

Dept. of Surgery,
Fac. Vet. Med., Assiut University

**PREVALENT EXTERNAL NEOPLASMS
IN DONKEYS AND CATTLE**
(With 6 Tables and 24 Figures)

By

M. SEMIEKA AND M. MUBARAK*

*Dept. of Pathology, Fac. Vet. Med., Assiut University

الأورام السرطانية الخارجية الشائعة في الحمير والأبقار

محمد سميكه ، محمد مبارك

تم إجراء هذه الدراسة على ٧٥ حيوان (٤١ من الحمير و٣٤ من الأبقار) مصابة بأورام سرطانية خارجية. تم أخذ التاريخ المرضي وإجراء الفحص الكليني لكل حالة من الحالات وتم علاج معظم الحالات باستئصال الورم جراحياً. تم أخذ عينات من هذه الأورام وتم تجهيزها للفحص السيتولوجي. وقد أوضحت النتائج وجود أنواع متعددة من السرطانات الحميدة والخبيثة في الحيوانات المصابة. وأثبتت النتائج أيضاً أن العلاج الجراحي مرضى في معظم الحالات.

SUMMARY

The present study was carried out on 75 animals (41 donkeys and 34 cattle) affected with external neoplasms. In each, case history was taken and physical examination was made. Treatment of most cases was performed by surgical excision of the neoplasm. Samples were taken from the excised tissues, then prepared and examined histopathologically. The results indicated presence of varieties of both benign and malignant tumours affecting donkeys and cattle. The surgical treatment was satisfactory in most cases.

Key words: Tumours.

INTRODUCTION

A neoplasm can be defined as "an abnormal mass of tissue, the growth of which exceeds uncontrolled, in comparison to the normal tissue and persists in the same excess even after cessation of the stimuli which evoked the change". The neoplasm or tumour does not obey the

law of the normal tissue growth. The cells of a neoplasm continue to multiply indefinitely irrespective of any structural or functional requirements and form an ever increasing mass of the tissue of a particular kind (Tyagi and Singh, 1996).

There are two varieties of neoplasms, benign and malignant. The difference between them is important for diagnosis, treatment and prognosis.

The effects of neoplasms depend on the size, location, and tissue from which they originate. Some expanding tumours cause pressure on the neighbouring tissue and produce pressure atrophy.

The invading neoplastic cells cause destruction of the tissues, blood vessels and nerves. The surface of the tumours may ulcerate and subsequently become infected. The malignant neoplasms in most cases cause death of the host (White, 1992; Jean *et al.*, 1994; Tyagi and Singh, 1996 and McCrary *et al.*, 1998).

Skin neoplasms, common in animals, may arise from the epithelium, adnexia, derms vasculature and cells. There is a considerable variation in the prevalence of skin tumours and in the ratio of malignant to benign tumours (Jubb *et al.*, 1993 and Tyagi & Singh 1996).

Cutaneous fibromas, fibropapillomas, papillomas, sarcoids, lipomas, melanomas, myxomas, fibrous histiocytomas, fibrosarcomas, lymphosarcoma and squamous cell carcinoma have been recorded in animals (Dietz and Wicsner 1984; Misk *et al.*, 1984; Makady *et al.*, 1987; Fessler 1993; Jubb *et al.*, 1993; Misk *et al.*, 1994; Tyagi and Singh 1996; El-Seddawy and Abd-Elaal 1996; Basher *et al.* 1997; Guedes *et al.*, 1998 *et al.*; Mair 1998; Crocker and Rings 1998; Auer and Stick 1999 and McGavin *et al.*, 2001).

MATERIALS and METHODS

The present study was carried out on 75 clinical cases (41 donkeys and 34 cattle) affected with different types of external neoplasms. Animals were of both sexes and of different ages; ranged between 6 months and 15 years old. Some animals were presented to Assiut Veterinary teaching hospital and the others were diagnosed in Assiut and Sohag villages.

The general history was taken and a physical examination was made in each case. Size, shape and position of each neoplasm were recorded.

Surgical excision of the neoplasm either alone or with the affected organ was performed in most cases. Surgery was performed under the effect of tranquillizer (Rompun at a dose rate of 0.05mg / kg B.W. in cattle and combelen at a dose rate of 0.2mg/Kg. B.W. in donkeys) and local infiltration analgesia using xylocaine HCl 2%. Samples were taken from each excised tissue in neutral buffer formaline and prepared for histopathological examination.

Follow up for 6-12 month post surgery was performed in most cases.

RESULTS

Based on history, clinical finding and histopathological examination, various types of both benign and malignant tumours in donkeys and cattle were diagnosed and recorded in the present study (Tables 1- 6).

Table 1: Types of benign tumours recorded in donkeys and cattle.

Tumours	Animals		Total		
	Donkeys	Cattle	Male	Female	
Fibromas	4	6	3	5	18
Fibropapillomas	1	3	2	6	12
Papillomas	2	2	3	4	11
Sarcoid	2	7	-	-	9
Lipomas	1	2	-	2	5
Myxomas	-	2	-	2	4
Melanomas	-	-	-	1	1
Fibrous histiocytomas	-	-	-	1	1
Total	10	22	8	21	61

Table 2: Types of malignant tumours recorded in donkeys and cattle.

