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Pathological study of neoplasms surgically excised from animals attended the veterinary teaching hospital

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Abstract

This study aimed to investigate the occurrence and histopathological features of neoplastic conditions in different species of animals that attending the Veterinary Teaching Hospital, College of Veterinary Medicine, University of Mosul. Samples had been collected from animals with variable neoplastic lesions. The results of this study showed that the total number of the excised tumours was 36, those were noticed in cattle 30.6%, sheep 22.2%, dog 10.4%, poultry 13.9%, cat 11.1%, and goat 2.8%. The tumours were diagnosed as squamous cell carcinoma 22.22%, fibroma 19.44%, adenoma 13.89%, pulmonary adenomatosis and fibrosarcoma 11.11%, leucosis and lymphoma 8.33%, thymoma, and transmissible venereal tumour 2.78%. We concluded from the current study occurrence a different type of tumours which was malignant or benign in different species of animals.

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Introduction

Surgical pathology of tumours in animals is widely described around the world in both farm and pet animals, with more advanced studies in the prevalence of each tumour type and their grading with prognosis (1). In Iraq, few studies are conducted to explain types of tumours in different species of animals, most of them are present to the scientific community as case reports, which emphasizing on describing these cases from a clinical perspective, only a few of them were conducting a pathological study to clear their histopathological architecture of neoplastic cells (2-5). In Iraq, especially in pet animals, the prevalence of this condition is obscure, and they were recorded as a case report only, without advanced study to causes and pathology of them (6). The most common types of tumour that have been recorded in Iraq are cutaneous papilloma, cutaneous fibroma, hepatic adenoma, cutaneous squamous cell carcinoma, lipoma, and thymoma (2-5). Few of previous studies explained the histological nature of these types of tumours; others were describing the gross lesions with emphasizing on the clinical aspects of these cases (7). In Mosul city, the neoplastic masses which have been recorded are bovine cutaneous papilloma, cutaneous squamous cell carcinoma, and mixed thymic tumour (2,3,5). This study aimed to investigate the pathology of surgically excised tumours in animals that attended Veterinary Teaching Hospital (VTH), College of Veterinary Medicine, University of Mosul.

Materials and methods

Tumour mass collection

The suspected animals with an abnormal mass that attending to the VTH has been sent to the surgical department starting from October 2018 to August 2019. The tissue samples were excised, and different sections of these samples have been taken from different part of the masses. The samples were immersed in 10% neutral buffered formalin for at least 27 hours to be submitted later for histopathological examination (8).

Surgical procedure

Different species of animals prepared under different protocols of anaesthesia or deep sedation using xylazine and/ or ketamine to varying doses according to species of animal (Table 1). The masses wholly removed and the site of operation was sutured with simple interrupted suture technique in all animals. The collected tissue samples were sent for histopathological examination.

Table 1: Dose of anaesthetic agents in different species of animals

Species	Dose at mg / Kg of body weight	
	Ketamine	Xylazine
Dogs	10 mg	3 mg
Cat	40 mg	-
Poultry	10 mg	-
Cattle	-	0.05 mg
Sheep	-	0.05 mg
Goat	-	0.05 mg

Histopathological protocol

Collected neoplastic samples were previously fixed in buffered 10% formalin. The specimens were grossed carefully at 0.5 cm thickness for tissue processing. Then, the samples were dehydrated in alcohol, cleared by xylol, infiltrated and embedded by host paraffin wax. After that, these tissue samples were sectioned at 6µm thickness and stained with routine Harris' Hematoxylin and alcoholic Eosin (HE), Masson's trichrome stain (MT), and Periodic Schiff's reagent stain (PA) (8).

Results

The total number of neoplastic cases that have been recorded during the study were 36 cases in different species of animals (Table 2). The prevalence of tumors incidence was in cattle 30.6%, sheep 22.2%, dog 19.4%, poultry 13.9%, cat 11.1, and in goat 2.8% (Figure 1). Depends on the results explained in table 3, the results showed that sixteen tumour type had been recorded in which either one type or more than one in each neoplastic case. The percentage of these tumours type was SCC 22.22%, fibroma 19.44, adenoma 13.89%, pulmonary adenomatosis and fibrosarcoma 11.11% each, leucosis and lymphoma 8.33% each, thymoma and VTT 2.78% each (Figure 2).

