


Figure 3: (a) Showing transverse scan image of multilocular anechoic content of the enlarged ovary. (b) Ovarian tissue section showing multiple follicular cysts (H&E×100).



mass consisted of interlacing bundles of cellular fibrous connective tissue Plate-B (Figure 6).

Thecoma: Thecoma was seen in one queen (2.86%) as unilateral, well-defined, firm, solid mass and covered by intact ovarian serosa. It appeared small and yellow color with mixture of white fibrous tissue.

Histologically, Spindle cells with moderate pale cytoplasm containing lipid droplets and central nuclei intervening stroma has collagen deposition and focal hyaline plaque formation Plate-B (Figure 7).

Serous Cystadenofibroma: This is a type of benign ovarian epithelial tumor was recorded in two queens (5.71%). Grossly, tumor mass appeared gray-yellow and cystic. Histologically, unilocular cysts filled with clear watery fluid and lined by simple low-cuboidal cells. The stroma is composed of bland spindled cells arranged in fascicles and storiform patterns in a collagenized background Plate-B (Figure 8).

Luteinized granulosa-theca cell tumor: Granulosa cell tumor was detected in two examined queens (5.71%) which characterized macroscopically, by nodulation of ovarian surface. The cut surface appeared cystic with white solid areas.

Microscopically, the tumor mass consisted of closely-packed polyhedral cells and number of small abortive follicles (Call-Exner bodies). Ovoid or elongated hyperchromatic nucleus with scanty cytoplasm was seen. The granulosa or theca cells appeared plumper and have ample cytoplasm characteristic of luteinization Plate-B (Figure 9).

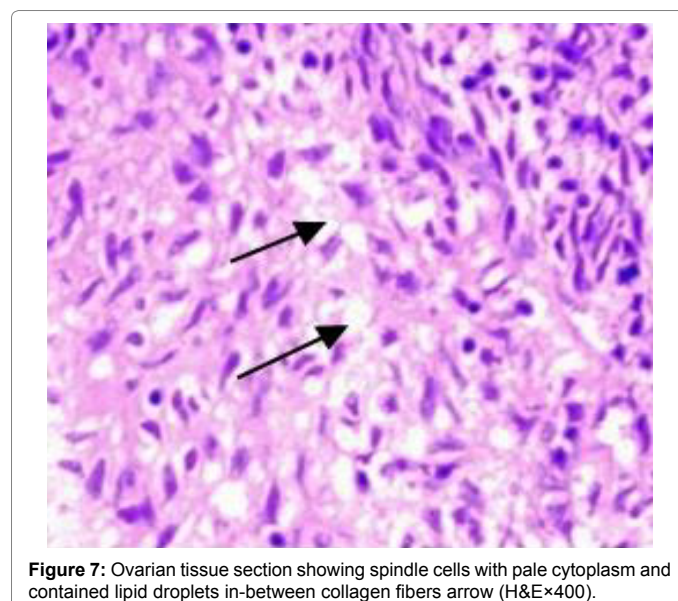
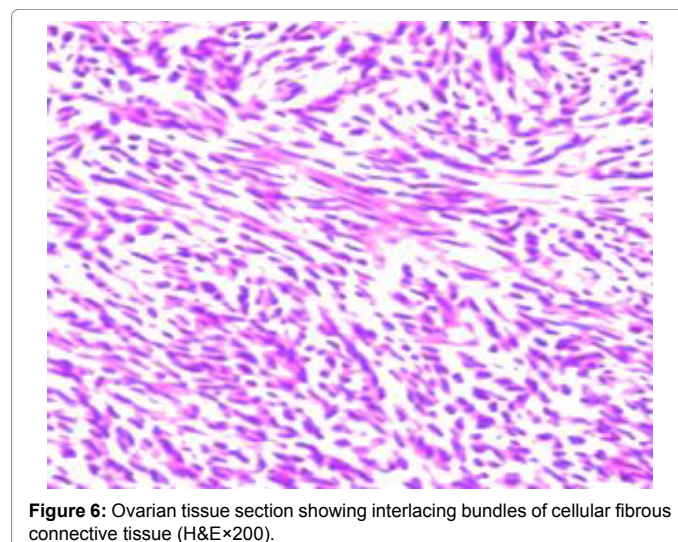
Teratoma: Teratoma was seen in one queen (2.86%) as embedded mature type. It consisted of glandular structure lined by columnar or cuboidal cells. One of these is in a group of vacuolated polyhedral cells bounded by thick eosinophilic basement membrane. Plate-B (Figure 10).