Tumour	Animals		Total		
	Donkeys	Cattle	Male	Female	
Squamous cell carcinoma	2	3	1	3	9
Lymphosarcoma	-	2	-	1	3
Fibrosarcoma	-	2	-	-	2
Total	2	7	1	4	14

Table 3: Percentage of benign and malignant tumours in donkeys and cattle.

Tumour	Animal		Donkeys		Cattle		Total	
	No.	%	No.	%	No.	%	No.	%
Benign	32	78.1	29	85.3	61	81.3		
Malignant	9	21.9	5	14.7	14	18.7		
Total	41	100	34	100	75	100		

No. = number of animals, and % = percentage

Table 4: Sex percentage of benign and malignant tumours in donkeys and cattle.

Tumour	Animal		Donkeys				Cattle			
			Benign		Malignant		Benign		Malignant	
	No.	%	No.	%	No.	%	No.	%	No.	%
Males	10	31.3	2	22.2	8	27.6	1	20		
Females	22	68.7	7	77.8	21	72.4	4	80		
Total	32	100	9	100	29	100	5	100		

No. = number of animals, and % = percentage

Table 5: Percentage of different types of benign tumours in donkeys and cattle.

Tumour	Animal		Donkeys		Cattle		Total	
	No.	%	No.	%	No.	%	No.	%
Fibromas	10	31.2	8	27.6	18	29.5		
Fibropapillomas	4	12.5	8	27.6	12	19.7		
Papillomas	4	12.5	7	24.2	11	18		
Sarcoids	9	28.1	-	-	9	14.8		
Lipomas	3	9.4	2	6.9	5	8.2		
Myxomas	2	6.3	2	6.9	4	6.6		
Melanomas	-	-	1	3.4	1	1.6		
Fibrous histiocytomas	-	-	1	3.4	1	1.6		
Total	32	100	29	100	61	100		

No. = number of animals, and % = percentage

Table 6: Percentage of different types of malignant tumours in donkeys and cattle.

Tumours	Donkeys		Cattle		Total	
	No.	%	No.	%	No.	%
Squamous cell carcinoma	5	55.6	4	80	9	64.3
Lymphosarcoma	2	22.2	1	20	3	21.4
Fibrosarcoma	2	22.2	-	-	2	14.3
Total	9	100	5	100	14	100

No. = number of animals, and % = percentage

A- BENIGN TUMOURS:

Out of 75 affected animals, benign tumours were diagnosed in 61 cases (32 donkeys and 29 cattle) including fibromas, fibropapillomas, papillomas, sarcoids, lipomas, myxomas, melanomas and fibrous histiocytomas.

1- Fibromas (Fig. 1 - 3):

In the present study, fibromas were diagnosed in 18 animals (10 donkeys and 8 cattle). History of the cases indicated slow growth of the fibromas. They were of different sizes varied from the size of pea to tennis ball. In 15 cases, fibromas were rounded while in 3 cases they were nodular or lobulated. In all cases fibromas were found non pedunculated except in one case affecting udder, in which the fibroma was pedunculated. In 16 cases fibromas were circumscribed while in 2 cases they appeared diffuse on the affected area specially those affecting metacarpal or metatarsal regions. By palpation, the fibromas were painless, uniformly hard and firm in 14 cases however they were soft in 4 cases. The cut surface of the fibroma was grayish - white and was poorly vascularized. Fibromas were located on the limbs (8 cases), the eyelids (3 cases), the head (2 cases), the neck (2 cases), the udder (2 cases) and on the abdominal wall (one case).

The histopathological examination revealed that the tumour consisted of connective tissue cells and a fibrilly intercellular substances. The fibers constituting the tumour mass are running in different directions to intersect each other.

Surgical excision of the circumscribed fibromas gave satisfactory results without recurrence during the follow up period. In cases of diffuse fibromas surgical excision was not practical.

2- Fibropapillomas (Fig. 4 & 5):

Fibropapillomas were diagnosed in 12 animal (4 donkeys and 8 cattle). They were formed slowly with different sizes and shapes. They varied in size from a small nodule to a large orange-like mass. They were rounded in 8 cases and nodular in 4 cases. They were single circumscribed in 9 cases and multiple diffused in 3 cases. Fibropapillomas were hard in consistency with intact skin except when exposed to trauma. They were seen affecting limbs (4 cases), head (3 cases), neck (2 cases), nose (one case), eyelids (one case) and udder (one case). Histopathologically the neoplasm is composed of proliferative epithelium, fibroblasts and collagen. Good primary healing without recurrence was obtained.

3- Papillomas (Fig. 6 - 8):

Papillomas were diagnosed in 11 animals (4 donkeys and 7 cattle). History of the cases indicated slow growth of papillomas. In donkeys papillomas were localized while in cattle they were either localised (5 cases) or generalised all over the body of the animal (2 cases). They were either single (2 cases) or multiple tumours (9 cases). Some papillomas were about the size of a pea, while others were as large as the man's head. They were hard in consistency and the skin was very often cracked and fissured so that the tumours appeared having an irregular surface resembling cauliflower or bunch of grapes. Papillomas might have a broad attachment (7 cases) or might be pedunculated (4 cases). The sites of papillomas were the limbs (3 cases), withers (2 cases), head (2 cases), nose (one case), lower lip (one case) and generalised form (2 cases). The histopathological examination showed papillary projections of epithelium over collagen core. Epithelium was thickened by hyperkeratosis and acanthosis. Surgical excision of localised papillomas (9 cases) gave satisfactory results without recurrence during the follow up period. In cases of generalised papillomas (2 cases) surgical excision was not practicable.