Squamous cell carcinoma

This type of tumour is recorded in eight cases in skin and vagina, mostly in cattle which characterized by the presence of keratin pearls. This structure is composed of the centric layer of keratin produced by neoplastic keratinocytes which present at the edge of these pearls. Also, it associated with the presence of collagen fibers, especially when a mixed type of fibroma related to squamous cell carcinoma (Figure 3).

Fibroma and fibrosarcoma

The fibroma is recorded in seven cases of skin while fibrosarcoma recorded in four cases. Fibroma characterized by presence polymorphic fibroblast that either spindled or oval shape presents in dens stroma of abundant collagen fibers. This tumor mass characterized by a few blood vessels supply with a complete absence of necrotic or degenerated tissue (Figure 4). On other hands, fibrosarcoma composed mainly from neoplastic fibroblast that arranged in a herringbone like patterns which give its diagnostic histological feature that known as cell nests. These neoplastic cells characterized by scant cytoplasm with active mitotic figures of an elongated nucleus. The neoplastic cells associated with moderate mucin deposit in affected tissue (Figure 5).

Adenoma

Adenoma was recorded in five cases in intestines, mainly this tumour present with heavy deposition of collagen fibers and major blood vessels. The affected epithelial cells lose their typical architectures and appear less cellular and maturation than other epithelial cells. These structures arranged either in the tube or villous or may be presently mixed of both types. The nucleus presents near the basement membrane of affected cells with scant cytoplasm that show at the edge of neoplastic cells (Figure 6).

Pulmonary adenomatosis

This type of tumor was recorded in four cases of sheep. The tumor cells characterized by hyperplastic proliferation of pneumocytes types II into cuboidal or columnar. This construction composed from collagen deposition with scattered infiltration of macrophages. The nucleus characterized by well-identified mitotic figures and positive reaction to Schiff's regent in the cytoplasm (Figure 7).

Lymphoid leucosis

It is recorded in three cases of domesticated back yard chickens. It characterized by the presence of uniform large neoplastic lymphoblast with the vacuolated nucleus, prominent mitotic figures, and poorly define cytoplasmic membrane. This tumor found in different organs included lung, heart, kidney, and bursa of Fabricius (Figure 8).

Lymphoma

This type of tumor was recorded in three cases. It showed polymorphic infiltration of lymphoblast in the skin, that diffusely present in the extracellular matrix of collagen fibers, with moderately basophilic cytoplasm. The nucleus is round or oval or vacuolated with basophilic nuclei (Figure 9).

Thymoma

It is recorded in one case of a rooster. This type of tumor is polymorphic lymphocytes that appear as oval or spindle in shape with scant cytoplasm of the ill-defined cytoplasmic membrane (Figure 10).

Venereal transmissible tumor

This transmissible tumor has been recorded in one case of the cat in vulva and vagina. The neoplastic features composed from large oval to round cells with a pleomorphic nucleus that showed active mitotic figures. The cytoplasm and its membrane are poorly defining and contained vacuoles in affected cells (Figure 11).

Table 2: Number and incidence of tumors in different species of animals

Species	Number	%
Cattle	11	30.6
Sheep	8	22.2
Dog	7	19.4
Poultry	5	13.9
Cat	4	11.1
Goat	1	2.8
Total	36	100

Table 3: Number and occurrence of each type of tumors in the study

Type	Number	%
SCC	8	22.22
Fibroma	7	19.44
Adenoma	5	13.89
PAM	4	11.11
Fibrosarcoma	4	11.11
Leucosis	3	8.33
Lymphoma	3	8.33
Thymoma	1	2.78
VTT	1	2.78
Total	36	100

Discussion

In this study, the total number of cases were attended to the VTH from October 2018-August 2019, that was diagnosed with a different type of neoplastic growth was thirty-six cases. The prevalence of these tumors in an other type of animals was in cattle 30.6%, in sheep 22.2%, in dog 19.7%, in poultry 13.9%, in cat 11.1%, and goat 2.8%. It has been confirmed that the most common tumor in Iraq where a cutaneous hemangiosarcoma sheep in Basra city (6). Furthermore, teratoma has been recorded in ovaries of cattle at Thi-Qar city (4).

