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RESEARCH ARTICLE

Surgical Management and Histopathological Classification of the Canine Mammary Gland Cancers

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Abstract

Thirty six canine mammary gland neoplasm had been recorded among female dogs during the period extended from 2013 to 2015. Malignant neoplasm of the mammary gland were recorded in 31 cases which represented by 86.2% of the examined animals. Out of these malignant masses, tubulopapillary mammary adenocarcinoma (7cases), carcinoma in benign mixed tumor (7cases) and cysticpapillary mammary adenocarcinoma (6cases) were the most commonly diagnosed mammary neoplasm. Only one case was recorded as malignant mixed tumor (carcinosarcoma) which represented (3.2%). Meanwhile, benign one was recorded in 5 animals which represented 13.8%. The all cases of benign neoplasm were adenomyoepithelioma (complex mammary adenocarcinoma). The surgical management as well as histopathological classification and the outcome of the surgery were all documented and considered.

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INTRODUCTION

The mammary tumors in the dogs are the second most common tumor (after skin tumors) over all and display the most frequent neoplasm in female dogs. These tumors represent a serious problem in the veterinary practice as the fastest progressive cause of canine morbidity (Misdrop, 2002 and Sontas et al., 2009).

The mammary tumor is account for approximately 82% of all tumors in reproductive organs (Gobello,Corrada, 2001; and Kovacevic et al., 2005).The critical age for mammary tumors in females is the 8th year of life and the risk increases with each subsequent year. The incidence of malignant mammary tumors is higher in middle and older age females (Rasotto et al., 2011). At 9 to 11 years of age, dogs have a maximum risk of developing mammary tumors (Gobello, Corrada, 2001; and Sontas et al., 2009; Gerry, 2009). Although the majority of the mammary tumors in dogs are malignant, it can be difficult to determine which histologically malignant mammary tumors will actually metastasize or recur (Stevens, 2014).

Mammary gland neoplasm is a common finding in older female dogs that are not spayed. Spaying female dogs when they are young greatly decrease their risk of developing mammary cancer when aged. Overall, unspayed female dogs have a seven times greater risk of developing mammary neoplasm than spayed female (Marconato et al, 2009; and Ezerskyte et al, 2011).

The exact causes for the development of canine mammary tumors are not fully understood. However, hormones of the estrous cycle seem to be involved. Female dogs who are not spayed or who are spayed later than the first heat cycle are more likely to develop mammary tumors (MacEwen and Withrow, 1996; and Gupta et al, 2012). Because 40 to 50 percent of dog mammary tumors have estrogen receptors, spaying is recommended by many authors (MacEwen and Withrow, 1996; North and Banks, 2009; Mann et al, 2011; and Fossum, 2013).

The mammary tumors are often multiple. About 50% of mammary tumors in dogs were found to be malignant. Adenomas and fibroadenomas make up the benign types. Malignant mammary tumors are divided into sarcomas, carcinosarcomas, inflammatory carcinomas (usually anaplastic carcinomas), and carcinomas (including adenocarcinomas), which are the most common (Rezaie et al, 2009; and Tavasoly et al, 2013).

Tumor size also affects the prognosis, in that dogs with tumors greater than 5 cm have a greater chance of lymph node metastasis. Metastasis for any malignant mammary tumor is usually to the regional lymph nodes and lungs. Appearance and location of the tumor is enough to identify it as a mammary tumor (Egenvall et al, 2005; de Boer et al, 2010; Rivera, 2010 Rasotto et al., 2011).

Biopsy will give type and invasiveness of the tumor. Surgical removal is the treatment of choice, but chest X- ray should be taken first to rule out metastasis. Removal should be with wide margins to prevent recurrence, taking the whole mammary gland if necessary (Clemente, 2010).

The mammary neoplasm is more commonly affect the caudal inguinal, caudal abdominal and cranial abdominal glands and occasionally the caudal and cranial thoracic glands (Shafiee et al., 2013). In dogs, the histopathological detection of lymphatic vessels invasion and/or regional lymph node metastases is associated with poor survival after surgery (Moe, 2001; Fulmer et al, 2007).

This article discusses the main features associated with the clinical characteristics, the distribution of the cancer among the affected mammary gland lobe, surgical management and prognosis a long with the histopathological subtypes.

Materials and methods

Animals:

The study was performed in 36 female dogs submitted to surgical resections of mammary tumors over the period extended from 2013 to 2015. The cases observed at the Veterinary Medicine Clinic in Faculty of Veterinary Medicine, Benha University and Private Clinics at Benha and Alexandria. The collected cases were ranged in age between 9-15 years (mean age 13 year).

