A RETROSPECTIVE STUDY OF CANINE MAMMARY GLAND TUMOURS

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ABSTRACT

A pathohistological analysis of 456 specimens of spontaneous canine mammary gland tumours in the period 2000-2010, was performed at the Department of General and Clinical Pathology, Faculty of Veterinary Medicine, Trakia University, Bulgaria. The tumours were classified according to the WHO Histological Classification of Mammary Tumors of the Dog and Cat. The ratio of benign to malignant neoplasm was 44 to 56. The most frequently diagnosed epithelial tumours were tubulopapillar carcinomas (26.31 %), cystadenomas (13.15 %) and complex adenomas (4.82 %). The most frequently diagnosed mesenchymal tumours were fibromyxomas (2.85 %), fibrosarcomas (2.61 %) and osteochondromas (2.41 %).

Key words: *bitch, mammary tumours, incidence.*

INTRODUCTION

Mammary neoplasms are among the most common tumours of the female dog. Estimates of lifetime list for malignant tumours vary from 2 % to more than 20 %, a risk assessed to be exceeded twofold to fivefold by that of benign mammary tumours (Bostock, 1972; Down et al., 1968; Mouton et al., 1986; Sorenmo, 2003). Two studies of large population of dogs have recently reported incidence information. The first study, involving a defined population of insured dogs in the United Kingdom, reported a standardized incidence rate for mammary tumours of 205 per 100000 dogs per year (Dobson et al., 2002). The second study surveyed a population of more than 80000 insured female dogs in Sweden and found an overall incidence for any mammary tumours of 111 per 10000 dog years at risk (Egenval et al., 2005). This study found also that incidence increased with age: at age 6 year, it was 1 %; at age 8 years - 6 %; and at age 10 - 13 %. The risk of male dogs is 1 % or less of that in female dogs. The median age of tumour manifestation is 10 to 11 years, with rare occurrence in dogs younger than 4 years old (Mouton et al., 1986; Sorenmo, 2003, Thomas & Fox, 2002; Ezerskyte et al., 2011). A recent report suggested that the incidence of malignant tumours was different in small breed dogs compared with large breed dogs (Itoh et al., 2005). The development of mammary tumours in the dog is clearly hormone dependent. Compared to the risk of impact dogs, the risk of malignant tumours in dogs spayed before the first estrus is 0.05 %; after the first estrus, it is 8 %; and it rises to 26 % if the dog is spayed after the second estrus (Schneider et al., 1969).

The study aims to determine the relative prevalence and distribution of canine mammary gland tumours in our bioptic samples, which were received and analyzed between 2000-2010 at the Department of Pathology, Faculty of Veterinary Medicine, Trakia University, Bulgaria.

MATERIAL AND METHODS

Animals and Tumours

The study was performed at the Department of Pathology, Faculty of Veterinary Medicine, Trakia University, Bulgaria. Four hundred and fifty six samples of spontaneous mammary gland tumour growths in dogs were studied. The study included dogs (bitches) of all breeds, with their age ranging between 3 months and 15 years.

Histopathologic examination

For histopathologic examination, the tissues were fixed in 10 % phosphate-buffered neutral formalin, routinely processed, paraffin embedded, and stained with hematoxyllin and eosin (H&E). Replicate sections of particular cases were also stained with special stains such Heidenhain's Azan's

Trichrome, periodic acid-Schiff (PAS) and Masson's Trichrome whenever they were needed to confirm the diagnosis. All tumour's diagnoses were histopathologically confirmed according to WHO Histological Classification of Mammary Tumors of the Dog and Cat (Misdorp et al., 2001).

RESULTS

Based on the final diagnosis out of 456 canine mammary gland neoplasms 256 (56 %) were malignant, while 200 (44 %) were benign tumours. Among the biopsy specimens, 30 (65.78 %) cases were diagnosed as epithelial tumours, 55 (12.06 %) were diagnosed as mesenchymal tumours and 101 (22.16 °/o) cases were diagnosed as mixed tumours (Tabl. 1). The most frequently diagnosed benign epithelial tumours were cystadenomas (13.15 %) and fibroadenomas (6.14 %) The most frequently diagnosed malignant epithelial tumours were tubulopapillary carcinomas (26.31 %) and solid carcinomas (6.79 %) followed by anaplastic carcinomas (2.63 %) and squamous cell carcinomas (2.41 %).