4- Sarcoids (Fig. 9):

Sarcoids were recorded in 9 donkeys. They were rounded in shape and either single (3 cases) or multiple (6 cases). Sarcoids were firm in consistency and some were pedunculated (2 cases) while others were non pedunculated (7 cases). Some sarcoids were moved freely under the skin (4 cases) but other sarcoids were adherent to the surrounding skin and underlying tissues (5 cases). In 7 cases, sarcoids were covered with intact skin while in 2 cases sarcoids were ulcerated.

They varied in size from a small nodule to a large orange-like mass. Sarcoids were recorded affecting the limbs (5 cases), head (3 cases) and abdominal wall (one case). The histopathological examination revealed that the tumour tissues are consisted of collagen fibers and fibroblasts. The neoplasm tissues were uniformly distributed without sharp demarcated edges. Surgical excision of the swelling with a considerable amount of normal surrounding tissues gave satisfactory results (6 cases). Recurrence was recorded in 3 cases within 4 months post surgery.

5- Lipomas (Fig 10):

Lipomas were diagnosed in 5 animals (3 donkeys and 2 cattle). They appeared as rounded localized well demarcated soft swelling with intact skin. The size of lipoma may reach the size of a tennis ball. They were either non pedunculated (4cases) or pedunculated (one case). Lipomas have been recorded on the limbs (2 cases), neck (one case), abdominal wall (one case) and on the ventral aspect of the base of the tail (one case). Histopathology revealed that the neoplasm contained well-differentiated adipocytes. Healing was obtained following surgical excision of lipomas without recurrence during follow up period which exceeded 12 month.

6- Myxomas (Fig. 11 & 12):

Myxomas were diagnosed in 4 animals (2 donkeys and 2 cattle). They varied in size from a small nodule to a large orange-like mass. The swellings were circumscribed, localized, hard in consistency with intact skin and broad attachment in all cases. They were located on the thorax (2 cases), neck (one case) and on the base of the ear (one case). The histopathological examination showed that the myxomatous cells have long cytoplasmic processes and prominent nuclei. Some of the cells are starry in shape. Satisfactory results were obtained following surgical excision of myxomas without complications or recurrence.

7- Melanomas (Fig. 13 & 14):

Melanoma was diagnosed only in an 8-year-old cow. History of the case indicated the presence of the swelling since one year. Melanoma appeared as localized, hard swelling with intact skin and broad attachment on the right abdominal wall. Histopathologically the dermal tissue was invaded by numerous melanin-bearing neoplastic cells. This melanotic tumour has indefinite outline. As in other types of benign tumours, good healing was obtained following excision of the melanoma without recurrence during the follow up period.

8- Fibrous histiocytoma (Fig. 15 & 16):

Fibrous histiocytoma was diagnosed only in a one-year-old cow. It appeared as several nodules of small size, rounded and oval in shape. They were scattered on the thoracic and abdominal wall as well as at the level of the tuber coxae. The nodules were soft in consistency and their surfaces were free from hair. Surgical interference was not performed in this case. One nodule was excised for histopathological examination which showed a sheet of large rounded to polyhedral cells (histiocytes) replacing the adnexia and collagen in the dermal tissue.

B- Malignant tumours:

Out of 75 animals, malignant tumours were recorded in 14 cases (9 donkeys and 5 cattle) including squamous cell carcinoma, lymphosarcoma & fibrosarcoma.

1- Squamous cell carcinoma (Fig. 17 - 20):

It was the most common malignant tumour recorded in the present study where it was diagnosed in 9 animals (5 donkeys and 4 cattle). History of the cases revealed the appearance of the lesion from several months. Squamous cell carcinoma appeared as ulcerated, raised nodular growths of variable sizes from 3 cm to more 15 cm. The growths were infiltrates and adhered to the skin with a broad base. The growths were in the form of a single mass (7 cases) or multiple growths (2 cases). In the present study squamous cell carcinoma were found affecting the eyes (5 cases), forehead (2 cases), neck (one case) and vulva (one case). Histopathology revealed that the neoplastic cells were arranged in a bird-nest like structures. The carcinomatous cells were differentiated to the inside of these structures. Cells towards the center have tendency for keratinization. The surrounding dermal tissue was infiltrated by mononuclear cells. Surgical excision of the growths affecting the eye and vulva was performed with satisfactory healing and without complications. However in case of those growths affecting the forehead and neck, the surgical excision caused a deficiency of skin and healing was occurred by second intention. Recurrence of squamous cell carcinoma was recorded in 2 cases during follow up period.

2- Lymphosarcomas (Fig. 21 & 22):

They were diagnosed in 3 animals (2 donkeys and one cattle) and were recorded affecting the orbital cavity in all cases. History indicated that the lesions appeared 3-5 months ago. Lymphosarcoma was seen as swelling bulging from the orbital cavity and including the upper and lower eyelids. The eyeball was difficult to be observed. Surgical

excision of the swelling and all of orbital contents revealed atrophied eyeball. Histopathology showed numerous metastatic cells invading the dermal tissues. The neoplastic cells were poorly differentiated. Satisfactory healing was obtained without recurrence during the follow up period.