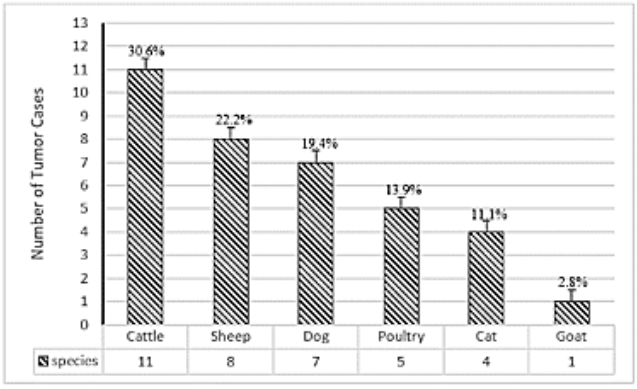

Figure 1: Occurrence of tumors related to animal species.

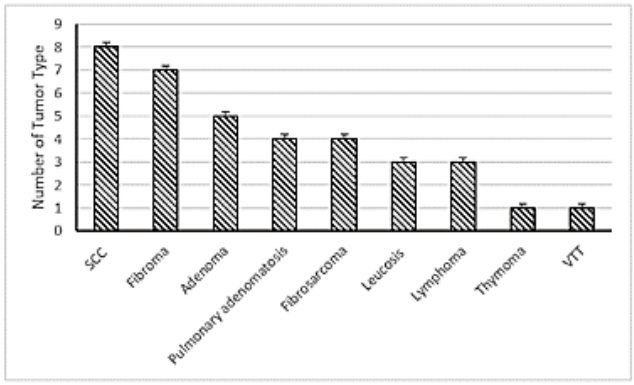

Figure 2: Prevalence of tumors according to neoplastic type.

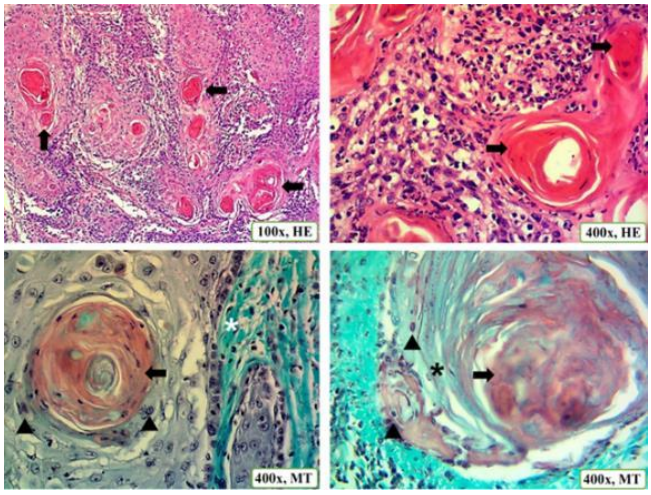

Figure 3: Squamous cell carcinoma, characterized by the presence of keratin pearls composed from centric layers of keratin (arrow), produced by neoplastic keratinocytes at the edge of these pearls (arrowhead), with deposition of collagen fibers (star).

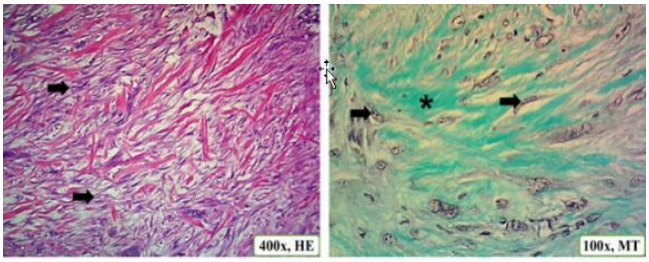

Figure 4: Fibroma, characterized by polymorphic fibroblast (arrow) with abundant collagen fibers (star).