Interstitial endocrine cell hyperplasia: Interstitial cells hyperplasia was seen in one cases (2.86%) as unilateral interstitial endocrine cell hyperplasia. The ovary of affected cat appeared to be larger than normal.

Histologically, the cells were uniform and typical of interstitial endocrine cells. Cords and nests of hyperplastic interstitial cells appeared as large polyhedral cells with pale eosinophilic granular cytoplasm and central nuclei separated by collagen bundles Plate-B (Figure 11).

Miscellaneous conditions

Ovarian hemangioma: Ovarian hemangioma was seen in one queen (2.86%) which characterized by ovarian parenchyma shows channels of variable size and shape randomly distributed throughout it. The lesion showed smooth outer surface and is red or purplish on



the cut surface. These channels are lined by a single layer of flattened spindle-shaped cells and generally contain variable numbers of blood cells. It accompanied with compression of the ovarian parenchyma. The endothelial cells lining of dilated vascular channels appeared normal in size, shape, and number without atypical features Plate-C (Figure 12).

Ovarian mineralization: Dystrophic mineralization of the ovary was seen in one queen (2.86%). This type of calcification occurred in healed corpus luteum cysts which known as corpus albicans Plate-C (Figure 13).

Discussion

Reproductive disorders in pet animal particularly cat is quickly turning into a significant a part of the veterinary care. The current study indicated that the ovarian affections were the one in all the foremost frequent calculable affections. The foremost common recorded pathological conditions within the ovarian cysts and neoplasms.

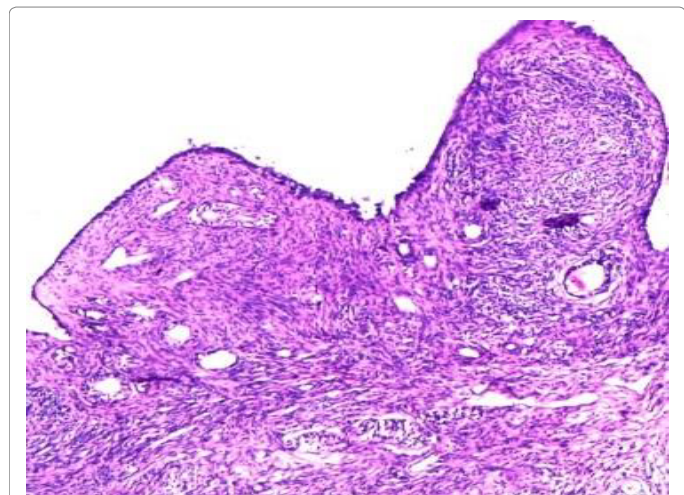


Figure 8: Ovarian tissue section showing unilocular cysts filled with clear watery fluid and lined by simple low-cuboidal cells (H&E×200).

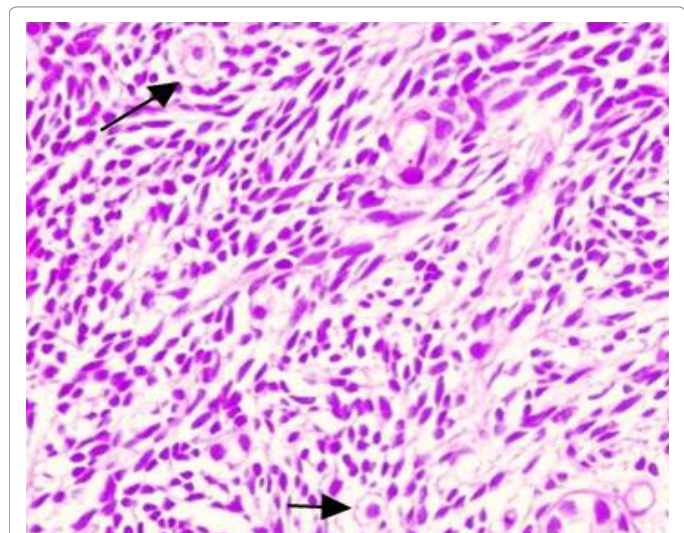


Figure 9: Ovarian tissue section showing polyhedral cells and number of small abortive follicles (Call-Exner bodies) arrow (H&E×400).

