HISTOPATHOLOGY IN VETERINARY DERMATOLOGY: HISTORICAL RECORDS OF THIRTY YEARS OF DIAGNOSIS AT THE DEPARTMENT OF PATHOLOGY OF BOTUCATU MEDICAL SCHOOL, UNESP (1977-2007)

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ABSTRACT

The aim of the present study is to report all histopathological exams in veterinary dermatology performed during the period of 1977 to 2007 at the Department of Pathology of Botucatu Medical School, UNESP, in partnership with the Veterinary Medicine School and private veterinary clinicians. During this period, 1,534 cases were examined and the results were grouped and presented according to origin, species, breed, age, gender, annual distribution, anatomical localization of lesions and disease category (allergic, neoplastic tumors, non-neoplastic tumors, bacterial, fungal, immune-mediated, parasitic, endocrine, keratinization defects, psychogenic, acquired alopecias, genodermatosis, nutritional and miscellaneous). The results of this study evidenced that, in most cases, the establishment of a precise diagnosis is impaired due to missing information in exam requisition forms or errors in material collection and that standardization of these procedures is fundamental for reliable results.

Keywords: veterinary dermatology, histopathology, diagnosis.

A HISTOPATOLOGIA NA DERMATOLOGIA VETERINÁRIA: LEVANTAMENTO HISTÓRICO DE TRINTA ANOS DE DIAGNÓSTICO NO DEPARTAMENTO DE PATOLOGIA DA FACULDADE DE MEDICINA DA UNESP (1977-2007)

RESUMO

O objetivo do presente trabalho foi fazer um levantamento de todos os exames histopatológicos em dermatologia veterinária realizados entre 1977 e 2007 no Departamento de Patologia da Faculdade de Medicina de Botucatu, em parceria com a Faculdade de Medicina Veterinária da UNESP e clínicos veterinários particulares. Durante este período, 1534 casos foram examinados e os resultados foram agrupados e apresentados de acordo com a origem, espécie, raça, idade, sexo, distribuição anual, localização anatômica das lesões e categoria da doença (alérgica, neoplásica, tumores não-neoplásicos, bacterianas, fúngicas, imunomediadas, parasíticas, endócrinas, defeitos de queratinização, psicogênicas, alopecias adquiridas, genodermatose, nutricionais e miscelânea). Os resultados do presente estudo evidenciaram que, na maioria dos casos, a impossibilidade de se estabelecer um diagnóstico

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preciso é devida a erros no preenchimento das requisições ou na colheita de material e que a padronização destes procedimentos é fundamental para assegurar resultados confiáveis.

Palavras-chave: dermatologia veterinária, histopatologia, diagnóstico.

HISTOPATOLOGÍA EN DERMATOLOGÍA VETERINARIA: ARCHIVOS HISTÓRICOS DE TREINTA AÑOS DE DIAGNÓSTICO DEL DEPARTAMENTO DE PATOLOGÍA DE LA FACULTAD DE MEDICINA DE BOTUCATU, UNESP (1977-2007)

RESUMEN

El objetivo del presente estudio fue hacer un levantamiento de todos los exámenes histopatológicos en dermatología veterinaria llevados a cabo entre 1997 y 2007 en el Departamento de Patología de la Facultad de Medicina, UNESP, en conjunto con la Facultad de Medicina Veterinaria y Zootecnia así como por clínicos veterinarios particulares. Durante dicho período fueron examinados 1534 casos y los resultados fueron agrupados y presentados de conformidad con origen, especie, raza, edad, género, distribución anual, localización anatómica de las lesiones y categoría de la enfermedad (alérgica, tumoral neoplásica, tumoral no neoplásica, bacteriana, fúngica, inmunomediada, parasitaria, endocrina, defecto en la queratinización, psicogénica, alopecias adquiridas, genodermatosis, nutricional y miscelánea). Los resultados del presente estudio hicieron evidente que, en la mayoría de los casos, la imposibilidad para realizar un diagnóstico preciso se debe a errores en el llenado de las requisiciones o en la colección del material y que la estandarización de los procedimientos antes mencionados es fundamental para garantizar resultados confiables.

Palabras clave: dermatología veterinaria, histopatología, diagnóstico.

INTRODUCTION

Previous reports have shown that dermatopathies represent a great part of the cases attended at companion animals' medical centers[1,2], which may be partially explained by the repulsive clinical appearance of some cases[3]. Specific training and continuing education of veterinarians in dermatology, as well as improvement and accuracy of diagnostic techniques and involved procedures are therefore extremely important.

Histopathology is widely used in dermatology and is referred to as one of the most significant diagnostic tools[4], once an abstract of anamnesis, physical examination and clinical suspicions has been given to the pathologist[5-7]. Samples should be preferentially obtained from primary lesions, which are considered more representative due to direct evolution of the primary process[3]. In order to enhance the chances of successful diagnosis, as many fragments as possible should be obtained[4].

Dermatopathies may be classified into inflammatory, dysplastic, degenerative, neoplastic tumors or non-neoplastic tumors, according to histological alterations observed during dermatopathological examination[8].

In a recent report, Werner[9] listed the main dermatohistopathological patterns found in different diseases, including spongiotic, intra-epidermic pustular, interface, perivascular, lichenoid, nodular/difuse dermatitis and pustular foliculites, among others, demonstrating the specificity of dermatopathology.

Data obtained from veterinary hospitals in North America by Sischo et al.[10], have shown that the most frequent dermatological diseases were, in a decreasing order, flea bite

allergic dermatitis, skin neoplasia, bacterial piodermitis, seborrhea, allergies, demodicosis, scabies, immune mediated dermatosis, endocrine dermatosis and acral lick dermatitis.