Pathohistologically, benign mammary tumours were always surrounded by thin fibrous capsule and with parenchyma consisting from both epithelial and mesenchymal cell components. Simple adenomas may be of tubular type, consisting of well-differentiated luminal epithelial cells. Some of the tumours had a secretory products. Complex adenomas were composed of luminal epithelial cells together with spindle shaped or stellate cells resembling myoepithelial cells. Fibroadenomas consisted of a mixture of luminal and fibroblast stromal cells, sometimes admixed with myoepithelial cells (Fig. 1). Benign mixed tumours were composed of benign cells resembling epithelium and myoepithelium mixed with mesenchymal cells that have produced fibrous tissue in combination with cartilage, bone and/or fat (Fig. 2). Tubulopapillary carcinomas were characterized by the formation of tubules with or without papillary projections (Fig. 3). The stromal component was usually scanty. Neoplastic cells in solid carcinomas were arranged in solid sheets, cords, or nest (Fig. 4). The amount of stroma ranged from small to moderate. Anaplastic carcinomas were composed of large pleomorphic cells, often with bizarre nuclei that are rich in chromatin. Some cells were multinucleated. The most frequently diagnosed canine mammary gland mesenchymal tumours were fibromyxomas (2.85 %), fibrosarcomas (2.61 %) and osteochondromas (2.41 %). The other neoplastic types varied between 0.75 % and 1.31 %. Fibromyxomas had both fibrous and myxomatous elements. Fibrosarcomas were composed of neoplastic spindle cells that have formed reticulin and colagenous fibers (Fig. 5). Osteosarcomas were characterized by osteoid production by neoplastic cells. Pleomorphism and mitotic activity were usually prominent. Carcinosarcomas were composed of cells morphologically resembling malignant epithelial cells (luminal epithelial and/or myoepithelial) and cells resembling malignant connective tissue (Fig. 6).

DISCUSSION

Out of the total number of tumours examinated for the period 2000-2010 at the Department of Pathology mammary gland tumours are found to be the most frequent neoplasms with an incidence of 35 %, following by skin neoplasms (33 %), which is consistent with the finding of others authors (Finnie & Bostock, 1979; Benjamin et al., 1999; Moulton, 1990; Dinev et al, 2002; Kovacevic et al., 2005). Recently, a tendency toward progressive increase in malignant tumour incidence on the account of benign ones was noticed, as well as towards a relatively younger age of dogs affected by benign neoplasms (Perez Alenza et al., 1998; Perez Alenza et al., 2000; Gourley, 2000, Dinev et al., 2002). At 9 to 11 years of age, dogs have maximum risk of developing mammary tumours, although the risk rises at the age of 6 to 11 years (Schneider et a., 1969; Moulton, 1990). The results of investigation of Dinev et al., 2002 in Bulgaria showed a considerable increase in the number of mammary tumours since 1996 with peaks in 1998 and 1999. Those data are in accordance with the existing tendency towards progressive increase in this neoplastic kind in the bitch and the neoplastic incidence in general (Zhelev et al., 1966; Tzvetkov, 1998; Perez Alenza et al., 2000; Restucci et al., 2000, Sorenmo, 2003, Ezerskyte et al., 2011). By respect to age-related incidence, our data are very

close to those of most researchers (Priester and McKay, 1980; Tzvetkov, 1998, Dinev et al., 2002, Egenval et al., 2005; Zatloukal at al., 2005, Ezerskyte et al., 2011). They confirmed the fact that the highest incidence of canine skin tumours is observed by the age of 8-11 years.

Table 1. Incidence of canine mammary gland tumours diagnosed at the Department of General and Clinical Pathology, Faculty of Veterinary Medicine – Stara Zagora from 2000 to 2010.

Origin	Histological diagnosis	Neoplasms	
		Number	%
Benign tumours			
Epithelial		120	26.31
	Adenoma	32	7.01
	- simple adenoma	10	4.56
	- complex adenoma	22	4.82
	Cystadenoma	60	13.15
	Fibroadenoma	28	6.14
Mesenchymal		30	6.57
	Fibroma	6	1.31
	Fibromyxoma	13	2.85
	Osteochondroma	11	2.41
Mixed		50	10.96
Total of benign neoplasms		200	44
Malignant neoplasms			
Epithelial	Adenocarcinoma	180	39.47
	- tubulopapillary	120	26.31
	- solid	31	6.79
	- anaplastic	12	2.63
	- spindle ce11	6	1.31
	- squamous cell	11	2.41
Mesenchymal		25	5.48
	Fibrosarcoma	12	2.61
	Osteosarcoma	3	0.75
	Liposarcoma	4	0.8
	Chondrosarcoma	3	0.75
	Myxosarcoma	3	0.75
Mixed		51	11.18
Total of malignant neoplasms		256	56
Total of observed neoplasms		456	100