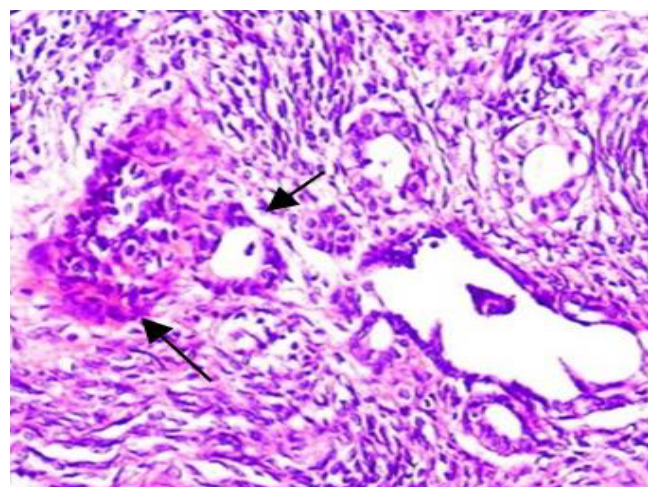


Figure 10: Ovarian tissue section showing glandular structure and cluster of vacuolated polyhedral cells bounded by thick eosinophilic basement membrane arrow (H&E×200).

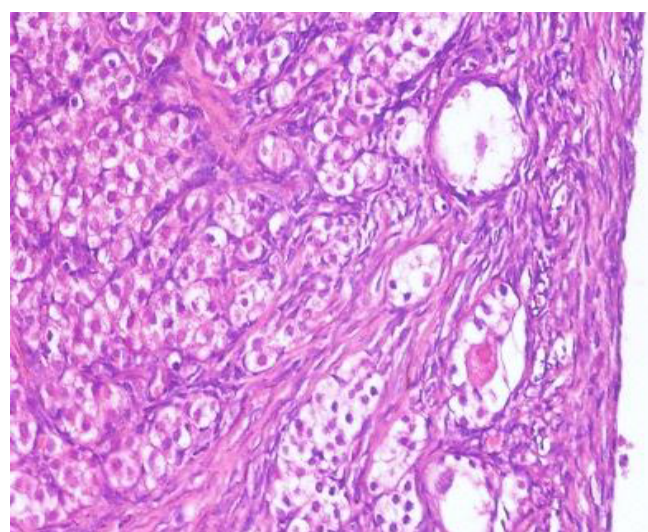


Figure 11: Ovarian tissue section showing interstitial cell hyperplasia which appeared as variably sized clusters of pale-staining cells (H&E×200).

Ovarian remnant syndrome (ORS) is that the presence of practical ovarian tissue with signs of oestrus once ovariectomy or ovariectomy [7-9]. Signs of oestrus could occur weeks to several years once surgery. Three queens (8.57%) antecedently ovariectomized showed this syndrome sometimes resulted from partial or complete lack of removal of one or each ovary.

Dilation of the anatomical structure rete tubules at intervals the medulla of the ovary at the hilum was seen in two queens (5.71%) as unilateral cystic anatomical structure was seen. It appeared as variable size cysts stuffed with clear fluid. Microscopically, cysts were lined by single planate layer of epithelial cells [10].

Ovarian follicular cyst was seen in seven unilateral and four queens bilateral (31.42%) is that the most typical form of follicular cyst in our survey followed by corpora lutea cyst were seen in five unilateral and two queens bilateral (20%). Paraovarian cysts were seen in two queens (5.71%). The ovarian cysts thought-about because the main reason for infertile

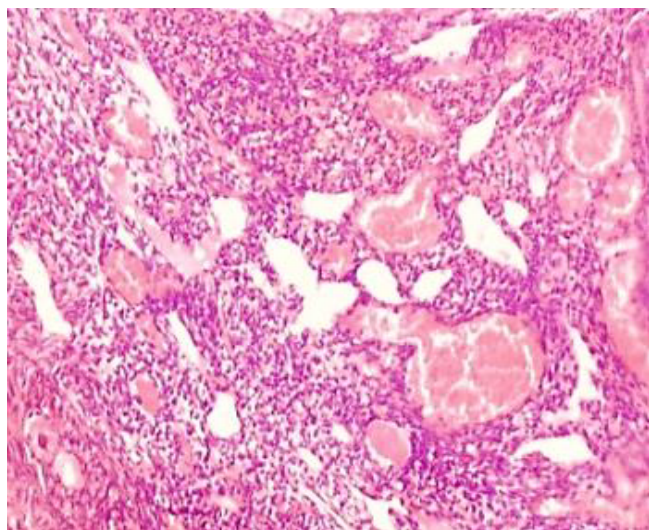


Figure 12: Ovarian tissue section showing channels of variable size and shape randomly distributed throughout parenchyma (H&E×200).