Radiographic examination:

The affected animals were subjected to thoroughly clinical examination and using X-rays for determining the metastasis to the internal organs in the thoracic, abdominal or pelvic cavities. X-ray was done in the department of Surgery, Faculty of Veterinary Medicine, Benha University by using simply HP X-ray machine and private X-ray centers in Benha and Alexandria.

Surgical intervention:

All these cases were subjected to surgical intervention; the animals were anesthetized by Xylazine-ketamine mixture in a rate of 2-1 and maintained by a continuous rate infusion of propofol in a dose rate of 0.15 mg/kg/min (Waelbers et al, 2009, and Jia et al, 2015). The surgical interference includes lumpectomy, simple mastectomy or regional mastectomy, with or without the superficial inguinal lymph nodes in all cases and ovariohysterectomy in 11 cases. The surgical operations were conducted according to the techniques cited by Mann et al, 2011 and Fossum, 2013. Follow up for detection of recurrence also was carried out when possible

Histopathological assessment

The excised mammary tumors were grossly examined and tissue samples were fixed in 10% buffered formalin and embedded in paraffin. Sections 4 µm thick were obtained from each sample and stained with Heamatoxyline and Eosin (H&E) and examined microscopically.

Results

The table (1) showing that the malignant neoplasm of the mammary gland were recorded in 31 cases which represented by 86.2% of the examined cases. Meanwhile, benign one was recorded in 5 animals (13.8%).

The mammary gland tumors were recorded in 7 cases (19.4%) of spayed old age bitch (mean age 14 year). Four of them exhibited benign tumors with small size less than 0.5 and treated by lumpectomy (Fig, A6). The remaining 3 cases were malignant. Twenty nine cases were recorded in intact female dogs; nine of them were metastasized to the inguinal lymph nodes (Fig, B4).

Table (1): Showing the distribution of the mammary gland tumor subtypes among spayed and unsayed female dogs and the number of metastasis cases.

Types	Spayed	unsayed	Total number	Lymph node involvement
Tubulopapillary mammary adenocarcinoma	-	7	7	-
carcinoma in benign mixed tumor	1	6	7	-
cysticapillary mammary adenocarcinoma		6	6	-
Solid Mammary adenocarcinoma	2	2	4	4
Carcinoma and malignant myoepithelioma	2	1	3	1
Comedocarcinoma	1	2	3	3
malignant mixed tumor (carcinosarcoma)	1	-	1	1
Adenomyoepithelioma (Complex adenoma)	-	5	5	-

Table (2): Showing the allocation of the mammary gland tumors in different mammary gland lobes.

Types	Right			Left		
	Thoracic	Abdominal	Inguinal	Thoracic	Abdominal	Inguinal
Tubulopapillary mammary adenocarcinoma	-	-	1	-	2	4
carcinoma in benign mixed tumor	1	-	3	-	1	2
cysticapillary mammary adenocarcinoma	-	1	1	-	2	2
Solid Mammary adenocarcinoma	-	-	-	1	1	2
Carcinoma and malignant myoepithelioma	-	1	1	-	-	1
Comedocarcinoma	-	1	-	-	1	1
malignant mixed tumor (carcinosarcoma)	-	-	-	-	-	1
Adenomyoepithelioma (Complex adenoma)	-	1	-	2	1	1

The caudal mammary glands (Fig, B2) were frequently involved than the cranial glands (Fig, A3) .The tumors can present as either isolated lumps or multiples. In the case of multiple lumps, each one was treated as an individual. Usually, these lumps are non-painful; they may appear and remain static or grow rapidly (Fig, B2).

The preferential localization of mammary neoplasm was the inguinal lobes (55.5% of cases), abdominal lobes (33.4%) and thoracic lobes (11.1%) (Table, 2).

Eventually, 69.4 % of tumor masses were found in the left mammary lobes and 30.6% in the right mammary lobes. Twenty five % of cases showed superficial lymph nodes involvement.

Eighty % of mammary tumors exhibited a small size (Fig, A1), with weight inferior to 50 gm but a relatively high proportion of these masses (20%) weighted more than 100 gm, even reaching 110 gm (Fig, B3) and 180 gm (Fig, B4).

Seventy percent of the tumors showed a hard, fixed appearance (Fig, A4) or an elastic consistency but 30% appeared fluctuant well circumscribed (Fig, A5) and involve one or multiple glands.

In the great majority of cases, the aspect of the tumor on the cut surface was grayish-white (Fig, B4) to light brown, multilobulated with foci of necrosis, and superficially ulcerated.

Some cystic structures or blood spot districts areas were also often found.

The radiographic image confirmed the metastasis in 2 cases of malignant mammary tumor, one in the distal part of thoracic cavity (Fig, B5), while the other in the abdominal cavity (Fig, B6).