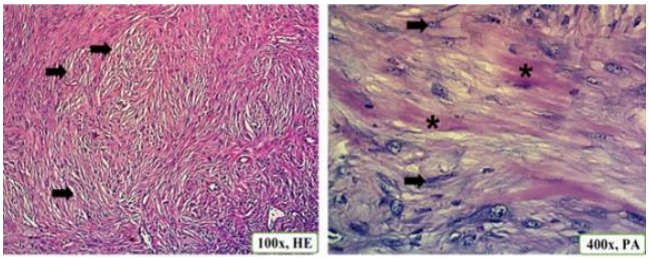

Figure 5: Fibrosarcoma, showed neoplastic fibroblast that arranged in a herringbone like patterns known as cell nests (arrow), associated with the positive reaction for Schiff's reagent due to presence of mucin deposit in affected tissue (star).

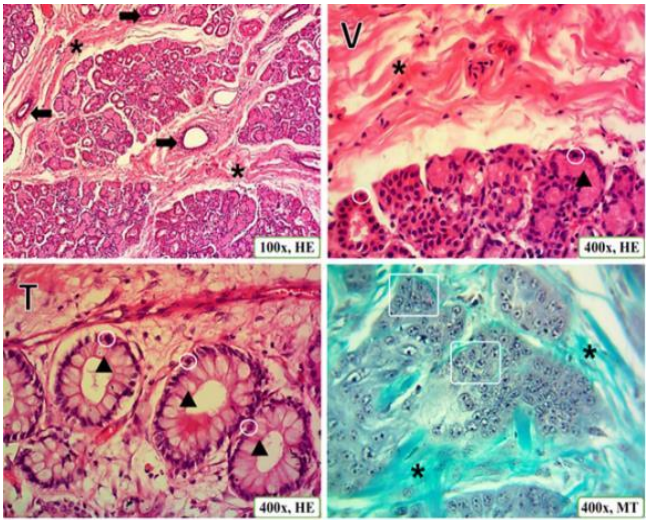

Figure 6: Adenoma, showed heavy deposition of collagen fibers (star), major blood vessels (arrow), tumor cell arranged in tubular (T) or villous shape (V), the nucleus present near the basement membrane (circle), active mitotic figure (rectangle), with scant cytoplasm that present at the edge of neoplastic cells (arrowhead).

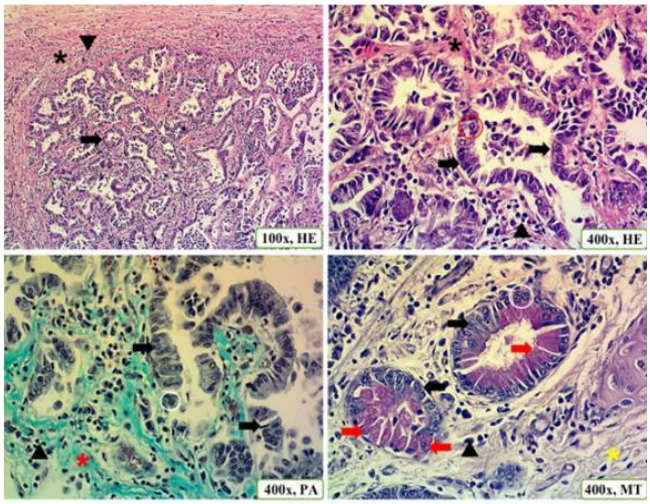

Figure 7: Pulmonary Adenocarcinoma, showed neoplastic proliferation of pneumocytes types II into cuboidal or columnar (arrow) with thick stroma composed from collagen deposition (star), with scattered infiltration of macrophages (arrowhead), the nucleus characterized by well-identified mitotic figures (circle). The cytoplasm showed a positive reaction to Schiff's regent (red arrow).