3- Fibrosarcomas (Fig. 23 & 24):

Fibrosarcomas were diagnosed in 7 and 9 year-old she-donkeys. History of the cases revealed the appearance of the growths 9 months ago in one case and more than one year in the other one. In one case, fibrosarcoma was found as several nodules of varying size affecting the upper and lower eyelids resulting in complete closure of the palpebral fissure. In the second case, fibrosarcoma affected the face rostral to the medial canthus of the left eye and appeared as a single rounded ulcerated swelling about 5cm in diameter with broad attachment. Histopathologically, the tumour mass was composed of bundles of spindle cells which were densely aggregated. Nuclei of the neoplastic cells were hyperchromic and pleomorphic. Satisfactory healing was obtained in one case. Healing occurred by second intention in the second case.

DISCUSSION

The skin is the most common site for neoplasia in dogs, horses, cattle and cat (Jubb et al 1993). Neoplasm of the skin and subcutaneous tissue may be benign, semimalignant or malignant in nature (Dietz and Wiesner 1984). The incidence of neoplasm is variable, depending on geographical location, type of animal, interests of the pathologist, diagnostic criteria for classification of tumour types, and other ill-defined factors (Rooney and Robertson 1996).

In the present study, varieties of both benign and malignant tumours were recorded in donkeys and cattle including fibromas, fibropapillomas, papillomas, sarcoids, lipomas, myxomas, melanomas, histiocytomas, squamous cell carcinomas, lymphosarcomas and fibrosarcomas. The prevalency of benign tumours in donkeys and cattle (78.1% in donkeys & 85.3 % in cattle) was higher than malignant ones (21.9% in donkeys & 14.7% in cattle). Sex may play a role in the incidence of the neoplasm which observed more common in females than in males. Fibromas (29.5%), fibropapillomas (19.7%), papillomas (18%) and sarcoids (14.8%) were the most common benign tumours. However squamous cell carcinoma (64.3%) was the most common

malignant tumours diagnosed in the present study. These results were in agreement with that of Rooney and Robertson, (1996) who stated that, a variety of skin tumours have been seen but the commonest were fibromas, papillomas, sarcoids and squamous cell carcinomas. In the present study fibromas were more common in donkeys (31.2%) than cattle (27.6%) while fibropapillomas and papillomas were more common in cattle (27.6% and 24.2%) than donkeys (12.5% and 12.5%). This may be due to bovine papillomavirus which cause papillomas and fibropapillomas. Jubb et al 1993 stated that most papillomas are caused by infection with a host-and site-specific papillomavirus of the family papovaviridae. They added that at least six different papillomaviruses occur in cattle. Three (bovine papillomavirus types 1,2&5) cause cutaneous fibropapillomas, while the other three (types 3,4&6) cause papilloma of the skin. Dietz and Wiesner (1984) stated that the predilection sites of fibromas were the head, the eyelids, prepuce, the stifle fold, and the thigh while papillomas and fibropapillomas affected the nose, eyelids, lips, ear, the intermaxillary area and neck. In the present study fibromas were recorded affecting limbs, eyelids, head, neck, udder and abdominal wall. Fibropapillomas were recorded affecting head, neck, limbs, udder, nose and eyelids while papillomas were affecting nose, lower lip, head, wither and limbs. Generalized forms of papillomas all over the animal body were recorded in cattle but were not observed in donkeys.

Sarcoids are specific fibromas occurring in the horse (Oehme and Prier, 1974). In the present study sarcoids were recorded as one of the most common neoplasms (28.1%) in donkeys (Makady et al 1987, Mair et al 1998, Auer & Stick 1999 and McGavin et al 2001) while they were not recorded in cattle. McGavin *et al.* (2001) recorded 4 types of sarcoids including verrucous, fibroblastic, occult and mixed form. Based on clinical signs and histopathological examination fibroblastic sarcoid was the type recorded in the present study. In agreement with James & John (1996) and Mair *et al.* (1998) sarcoids were found affecting head, limbs and abdominal wall. Auer and Stick (1999) stated that approximately 50% of sarcoids treated by surgical excision alone recur within 6 months. Rooney and Robertson (1996) stated that recurrence of sarcoids following surgical resection is common and estimated at 30% - 50%. In the present study recurrence of sarcoids was recorded in three cases during the follow up period.

In the present study lipomas were recorded as a common benign tumour in donkeys (9.4%) but were less common in cattle (6.9%). Auer & Stick (1999) and McGavin *et al.* (2001) stated that lipomas were less common neoplasm in equine and cattle. The same authors recorded that the most common site of lipomas were the neck, thorax, limbs, eyelids and abdomen. In the present study, lipomas were found affecting limbs, neck, abdominal wall and the ventral aspect of the tail.

Myxoma is a fibroma in which the tumour cells have the stellate morphology of primitive mesenchymal cells (Jubb *et al.*, 1993). Myxomas were less frequent in the present study either in donkeys (6.3%) or in cattle (6.9%). They affected thorax, neck and base of the ear. McGavin *et al.* (2001) stated that myxoma was rare neoplasm in domestic animals and may be found at any location of the animal body.