Small nodules less than 0.5 cm were firm and superficial were treated surgically by lumpectomy in 4 cases, one case in thoracic lobes and 3 cases in abdominal lobes.

In 12 cases that showed centrally located tumors more than 1 cm or with some degree of adhesion to skin were surgically interfered by mastectomy to remove the whole gland with margins of 1–2 cm of grossly normal tissue.

Regional mastectomy was carried out in 20 cases where the inguinal lobes were incriminated by cancers. The whole glands were removed for ease of surgery and the inguinal lymph node was removed. Ovariohystrectomy was performed according to the owner choice in 11 cases.

Follow up for 8 months after mastectomy in 19 cases revealed that, death was taking place in 3 cases 5 months after surgical operation.

Tubulopapillary Mammary adenocarcinoma microscopically appeared as a multilobulated, well circumscribed, unencapsulated neoplasm expanding the dermis and replacing normal mammary tissue architecture. The tumor composed of epithelial cells arranged in a tubulopapillary pattern in an abundant collagenous stroma. Neoplastic cells covering papillary structures and lining ducts were distinctly 1 to 2 cells thick, with scant eosinophilic cytoplasm and indistinct cell borders. Nuclei were oval, normochromic or hyperchromic, with finely stippled chromatin. Mitotic figures were variable, with averages 2-4 per high power field. There was a focal area of necrosis containing numerous erythrocytes, and there were multifocal aggregates of lymphocytes in the interstitium (Fig. C1).

Cysticapillary Mammary adenocarcinoma appeared as a well-circumscribed, unencapsulated, variably sized, multi-cystic, neoplasm expanding the dermis and subcutis, elevating the dermis and adnexa and effacing normal mammary tissue. The tumor composed of a single layer of polygonal cells to flattened cells supported by a variably dense fibrous stroma. Neoplastic cells have indistinct cell borders with moderate amounts of eosinophilic granular cytoplasm, forming dilated cystic structures filled with homogenous eosinophilic material or finely flocculent material admixed with few degenerating leukocytes. The cysts were lined by single layer of polygonal cells supported by a dense fibrous stroma, infiltrated by neoplastic cells, and moderate numbers of lymphocytes (Fig. C2). Nuclei are round to oval, with finely stippled chromatin and up to 2 variably distinct nucleoli. Mitotic figures were rare. There was scattered single cell necrosis and hemorrhage. Multifocal, the interstitium contains neoplastic cells, moderate numbers of lymphocytes mixed with fewer macrophages and plasma cells.

Solid Mammary adenocarcinoma showed as unencapsulated, multilobulated, infiltrative neoplasm was expanding the dermis and subcutis, elevating the overlying epidermis, and compressing adjacent adnexa. The neoplasm composed of nests and solidly cellular areas of polygonal cells supported on a fine fibrovascular stroma. The majority of cells (up to 90%) were closely packed, with variably distinct borders, moderate amounts of eosinophilic cytoplasm and round to oval normochromic or hyperchromic, nuclei with finely stippled chromatin and 1-2 basophilic nucleoli. Anisokaryosis and anisocytosis were moderate to severe, and the number of mitoses was variable, with averages 6-8 per high power field. Rarely, the neoplastic cell population was arranged in cords and tubules and surrounded slit like lumina (Fig. C3) that were lined by a double layer of epithelial cells which exhibited significant anisokaryosis and anisocytosis; there are also numerous mitotic figures. Multifocally there were large areas of necrosis and numerous minute hemorrhages scattered throughout the tumor (Fig. C4). Infiltration of neoplastic cells into lymphatic vessels was found at the periphery of the neoplasm, with metastasis to regional lymph nodes (Fig. C5).

Comedocarcinoma come into view as, an unencapsulated, multilobulated, infiltrative neoplasm was expanding the dermis and subcutis, and elevating the overlying epidermis. The tumor characterized by the presence of necrotic areas within the center of the neoplastic cell aggregates (Fig. C6). Neoplastic cells were arranged in solid clusters with central necrosis composed of abundant amorphous eosinophilic material admixed with cell debris, necrotic neutrophils, and macrophages. Occasionally, massive hemorrhages were also observed admixed with the necrotic tissue. The peripheral tissue of the affected area and any foci not showing necrosis consisted of aggregates of closely packed cells arranged in solid foci, nests, cords, or tubules, supported by a fine fibrovascular connective tissue stroma. The majority of cells were closely packed, with variably distinct borders, moderate amounts of eosinophilic cytoplasm and round to oval normochromic or hyperchromic, nuclei with finely stippled chromatin and 1-2 basophilic nucleoli. Anisokaryosis and anisocytosis were moderate to severe, and the number of mitoses was variable, with averages 2-4 per high power field.