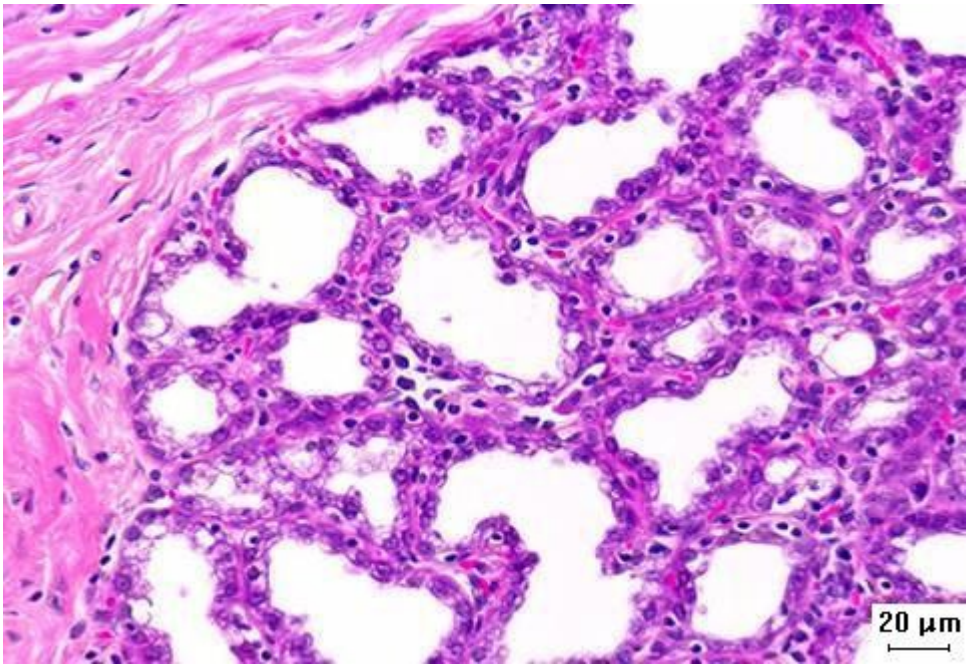

Fig. 1. Fibroadenoma. H/E stain.

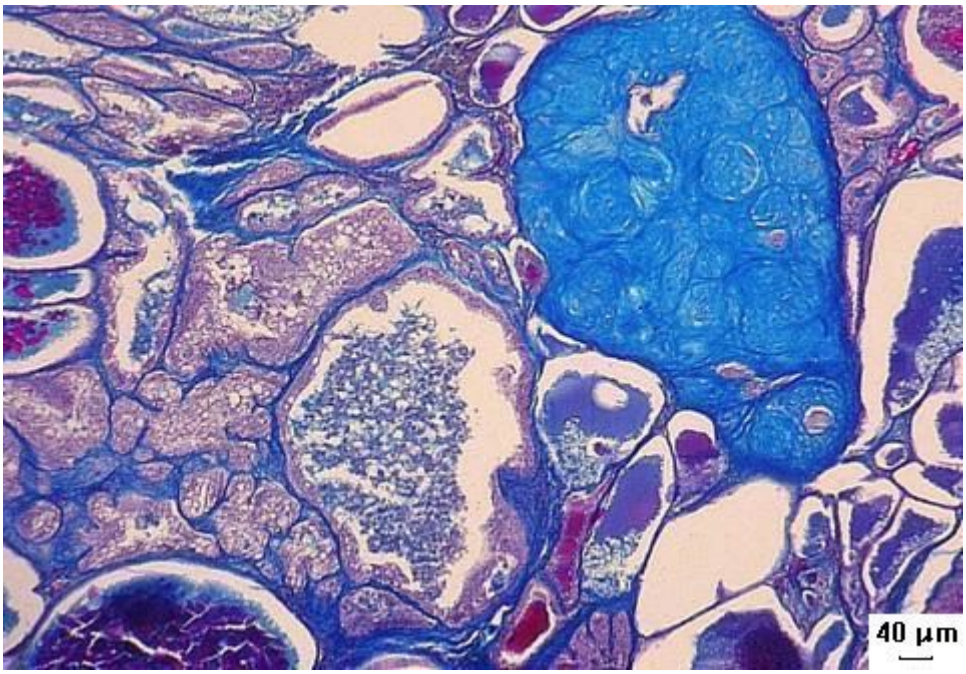

Fig. 2. Benign mixed tumour. Heidenhain's Azan's Trichrome stain.