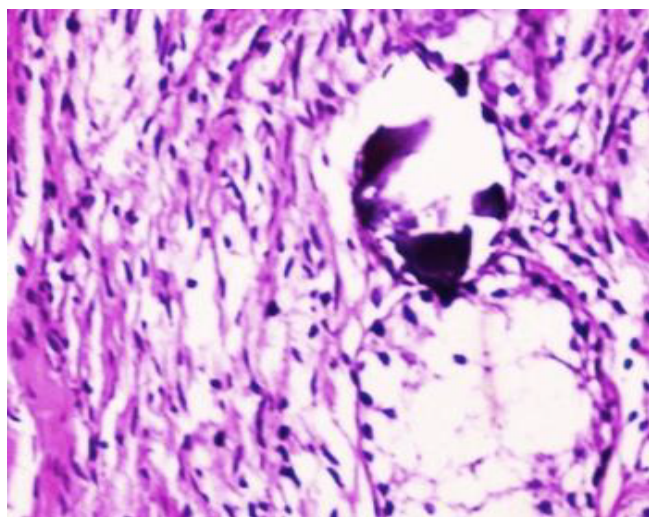


Figure 13: Calcification of healed corpus luteum cysts was known as corpus albicans (H&E×200).

in queen. They arise from mature or atretic follicles, fail to discharge and persistently stay within the ovary, thereby inhibiting restoration of folliculogenesis and consequently rendering the queen sub-fertile. The foremost generic form of cyst is that the functional follicular cyst, which secretes estrogen. Follicular cysts are thin-walled ovarian structures, which could be single or multiple and may be unilateral or bilateral [11]. Additionally, cystic corpora lutea was produced progesterone hormone. These styles of cyst replaced the encircling physiological Ovarian tissue, which can secondary lead to functional loss [12].

Ovarian benign tumor was recorded in one queen (2.86%) that raised from ovarian stroma. Ovarian fibromas square measure benign neoplasms that may mimic malignant ovarian tumors because of the gift as solid adnexal lots, typically related to pathology and serous membrane effusions [13].

Thecoma was seen in one queen (2.86%) as unilateral, well-defined, firm, solid mass and lined by intact ovarian membrane. Histologically,

Spindle cells with moderate pale living substance containing lipid droplets and central nuclei. Neoplasms of this sort gibe fibromas, however there's vacuolization of the living substance with lipid droplets [13].

Ovarian Cystadenofibroma could be a form of benign ovarian tumor was recorded in two queens (5.71%). The histopathological findings unconcealed series of ovarian tumors enclosed a bilateral cystadenoma, apparently the primary benign animal tissue tumor rumored within the cat ovary [4]. The Lumina of cystic tumor lined by columnar or cubiform epithelial cells.

The granulosa cell tumors square measure sex cord-stromal in origin. They're the foremost common primary ovarian tumor [14]. Our study unconcealed granulosa cell tumor in two queens (5.71%) that characterized macroscopically, by nodulation of ovarian surface. The cut surface is cystic with white solid areas. Microscopically, the tumor mass consisted of closely-packed solid cells. The granulosa cell tumors have multiple microscopic anatomy patterns-including vesicle, Sertoli cell, and sarcomatous. Call-Exner bodies typically seen within the tumors of cats and girls [4].

The teratomas have differentiation of cells so that there are ectodermal, mesodermal, endodermal and neuroectodermally derived cells within the same neoplasm [15]. Teratoma was seen in one queen (2.86%) our study as embedded immature type.

Interstitial cells hyperplasia was seen in one cases (2.86%) that showed some equivalent gross and microscopic findings seen in each mice and mouse like that seen in queens [16]. Interstitial cells hyperplasia appeared as variably sized cords or nests of hyperplastic cells composed of huge solid cells with pale eosinophilic granular cytoplasm and central nuclei.

Ovarian hemangiomas are usually situated in the medulla and the hilus. It may be a true tumor or hamartoma or stimulated vessels by hormonal influences, congenital malformations, pregnancy or infection [17,18]. The most common histologic type found in the ovary is the cavernous or mixed cavernous-capillary type resemble to that detected in our study in one queen (2.86%) which characterized by channels of variable size and shape indiscriminately.