Adenomyoepithelioma (Complex adenoma) visible as, an unencapsulated, infiltrative, multilobulated neoplasm was expanding and effacing the mammary gland. The neoplasm consisted of two cell populations and variable amounts of fibrous stroma. The first population was composed of tubules lined by cells that were cuboidal to columnar and had a moderate amount of eosinophilic cytoplasm. Nuclei were round to oval with finely stippled or marginated chromatin and a single central basophilic nucleolus. Anisokaryosis and anisocytosis are usually minimal. The second population is composed of spindle to stellate cells with poorly demarcated cell borders and a moderate amount of cytoplasm. Nuclei are round to fusiform with finely stippled chromatin and a single nucleolus. Intimately associated with these cells is an abundant basophilic fibrillar myxoid matrix (Fig. D1).

Carcinoma in benign mixed tumor be seen as, an unencapsulated, infiltrative, multilobulated neoplasm was expanding and effacing the mammary gland. The neoplasm was characterized by the presence of two cell populations supported by a fibrovascular stroma. The first population of epithelial cells is arranged in irregular tubules lined by a single layer to several layers of cuboidal to columnar cells with a scant to moderate amount of eosinophilic cytoplasm. These cells exhibit moderate to marked anisokaryosis and anisocytosis, and variable numbers of mitoses are present (Fig. D2). Necrosis of these epithelial cells was occasionally present. The second population is composed of spindle to stellate cells (myoepithelial cells) within the interstitium, arranged in irregular bundles within a fibrillar basophilic (myxoid) matrix. These cells have poorly demarcated cell borders, moderate homogeneous slightly eosinophilic cytoplasm, and round to fusiform central nuclei with finely stippled chromatin and a small central nucleolus. Multifocal, there were varisized areas of chondroid component.

Carcinoma and malignant myoepithelioma existed as, an unencapsulated, infiltrative, multilobulated neoplasm with multifocal areas of necrosis, and hemorrhages was expanding and effacing the mammary gland. The neoplasm compressed adjacent ducts and elevated the overlying epidermis. This malignant neoplasm was characterized by the presence of two cell populations supported by moderate fibrous stroma. The first population was composed of cuboidal to columnar cells arranged in irregular tubules and nests. The second population of cells was spindle shaped and had poorly demarcated cell borders and a moderate homogeneous eosinophilic cytoplasm with round to elongate central nuclei, finely stippled chromatin, and a single nucleolus. Cells exhibit anisokaryosis and anisocytosis, and variable numbers of mitoses were found (Fig. D3). Multifocal, there were varisized areas of hemorrhages.

Malignant mixed tumor (Carcinosarcoma) appeared microscopically as; an unencapsulated, infiltrative, multilobulated neoplasm was expanding and effacing the mammary gland. The tumor was composed partly of cells morphologically resembling the epithelial component and partly of cells morphologically resembling connective tissue elements, both types of which are malignant. The carcinomatous components showed different types of differentiation, including adeno-, solid, squamous, and anaplastic types. Even in the same tumor two or more types of carcinoma could be recognized. The neoplastic cells were cuboidal to columnar epithelial cells, arranged in irregular tubules and nests, and supported by fine fibrovascular stroma. Multifocal necrosis of these epithelial cells was occasionally seen. The mesenchymal components of the neoplasm were composed of polygonal neoplastic cells arranged in islands and solidly cellular areas supported by fine fibrovascular stroma. Neoplastic cells had variably distinct cell borders and abundant eosinophilic vacuolated cytoplasm. Larger vacuoles peripheralized the nucleus. Nuclei were vesiculate with one prominent magenta nucleolus. Mitoses average 1 per 2 HPF. There is moderate anisokaryosis and anisocytosis. Around this population of cells was a variably basophilic fibrillar material (myxoid matrix) that was also seen within vacuoles in the cytoplasm of the cells. Various types of differentiation also occurred in the sarcomatous areas. Multifocally, within the neoplasm, there were scattered foci of chondroid / osteoid metaplasia with neoplastic cells in lacunae (Fig. D4). In the surrounding tissue, there are low numbers of

lymphocytes

and

plasma

cells.



Fig (A) Small size solid mammary gland adenocarcinoma (1). Carcinoma in benign mixed tumor in the abdominal lobe. The tumor exhibited a hard, fixed and light brown coloration (2). Thoracic comedosarcoma (3). Tubulopapillary mammary adenocarcinoma in the abdominal lobe (4). Inguinal malignant mixed tumor (carcinosarcoma) affects multilobes of mammary gland (5). Benign adenomyoepithelioma (6).