Melanoma is a benign tumour of melanoblast. It was recorded only in cattle (3.4%) but it was not recorded in donkeys. Tyagi & Singh (1996) and Mair *et al.* (1998) stated that melanomas were mostly seen in dark cattle, buffaloes, sheep, goats and gray horses. Dietz & Wiesner (1984) found that the predilection sites of melanomas were tail near its root, perineal and perianal regions, on the head, on the ear margin and on the parotid region. In the present study melanoma was recorded on the abdominal wall.

Contrary with Jubb *et al.* 1993 who found that fibrous histiocytoma is a benign tumour affecting mainly dogs and cats, it was diagnosed in one cattle but not recorded in donkeys in the present study.

Squamous cell carcinoma was the common malignant neoplasm of the horse (Paterson 1997 and Mair *et al.* 1998), cattle and sheep (Misk *et al.* 1984 and tyagi & Singh 1996). In the present study squamous cell carcinomas were the most common type of malignant tumours affecting donkeys (55.6%) and cattle (80%). They were found affecting head, neck and vulva but the greatest number were affecting the eye. These results were in agreement with Tyagi & Singh (1996) who stated that ocular squamous cell carcinoma was the most common neoplasm in bovine. Except for the recurrence of squamous cell carcinoma that occurred in two cases, the surgical treatment was considered to be an effective treatment specially when the excision included the affected organ.

Lymphosarcoma was a malignant tumour arise from lymphatic tissue. Crocker and Rings (1998) found that lymphosarcoma was rare in

cattle and mainly affect prepheral lymph nodes, base of the heart, retrobulbar space, abomasum, uterus and spinal cord. Rooney and Robertson (1996) reported that lymphosarcoma was not rare in horses. In the present study lymphosarcomas were recorded in both donkeys (22.2%) and cattle (20%). They were found affecting the eye. Surgical excision of the neoplasm together with the affected content of the orbital cavity was considered the best treatment.

Fibrosarcoma was a malignant tumour of the fibrous connective tissue. It was rare in ruminant (Tyagi & Singh 1996). In the present study fibrosarcoma was found only in donkeys but was not recorded in cattle. As in cases of lymphosarcomas, surgical excision of fibrosarcoma was the best treatment without complications or recurrence.

Varieties of benign and malignant tumours and their differences in the percentage of occurrence in donkeys and cattle may be due to several factors were reported for the development of the neoplasms. These factors include genetic predisposition, sunlight radiation, x-rays radiation, ultraviolet rays, viruses, irritation caused by dust, sand, insects and radioactive chemicals (Tyagi & Singh 1996).

Diagnosis of the neoplasm was based on history of the case, clinical examination including location, size, shape and consistency of the neoplasm in addition to histopathological examination.

Surgical excision was the radical treatment in most cases affected with different types of benign neoplasms. In case of malignant neoplasms the results after surgical excision depend on the type and location of the tumour.

REFERENCES

- Auer, J.A. and Stick, J.A. (1999): Equine surgery. Second edition. W.B. Saunders Company. Philadelphia London Tokyo.166-173.
- Basher, A.W.P; Severin, G.A.; Chavkin, M.J. and Frank, A.A. (1997): Orbital neuroendocrine tumours in three horses. JAVMA , Vol.210 No. 5 March 1.668-671.
- Crocker, C.B. and Rings, D.M. (1998): Lymphosarcoma of the frontal sinus and nasal passage in a cow. JAVMA Vol.213 No.10 November 15. 1472-1474.