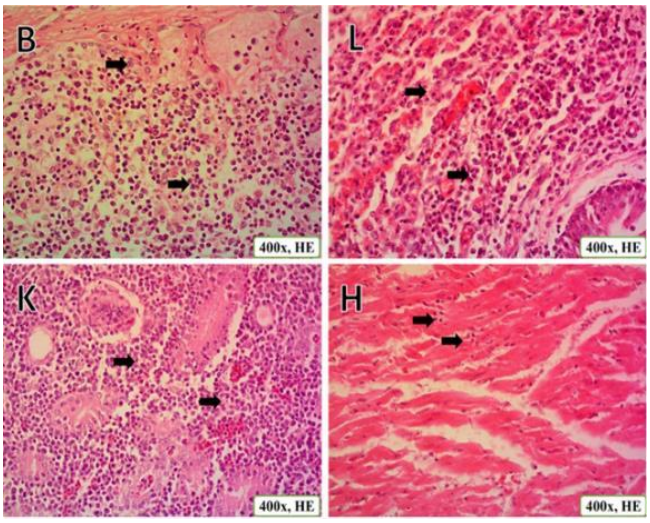

Figure 8: Lymphoid leucosis, showed this type of tumor characterized by the presence of uniform large neoplastic lymphoblast (arrow), in different organs included lung (L), heart (H), kidney (K), and bursa of Fabricius (B).

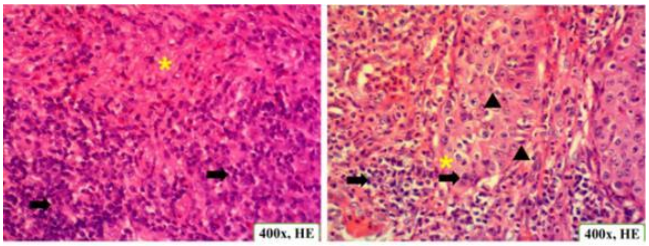

Figure 9: Lymphoma, showed polymorphic infiltration of lymphoblast in the skin (arrow), that diffusely present in the extracellular matrix of collagen fibers (star), with moderately basophilic cytoplasm (arrowhead).

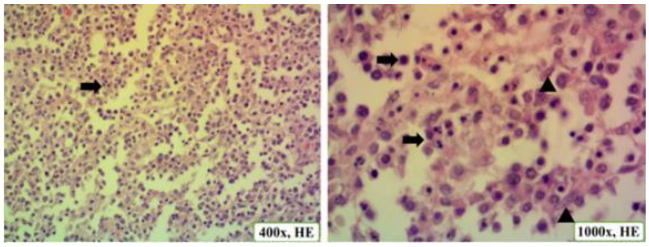

Figure 10: Thymoma, showed atypical pleomorphic lymphocytes that appear as oval (arrow) or spindle (arrowhead) in shape with scant cytoplasm of ill define cytoplasmic membrane.

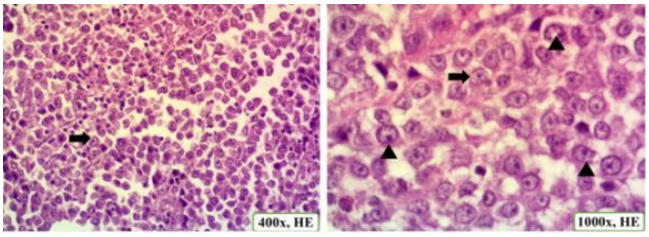

Figure 11: Venerable Transmissible Tumor, showed large oval to round neoplastic cells (arrow), basophilic nuclei, active mitotic figures in the nucleus, cytoplasm and its membrane is well defined and contained vacuoles in affected cells (arrowhead).

A case of gingival squamous cell carcinoma has been recorded by accident in ewe where it characterized by the presence of keratin pearls due to hyperplasia of neoplastic keratinocytes (3). A case of vaginal fibrosarcoma was described in a bitch aged ten years. These tumor mass diagnosed based on the presence of specific cell arrangement known as cell nests with hyperchromatic nuclei of well-differentiated fibroblasts (2).

A case of the mixed thymic tumor was designated in a rooster of a local breed that composed from squamous cell carcinomas due to presence of keratin pearls and well-differentiated thymoma and lipoma (5).

A case of diffuse lymphoma, leiomyoma, and VTT was diagnosed in vulvar and vaginal in dogs (9). In the current study, the high number of cases have been recorded in cattle. These may be due to dense breeding of bovine species in this area with decrease number of pet animals, the most common type of tumor has been detected as squamous cell carcinoma, this may be related to changes in the environment that initiate, promote and induct these tumors especially in skin of these animals (10).