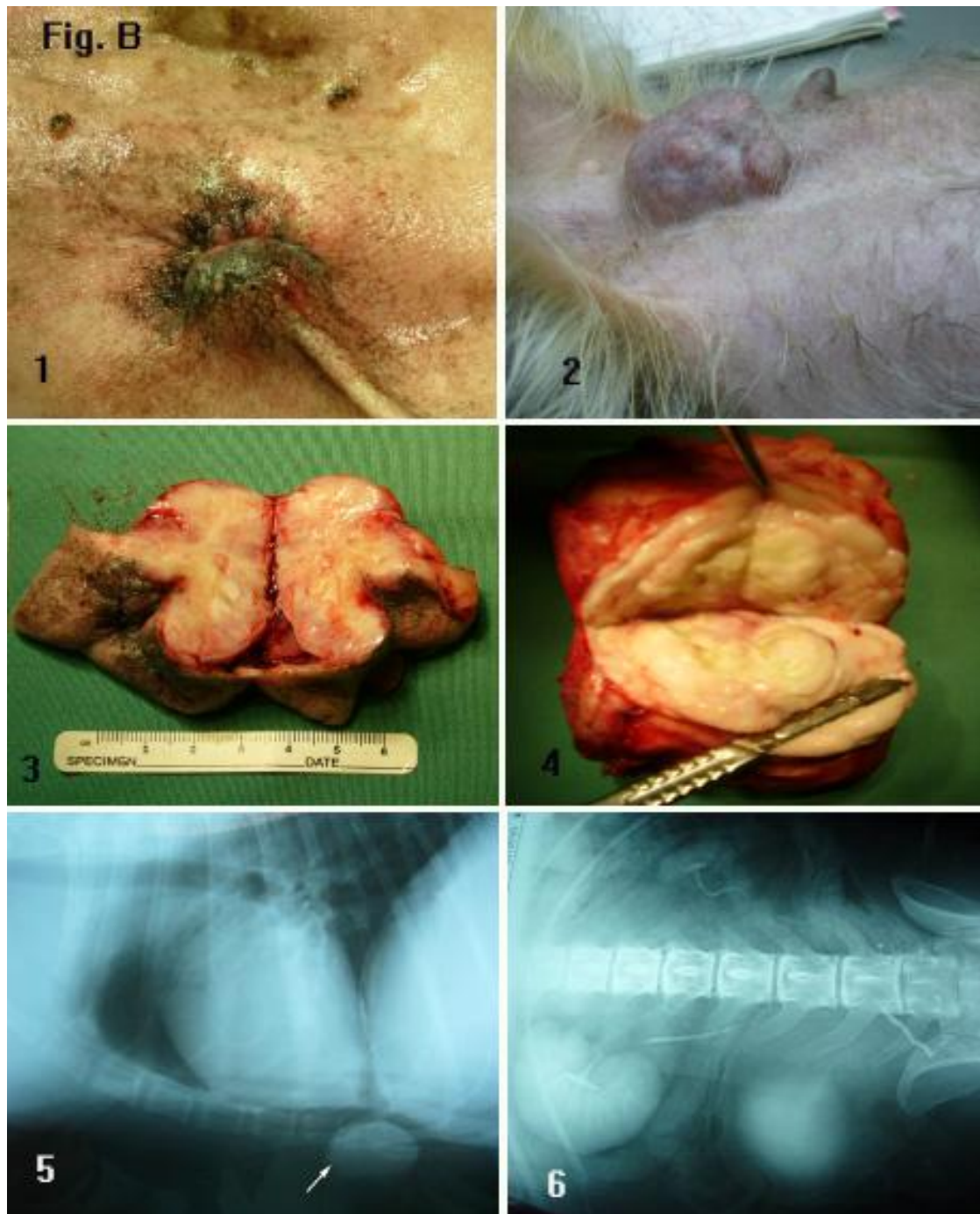


Fig (B)

Carcinoma in benign mixed tumor (1). Inguinal cysticpapillary mammary adenocarcinoma (2). Cut surface of the removed Carcinoma in benign mixed tumor, the specimen weighted 110 gm (3). Cut surface of the removed inguinal cysticpapillary mammary adenocarcinoma, the specimen weighted 180 gm (4). Radiograph of a case suffered from Tubulopapillary mammary adenocarcinoma. The image shows a metastatic circumscribed swelling at the distal part of thoracic cavity at the sternum region (5). Radiograph of malignant mixed tumor showing a high density circumscribed swelling in the abdominal cavity (6).