Dystrophic mineralization of the ovary was seen in one queen (2.86%). The ovarian mineralization is typically secondary to cell injury or necrosis. Dystrophic mineralization of the ovary has been rumored in rats and mice. Ovarian mineralization is seen in corpora lutea as a part of traditional atresia; but, it's additionally been rumored in association with chemicals induced ovarian follicle or corpora lutea abnormality [19].

Conclusion

The female reproductive disorders were significantly recorded in cats. The ovarian lesions included ovarian remnant syndrome and ovarian cysts which consisted of ovarian follicular cyst, corpora lutea cyst and Paraovarian cysts. Several types of ovarian neoplasia were ovarian serous cystadenomas, ovarian fibroma, granulosa cell tumor, thecoma and teratoma.

Acknowledgement

The authors wish to thank Pathology Department of Veterinary Medicine Cairo University.

Author Contributions

All co-authors contributed to the conception, design, execution, and analysis of the experiments described here, and to the writing and editing of this manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Axner E (2008) Updates on reproductive physiology, genital diseases and artificial insemination in the domestic cat. *Reprod Domest Anim* 43: 144-149.
2. Johnston SD, Root Kustritz MV, Olson PS (2001) Disorders of the feline ovaries. In *Canine and feline Theriogenology*. (2nd edn). Saunders, Philadelphia 453-462.
3. Keskin A, Yilmazbas G, Yilmaz R, Ozyigit MO, Gumen A (2009) Pathological abnormalities after long-term administration of medroxyprogesterone acetate in a queen. *J Feline Med Surg* 11: 518-521.
4. Gelberg HB, McEntee K (1985) Feline ovarian neoplasms. *J Vet Pathol* 22: 572-576.
5. Ferretti LM, Newell SM, Graham JP, Roberts GD (2000) Radiographic and Ultrasonographic evaluation of the normal feline postpartum uterus. *Vet Radiol Ultrasound* 41: 287-291.
6. Bancroft JD, Gamble M (2013) *Theory and practice of histological techniques*. (7th edn). Churchill Livingstone, Edinburgh, London, Melbourne and New York.
7. Pope JF, Knowles TG (2014) Retrospective analysis of the learning curve associated with laparoscopic ovariectomy in dogs and associated perioperative complication rates. *J Vet Surg* 43: 668-677.
8. Muraro L, White RS (2014) Complications of ovariohysterectomy procedures performed in 1880 dogs. *Tierarztl Prax Ausg K Kleintiere Heimtiere* 42: 297-302.
9. England GC, White R (2016) Incomplete ovarian tissue removal in female dogs and cats. In *Practice* 38: 315-326.
10. Gelberg HB, McEntee K, Heath EH (1984) Feline cystic rete ovarii. *Vet Pathol* 21: 304-307.
11. Gharagozlou F, Youssefi R, Akbarinejad V, Sasani F, Taghizadeh-Jahed M, et al. (2014) Evaluation of serum anti-Mullerian hormone (AMH) in a Persian queen cat with bilateral cystic ovarian disease. *Comp Clin Pathol* 23: 237-239.
12. Knauf Y, Failing K, Knauf S, Wehrend A (2013) Treatment of bitches with ovarian cysts using human chorionic gonadotropin-releasing hormone analogon. *Tierarztl Prax Ausg K Kleintiere Heimtiere* 41: 93-100.
13. Athey PA, Malone RS (1987) Sonography of ovarian fibromas/thecomas. *J Ultrasound Med* 6: 431-436.
14. Aliakbrai S, Ivoghli B (1979) Granulosa cell tumor in a cat. *J Am Vet Med Assoc* 174: 1306-1308.
15. Basarabe RJ, Kraft SL, Andrews GA, Leipold HW, Small D (1998) An ovarian teratoma in a cat. *Vet Pathol* 35: 141-144.
16. Dixon D, Alison R, Bach U, Colman K, Foley GL, et al. (2014) Nonproliferative and proliferative lesions of the rat and mouse female reproductive system. *J Toxicol Pathol* 27: 1S-107S.
17. Bolat F, Erkanli S, Kocer NE (2010) Ovarian hemangioma: Report of two cases and review of the literature. *Turk Patoloji Derg* 26: 264-266.
18. Shashikala K, Sharmila PS, Sushma TA (2013) Ovarian haemangioma with synchronous xanthogranulomatous inflammation-a rare pathological finding. *Int J Health Sci Res* 3: 116-119.
19. Montgomery CA, Alison RH (1987) Non-neoplastic lesions of the ovary in Fischer 344 rats and B6C3F1 mice. *Environ Health Perspect* 73: 53-75.