The most common type of tumor recorded in this study was squamous cell carcinomas, the diagnosis of this type is depended upon the presence of keratin pearls that can be described as hyperplasia of keratinocytes with pleomorphism (11).

A fibroma and fibrosarcoma have been recorded in this study were diagnosed depended upon the presence of bizarre fibrocytes with polymorphism and normochromic nuclei in the dense stroma of whorls collagen fibers (12).

Adenoma was described in many cases, recorded depended upon metaplasia and dysplasia of epithelial cells into cuboidal to columnar with the presence of nucleus near the basement membrane (13).

Ovine pulmonary adenomatosis was recorded in sheep in the current study, the micromorphological appearance of this tumor described as a transformation of pulmonary epithelial cells into columnar cells which either embedded in dense collagen stroma or scant deposition of collagen fibers (14).

Lymphoid leucosis recorded mainly in backyard chickens described as a normal proliferation of large lymphocytes that infiltrated in many organs like muscles, lung, and kidney; these neoplastic lymphocytes are recorded with prominent mitotic figures (15).

Many cases of lymphoma were recorded mainly in the cat, where they described as massive infiltration of lymphocytes or lymphoblast of large size that diffusely invade the whole layers of skin (16).

Thymoma also a popular type of tumor in chickens especially that affect with lymph proliferative viruses as in case of Marek's diseases in chickens, this tumor composed from atypical polymorphic T lymphocytes with ill-defined borders and they characterized by large size with a nucleus in spindle shape (5).

Venereal transmissible tumor was found as a common type of tumor in Hawshar dogs (9). In contrast, in the current study, this tumor was recorded in cats, it is characterized in both species large cells which is either macrophages or monocytes that appears as round, oval or spindle in shape that arranged in cord or sheets with a poor differentiated cytoplasmic membrane that usually contained vacuoles (9).

Conclusion

In conclusion, the incidence of neoplastic tumor between domestic and pet animals is varied, and its types were wieldy

diverse from benign to malignant one that can be recurrent or even cause death in affect animals. Also, the result of the current study conducted that the high incidence of animal affected with tumor was cattle, and the tumor type was squamous cell carcinoma.

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Conflict of interest

The authors declare that there is no conflict of interest regarding publishing or funding of this article.

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دراسة مرضية للأورام المستأصلة جراحياً من الحيوانات الواردة إلى المستشفى التعليمي البيطري

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الخلاصة

هدفت الدراسة الحالية إلى التحري عن حدوث والتغيرات النسجية المرضية للأورام السرطانية في الأنواع الحيوانية المختلفة الواردة إلى المستشفى التعليمي البيطري التابع لكلية الطب البيطري، جامعة الموصل. تم جمع العينات من الحيوانات التي ظهرت عليها آفات ورمية مختلفة. أظهرت نتائج الدراسة الحالية أن العدد الكلي للآفات الورمية ٣٦ عينة، والتي تم ملاحظتها بنسب مختلفة ففي الأبقار ٣٠,٦%، الأغنام ٢٢,٢%، الكلاب ١٠,٤%، الدواجن ١٣,٩%، القطط ١١,١%، والماعز ٢,٨%. فضلا عن ذلك تم التعرف على نوعية هذه الأورام نسجياً والتي كانت سرطانة الخلية الحرشفية ٢٢,٢٢%، ورم الخلية الليفية الحميد ١٩,٤٤%، الورم الغدي ١٣,٨٩%، الورم الغداني الرئوي وورم الخلية الليفية الخبيثة ١١,١١%، ابيضاض الدم وورم الخلية اللمفية الحميد ٨,٣٣%، ورم الخلية التوثية الحميد والمرض التناسلي المنتقل ٢,٧٨%. نستنتج من الدراسة الحالية حدوث أنواع مختلفة من الأورام السرطانية والتي كانت ورمية خبيثة أو حميدة في طبيعتها في الأنواع الحيوانية المختلفة.