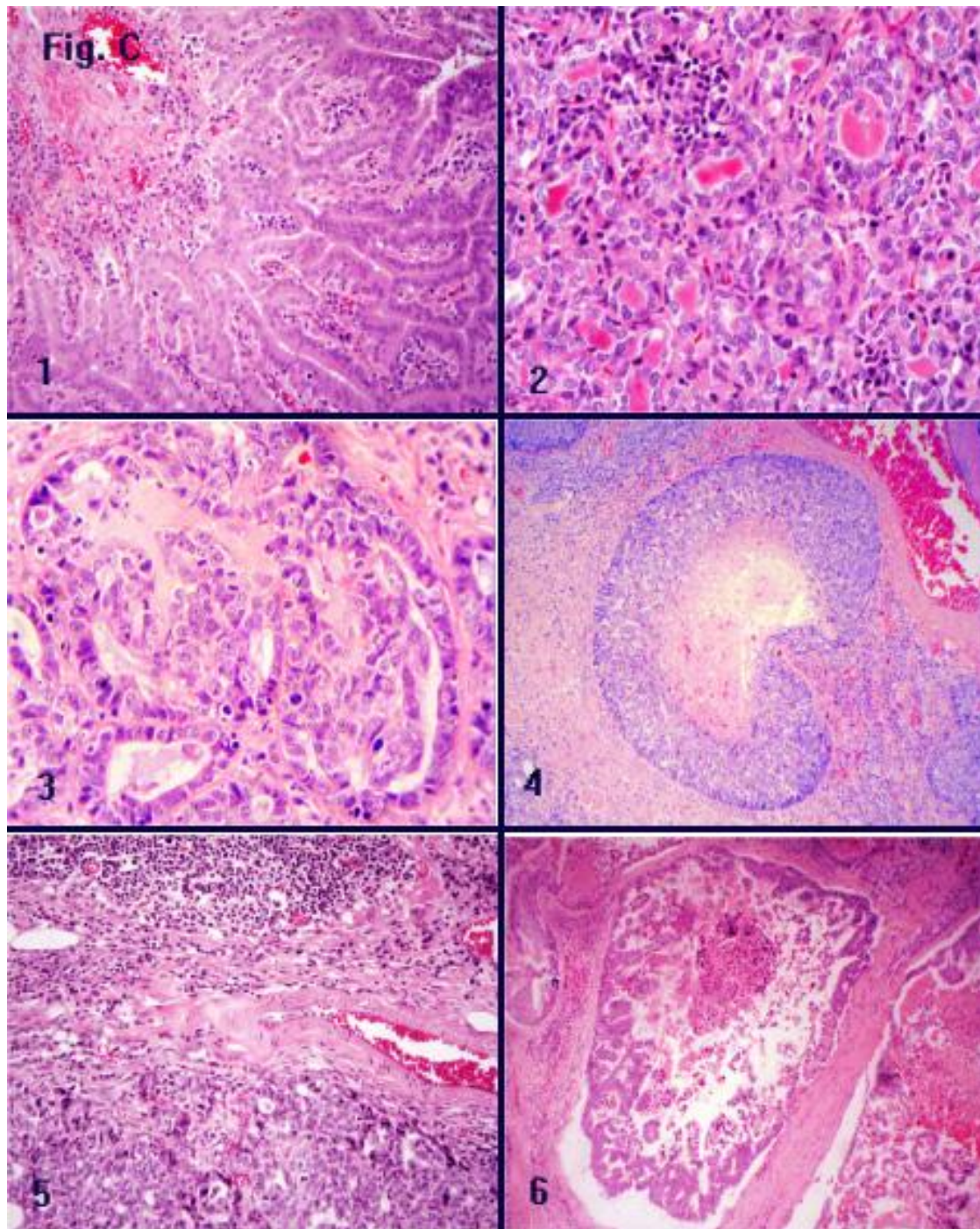


Fig (C)

Tubulopapillary carcinoma, mammary gland, canine. There was a focal area of necrosis containing numerous erythrocytes, and there were multifocal aggregates of lymphocytes in the interstitium. HE, 20x (1). Cystic papillary carcinoma, mammary gland, dog. Cysts lined by single layer of polygonal cells supported by a dense fibrous stroma, infiltrated by neoplastic cells, and moderate numbers of lymphocytes. HE, 40x (2). Solid carcinoma, mammary gland, dog. Neoplastic cell population rarely arranged in cords and tubules and surrounded slit like lumina. HE, 40x (3). Solid carcinoma, mammary gland, dog. Large areas of necrosis and numerous minute hemorrhages. HE, 10x (4). Metastatic solid carcinoma, mammary lymph node, dog. Aggregates of closely packed cells replaced the nodal tissue and arranged in solid foci, nests, cords, or tubules. HE, 20x (5). Comedocarcinoma, mammary gland, canine. Note the central area of necrosis, whereas the peripheral neoplastic cells are viable. HE, 10x (6).