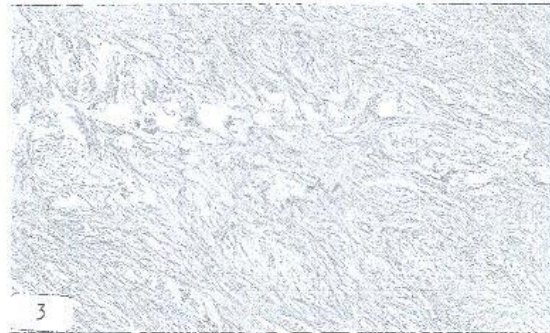
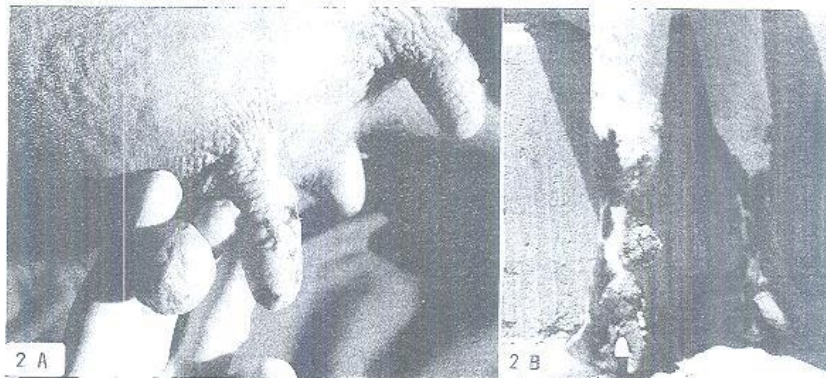
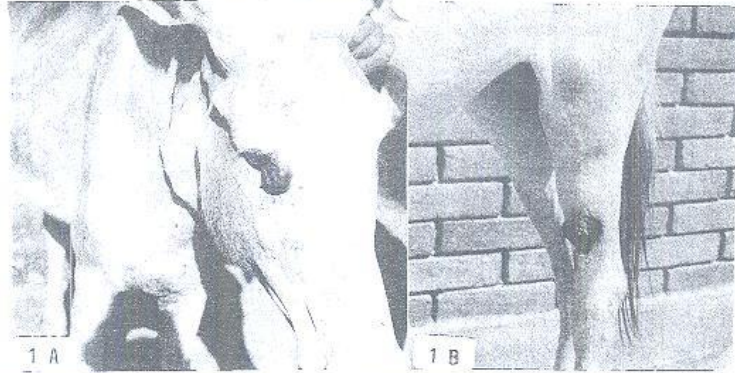
- Dietz, O. and Wiesner, E. (1984): Diseases of the horse. A handbook for science and practice part 2/1 S. Karger Basel Paris London. 22-31
- El-Seddawy, F.D. and Abd-El-Aal, A.M. (1996): Surgical management of some neoplasms in sheep in Sharkia Province with special reference to cryosurgical approach. Zag.J.ISSN (1110-1458) Vol. 24, No.1 pp 9-12.
- Fessler, J.F.; Faber, N.A.; Blevins, W.E and Coatney, R.W. (1993): Squamous cell carcinoma associated with a chronic wound in a horse. JAVMA Vol. 202 No.4 February 15. 615-616.
- Guedes, R.M.C.; Filho, E.J.F. and Lago, L.A. (1998): Mandibular lymphosarcoma in a goat. Veterinary record, 143, 51-52.
- Jean, D.; Lavoie, J.P.; Nunez, L.; Lagace, A. and Laverty, S. (1994): Cutaneous hemangiosarcoma with pulmonary metastasis in a horse. JAVMA Vol. 204, No5, March 1.776-778.
- Jubb, K.V.F.; Kennedy, P.C. and Palmer, N. (1993): Pathology of domestic animals. Fourth edition Volume I. Academic Press, INC London Sydney Tokyo.706-737.
- Mair, T.; Love, S.; Schumacher, J. and Watson, E. (1998): Equine Medicine, Surgery and reproduction. WB Saunders Company LTD London Philadelphia Tokyo.272-274.
- Makady, F.M.; Mahmoud, A.Z. and Youssef, H.A. (1987): Sarcoids in donkeys. Assiut Veterinary Medical Journal. Vol. 19, No. 37 161-171.
- McCrary, H.M.; Henry, C.J.; Potter, K.; Tyler, J.W. and Buss, M.S. (1998): Cutaneous mast cell tumours in cats: 32 cases (1991-1994). J. Am. Anim. Hosp. Assoc. 34: 281-284.
- Megavin, M.D.; Carlton, W.W. and Zachary, J.F. (2001): Thomson special veterinary pathology. Mosby London Philadelphia Sydney. 588-594.
- Misk, N.A.; Ismail, S.F.; Seleim, S.M. and Bayomi, A.H. (1994): A clinical aspect in the management of some tumours in donkeys (case report). Assiut Vet. Med. Journal. Vol. 31 No. 62.
- Misk, N.A.; Nigam, J.M. and Rifat, J.F. (1984): Surgical management of squamous cell carcinoma and papillomatosis in cattle and sheep. Veterinary Medical Review No.2 pp. 144-153.
- Oehme, F.W. and Prier, J.E. (1974): Textbook of large animal surgery. The williams and wilkins company. Baltimore. 193.

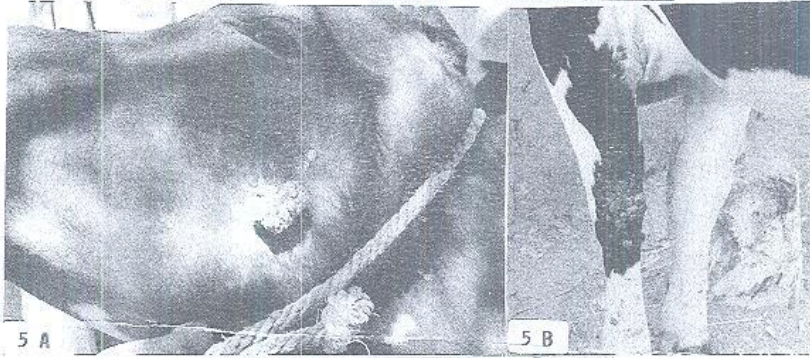
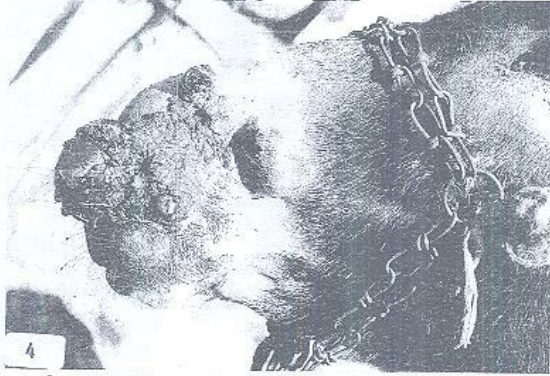
- Paterson, S. (1997): Treatment of superficial ulcerative squamous cell carcinoma in three horses with topical 5-fluorouracil. *Veterinary Record* 141, 626-628.
- Roony, J.R. and Robertson, J.L. (1996): *Equine Pathology*. Iowa state University press/AMES. 302-307.
- Tyagi, R.P.S. and Singh, J.I.T. (1996): *Ruminant surgery. A textbook of the surgical diseases of cattle, buffaloes, camels, sheep and goats*. CBS publishers and distributors. 412-424.
- White, R.A.S. (1992): Mandibulectomy and maxillectomy in the dog: Long term survival in 100 cases. *The European Journal of companion animal practice*. Vol. III (1): 53-57.