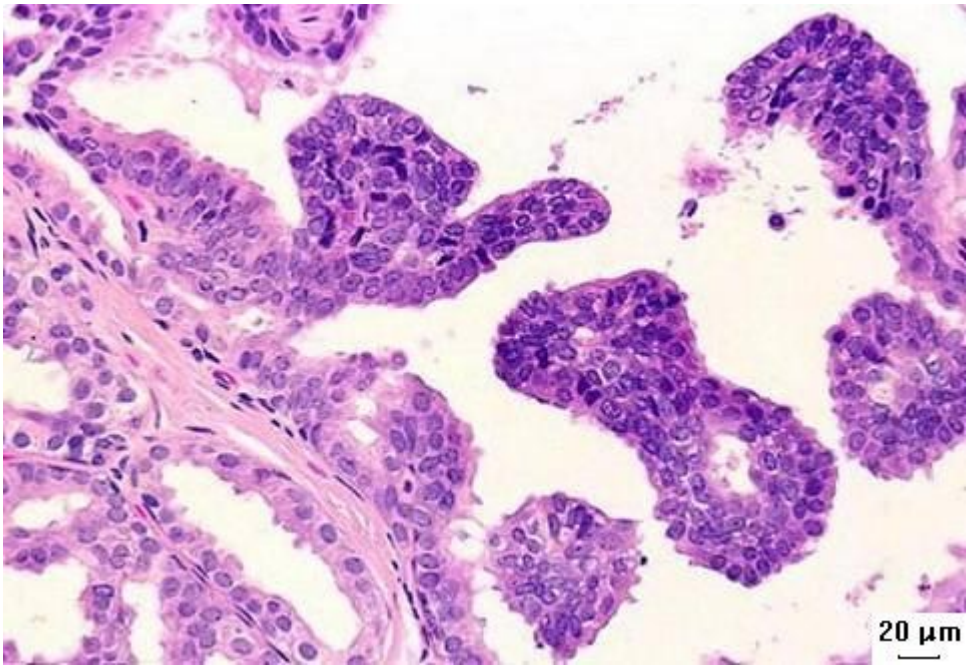

Fig. 3. Tubulopapillary carcinoma. H/E stain.

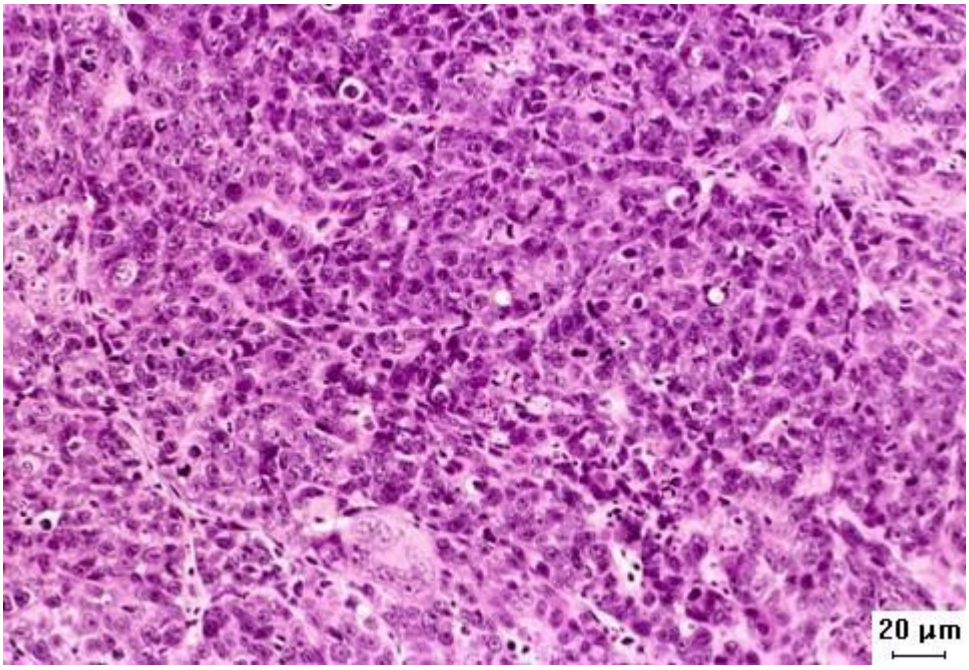

Fig. 4. Solid carcinoma. Neoplastic cells are arranged in solid sheets. H/E stain.