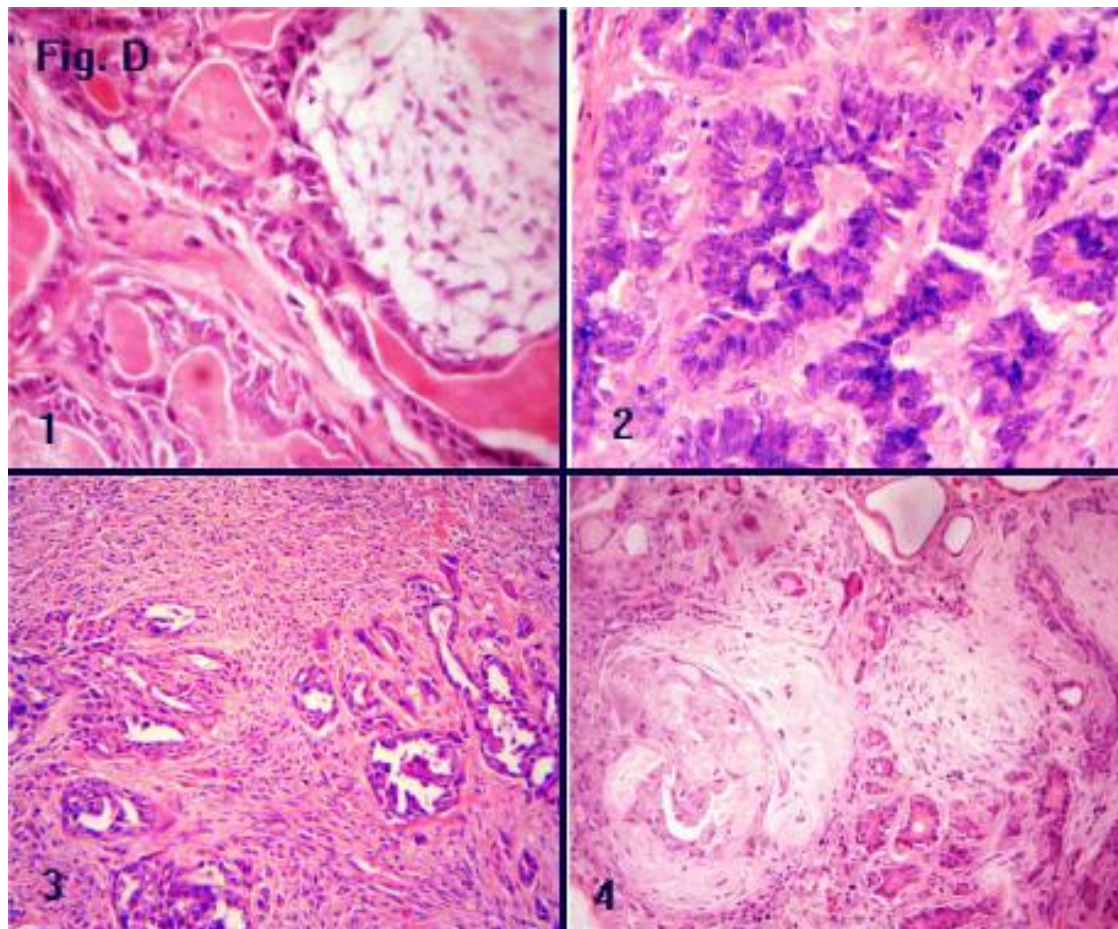


Fig (D)

Adenomyoepithelioma, mammary gland, canine. Foci of myoepithelial cell proliferation adjacent to several ducts. The myoepithelial cells are fusiform to stellate and surrounded by a basophilic mucinous matrix. HE, 40x (1). Carcinoma in benign mixed tumor, mammary gland, canine. Neoplastic epithelial cells arranged in irregular tubules lined by several layers of columnar cells with marked anisokaryosis and anisocytosis. HE, 40x (2). Carcinoma and malignant myoepithelioma, mammary gland, canine. Both epithelial and myoepithelial cells exhibit anisokaryosis and anisocytosis. HE, 20x (3). Malignant mixed tumor, mammary gland, canine. Two neoplastic populations are present; neoplastic cells showing chondroid / osteoid differentiation and islands of carcinoma cells. HE, 20x (4).

DISSCUSION

Mammary gland cancer were recorded in female dogs ranged in age between 9-15 years old (mean age 13years), this results showed a little difference from that recorded by (Gobello and Corrada, 2001 and Simkus et al., 2015) they explained that the incidence of mammary tumors is higher in the middle and older age females. They added that at 9 to 11 years of life, dogs have maximum risk of developing mammary tumors. Moreover (Moe, 2001; Misdrop, 2002; Egenvall et al, 2005 and Sontas et al., 2009) agree that the eighth year of life is the critical age for mammary tumors in female dog and with every subsequent year the risk increases

Among 36 cases of mammary tumor the malignant subtypes were encountered in 31 cases represented by 86.2% of the examined cases. This results were completely differ with that reported by (Sorenmo, 2003;Kovacevic et al., 2005; Cassali et al., 2013; and Shafiee et al., 2013) they reported that about 50% of cases of mammary gland tumor are malignant. Our results may be attributed to short period of study (2years), the little number of the cases (36 cases) and the older age of recorded animals (mean age 13).