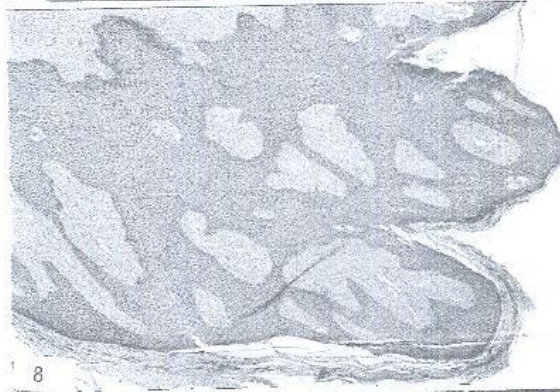
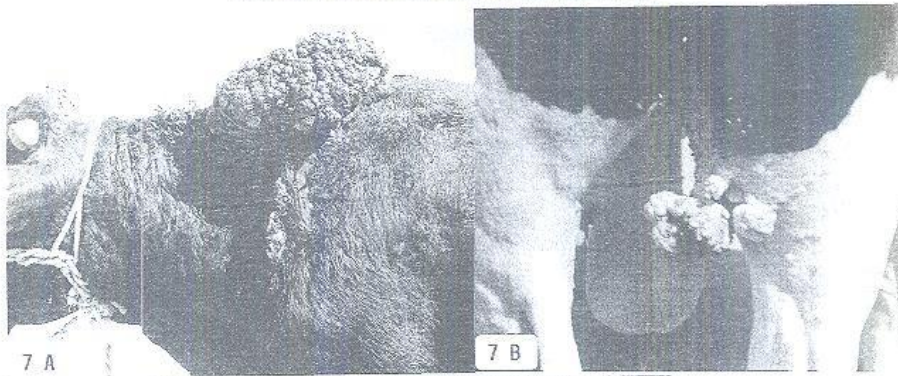
LEGENDS OF FIGURES

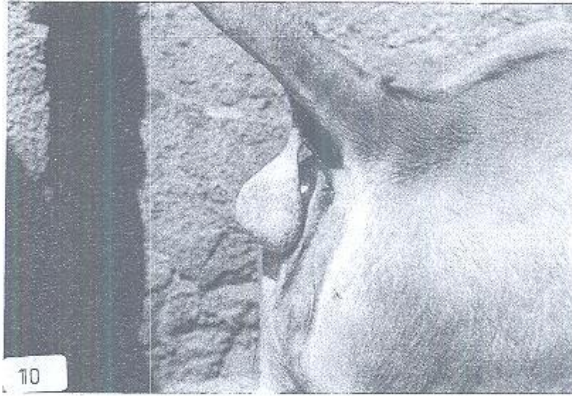
- Fig. 1: Fibromas on the right eye (A) and left hind limb (B) in a donkey.
- Fig. 2: Fibromas on the udder (A) and left metatarsal (B) in cattle.
- Fig. 3: Histologic view of a fibroma showing obliquely oriented fibers seen intersecting other parallel and perpendicular fibers. H&E. X100
- Fig. 4: Fibropapilloma at the nose in a donkey.
- Fig. 5: Fibropapillomas on the head (A) and left thoracic limb (B) in cattle.
- Fig. 6: Papilloma on the head in a donkey.
- Fig. 7: Papillomas on the wither (A) and right pelvic limb (B) in cattle.
- Fig. 8: Histologic view of a papilloma showing papillomatous outgrowths projecting from the skin. Note the marked acanthosis (stratum spinosum hyperplasia). H&E. X100.
- Fig. 9: Sarcoids on the head (A) and left thoracic limb (B) in donkeys.
- Fig. 10: Pedunculated lipoma on the ventral aspect of the base of the tail in cattle.
- Fig. 11: Myxoma near the base of the right ear in cattle.
- Fig. 12: Histologic view of a myxoma showing myxomatous cells have long cytoplasmic processes and prominent nuclei. H&E. X400