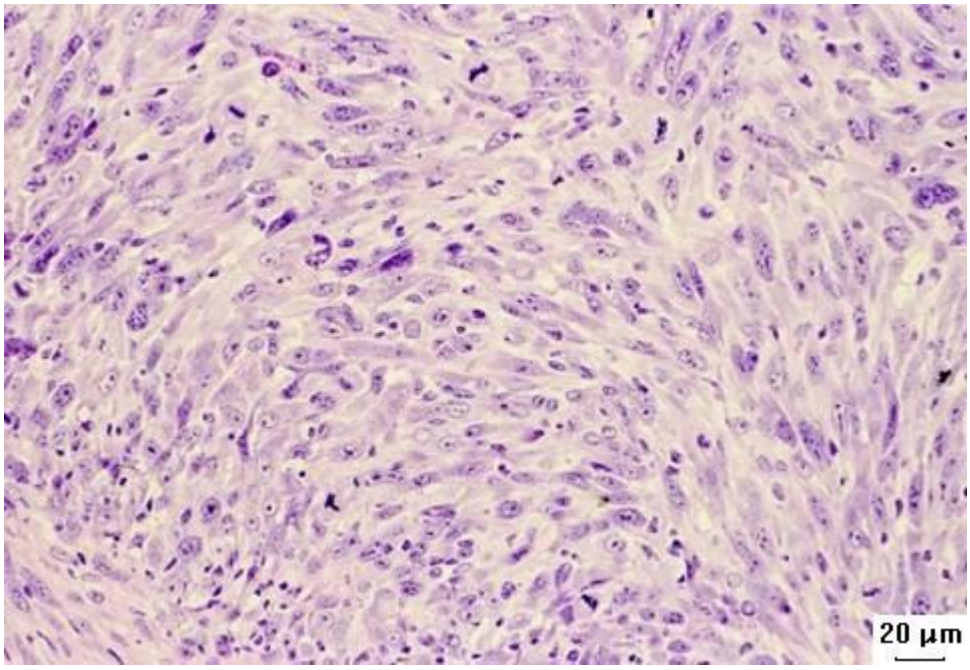

Fig. 5. Fibrosarcoma. Anisocytosis, anisokaryosis, abnormal mitotic figures. H/E stain.

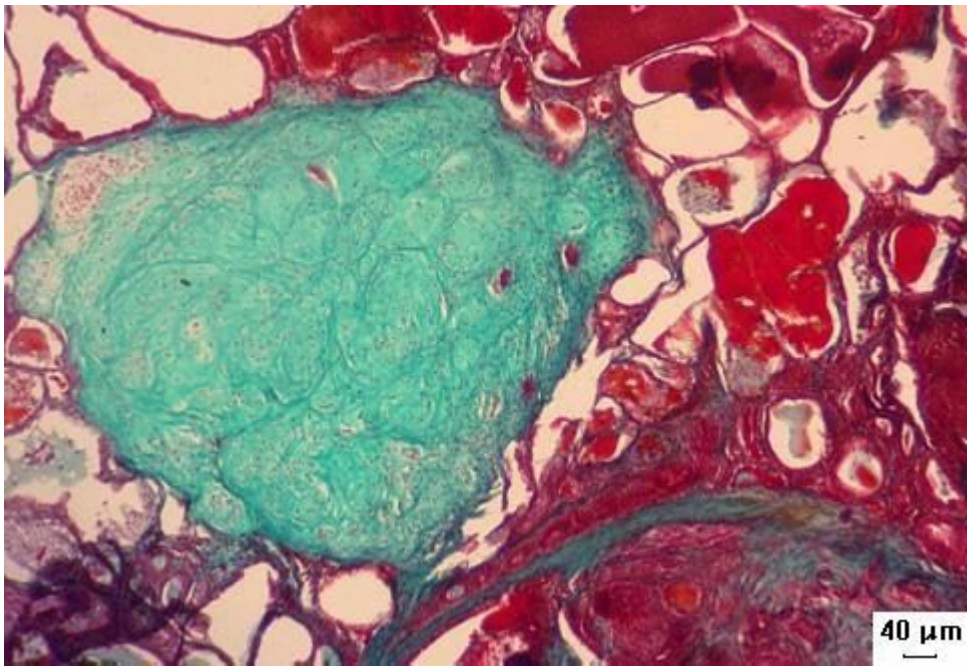

Fig. 6. Carcinosarcoma. Masson's Trichrome stain.

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