The main features associated with the clinical characteristics and the affected mammary gland lobes were not so far from that recorded by (Nourth and Banks, 2009; Gupta et al, 2012; and Shafiee et al., 2013) they stated that the mammary masses are localized in the inguinal lobes (60% of cases), abdominal lobes (%27) and thoracic lobes

(%13). (Misdrop, 2002 and Chang et al, 2005) they explained that 67% of tumor masses are found in the left mammary lobes and 33% in the right mammary lobes. They added that higher percentage of mammary tumors exhibited a small size and hard in consistency but some of them appeared fluctuant. Fulmer and Mauldin, 2007; and Rezaie et al, 2009 explained that in the great majority of cases, the aspect of the tumor on the cut surface was grayish-white and lobed.

The lymph node invasiveness was detected in 9 cases, while metastasis was confirmed radiological in 2 cases one in the thoracic cavity which appeared as a distal located circumscribed swelling. The second case was visible in the abdominal cavity. This result agree with that reported by (de Boer et al, 2010; Ezerskyte et al, 2011, Rasotto et al., 2011 and Tavasoly et al, 2013) they stated that canine mammary carcinomas usually metastasize through the lymphatic system to the regional lymph nodes and subsequently to the lung or, less frequently, other organs (liver, kidneys, spleen, and bone).

Our results showed that 29 cases (81%) of mammary gland tumor were recorded in intact female dogs this agree with that explained by (Sorenmo, 2003; Santas et al, 2009 and Simkus et al., 2015) they reported that mammary tumors are still commonly encountered in countries where ovariohysterectomy or ovariectomy is not routinely performed on young female dogs that are not acquired for breeding purposes. They discussed a number of studies have shown that ovariohysterectomy early protects female dogs from developing mammary cancer in later life. The risk of developing mammary cancer if spayed prior to first heat is 0.05%, 8% after 1st, and 26% after 2nd, compared to intact dogs. Ovariohysterectomy after four or more cycles or greater than 2.5 years of age has little or no protective effect on the development of malignant mammary tumors (MacEwen and Withrow, 1996; Nourth and Banks, 2009; and Ezerskyte et al, 2011). On the other hand the mammary tumors were recorded in 7 (19.5%) spayed female dogs. This result differs from that recorded by (Egenvall et al, 2005; and Gupta et al, 2012). This attributed to the older age of spayed bitch in our study (mean age 14 years).

In the present study the ovariohysterectomy was conducted in 11 cases at the time of ablation of the mammary gland tumor this result came in accordance with that recorded by (Chang et al., 2005) who explained that ovariohysterectomy at the time of mammary tumor removal improved survival 2 years after surgery, and was more beneficial for complex carcinomas than for simple carcinomas. Sorenmo (2003) also found a beneficial effect of ovariohysterectomy at the time of mammary tumor removal. It helps to prevent the development of further benign mammary tumors. In the other study, ovariohysterectomy when mammary tumors are removed does not have a significant effect on the progression of malignant disease (Moe, 2001; Misdrop, 2002; Rivera, 2010; and Fossum, 2013).

The Goal of surgery is remove the entire tumor by the simplest procedure with appropriate margins this agrees with that published by Al-Akraa and Mostafa 2015. They explained that the radical surgical excision with wide free margin still remains the method of choice for treatment of neoplasm in dogs.

Histopathological examination of the biopsy specimens was established as the most reliable diagnostic approach. This agree with that recorded by (Rezaie et al, 2009; Sontas et al, 2009; Clemente et al, 2010; and de Boer et al, 2010) who stated that, the histopathological assessment revealed the characteristics of the tumor in many terms, which included pleomorphism, mitotic index, differentiation level, presence of necrosis, and the stromal invasion (the infiltration with neoplastic cells of the blood and lymph vessels and the cutaneous and soft tissue and the surgical margins). This data have been accepted as a golden standard in diagnosis due to its great importance in terms of the biological behavior and the prognostic outcome of the neoplasm.

Conclusion

The authors concluded that, the incidence of mammary tumors increases in older dogs. The mammary lump should be palpated for size, whether fixed to underlying tissue or freely movable, any ulceration or edema should be considered. Thoracic radiographs were performed to assess for metastatic disease. The treatment of choice for the mammary gland tumors was surgical excision with free margin according to the size of the cancer, and the affected mammary gland lobes.

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