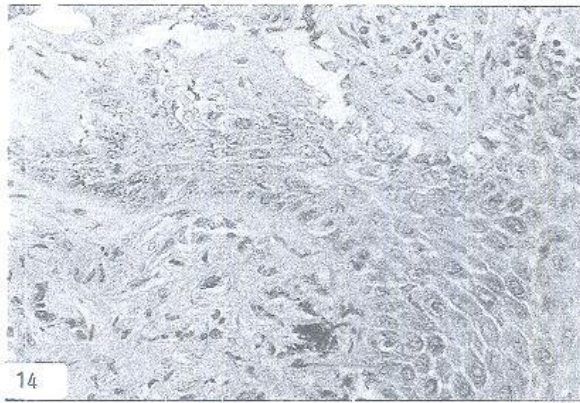
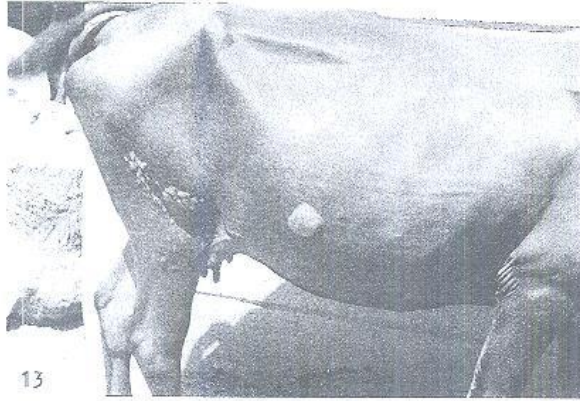
- Fig. 13: Melanoma on the right abdominal wall of a cow.
- Fig. 14: Histologic view of a melanoma showing numerous melanin-bearing neoplastic cells. H&E. X400.
- Fig. 15: Histocytoma in a cow.
- Fig. 16: Histologic view of a histocytoma showing sheet of large rounded to polyhedral cells (histocytes). H&E. X400.
- Fig. 17: Squamous cell carcinoma at the right eye of a donkey.
- Fig. 18: Squamous cell carcinoma at the neck of a donkey.
- Fig. 19: Squamous cell carcinoma at the right eye of a cow.
- Fig. 20: Histologic view of squamous cell carcinoma showing keratinization at the central part of the bird-nest like structures. The invading carcinomatous cells were differentiated to give this characteristic appearance. H&E. X400.
- Fig. 21: Lymphosarcoma at the left eye in a donkey.
- Fig. 22: Histologic view of a lymphosarcoma showing numerous neoplastic cells invading the dermal tissue. H&E. X400.
- Fig. 23: Fibrosarcoma in a donkey.
- Fig. 24: Histologic view of fibrosarcoma showing bundles of spindle cells which are densely aggregated. H&E. X400.

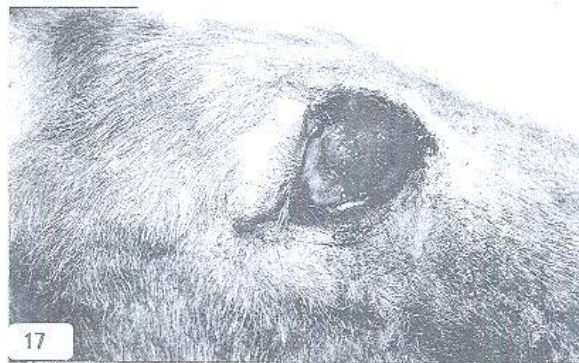


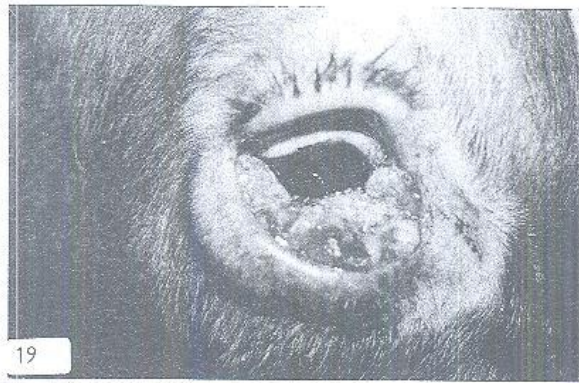




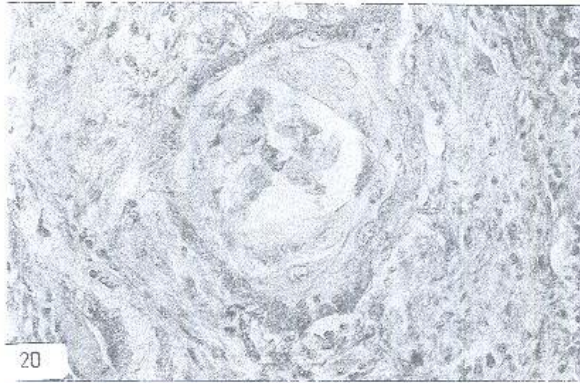




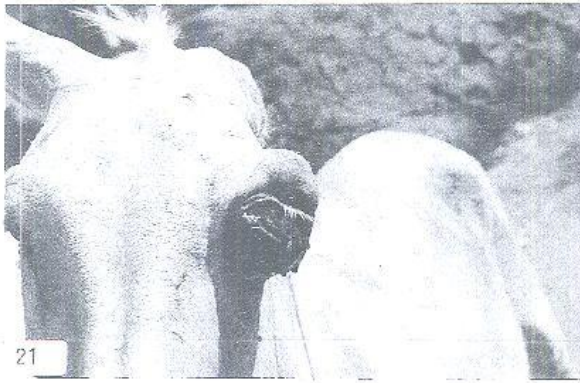




19



20



21