Machado, Apelt and Ferreiro[11], observed in a period of one year (2000-2001) the occurrence of 28.4% insect bite allergic dermatitis, 12.8% other allergic dermatitis and 7.6% scabies. Meneses et al.[12] reported that the main dermatological diseases of dogs and cats are bacterial diseases, parasitic diseases and fungal diseases, in decreasing order of occurrence.

In a Japanese case study, Nagata and Sakai[13] reported bacterial, immuno-mediated and endocrine diseases in decreasing order as the most frequent dermatopathies in veterinary practice. In Canada, however, the immuno-mediated diseases have been described as the most frequent, followed by bacterial and endocrine diseases[14].

The aim of the present study is to report the history of 30 years of histopathological examination in veterinary dermatology resulting from the partnership between the Medical and Veterinary Medicine Schools of São Paulo State University – UNESP – Botucatu – Brazil, as well as the partnership between these institutions and private veterinarians.

MATERIALS AND METHODS

All registered data from veterinary histopathological exams processed by the Department of Pathology of Botucatu Medical School, UNESP - Brazil from 1977 until 2007 were analyzed, with a total of 1,534 cases during those 30 years. When requisitions of exams from cases attended to at the Veterinary Hospital of UNESP – Botucatu were not completely filled out, clinical reports were examined in order to obtain missing information. In cases from other facilities this procedure was not possible.

All exams were processed according to standard procedures of fixation, inclusion, slicing, and staining in hematoxilin-eosin and/or other according to clinical suspicions[15].

Data were grouped according to origin, species, breed, age, sex, annual distribution, anatomical localization of lesions or disease category, and were presented as describing absolute or relative number of cases.

RESULTS

Some of the 1,534 cases had more than one fragment examined, thus from 1,970 fragments analyzed, there were 1,599 diagnostic results, demonstrating that some of those animals presented two or more associated diseases. Data are grouped and presented below.

Origin

From 1,534 total cases, 855 (55.7%) were collected at the Veterinary School of UNESP Botucatu, while 679 (44.3%) came from external facilities. The majority of animals (78.3%) were located in São Paulo State (the same region of the Laboratory), but 13.9% of the cases came from distant places, including one case from Portugal. Some of the cases (123) were lacking origin information.

Species

Fragments were obtained from different species of domestic and wild animals, being 1,362 (88.8%) canine, 103 (6.7%) feline, 44 (2.9%) equine, 9 (0.6%) bovine, 2 (0.2%) ovine, 2 (0.2%) swine and 1 animal of each of the following species (0.1% each): mule, snake, rabbit and parrot; 8 (0.5%) fragments were lacking species information.

Breeds

Among canine exams, 21% were from mongrel dogs and 16.5% did not refer to breed in the requisition. From 851 dogs of defined breeds, the most frequent breeds were: Poodle (12.3%), Boxer (9.6%), German Shepherd (9.4%), Akita (6.9%), English Cocker Spaniel (5.6%), Rottweiler (4.9%), Brazilian Terrier (3.9%), Labrador Retriever (3.4%), Teckel (3.2%), Doberman (2.8%), Pinscher (2,8%), Fila Brasileiro (2.7%), American Pit Bull (2.5%), Dalmatian (2.1%), Great Dane (2.0%). Other breeds with lower incidence were: Yorkshire Terrier, Lhasa Apso, English Pointer, Miniature Schnauzer, Siberian Husky, Collie, Weimaraner, Beagle, Bull Terrier, Mastiff, Belgian Shepherd, Sharpei, Basset Hound, English Bulldog, Dogo Argentino, Fox Terrier, Maltese, English Setter, Irish Setter, Chow Chow, Saint Bernard, Border Collie, Pekingese, Shih Tzu, American Cocker Spaniel, Australian Cattle Dog, Pug, Scottish Terrier, Shiba-inn, West Highland White Terrier, Afganhound, Bernese Mountain Dog, Bracco Italiano, American Bulldog, French Bulldog, Golden Retriever, Neapolitan Mastiff, White Shepherd, Saluki, Sheepdog, Spitz and Newfoundland.

Among feline exams, 58.7% were from mongrel cats and 14.4% did not refer to breed. The other fragments were from two breeds: 71.4% Siamese and 28.6% Persian.

Among equine exams, 51.1% were lacking breed information and 13.3% were mongrel horses. The others were Brazilian Sport Horse (20%), Thoroughbred (20%), American Quarter Horse (20%), Arabian (13.3%), Anglo-Arabian (13.3%), Criollo (6.7%) and Mangalarga (6.7%).

Among bovine exams, 44.4% did not refer to breed and the others were from Holstein (60%) and Nelore (40%) animals.

The two ovine exams were from Île de France and Romney Marsh animals. The exams from parrot, swine, snake and rabbit did not refer to breed.

Age

Age was not provided in 105 exams (6.8%) and, among those with age provided, cows varied from 2 to 84 months (average 25.4 months), dogs varied from 1 to 294 months (average 62.2), horses varied from 24 to 252 months (average 99.4 months), cats varied from 3 to 246 months (average 64.8 months). There was not enough data from the remaining species for evaluation.

Gender

In all species, except bovine, there were similar proportions of fragments from male and female animals. Among bovine, a higher proportion of female was observed, probably accompanying herd distribution.

Annual Distribution

The number of cases examined per year increased along the thirty years evaluated, as shown in Figure 1.
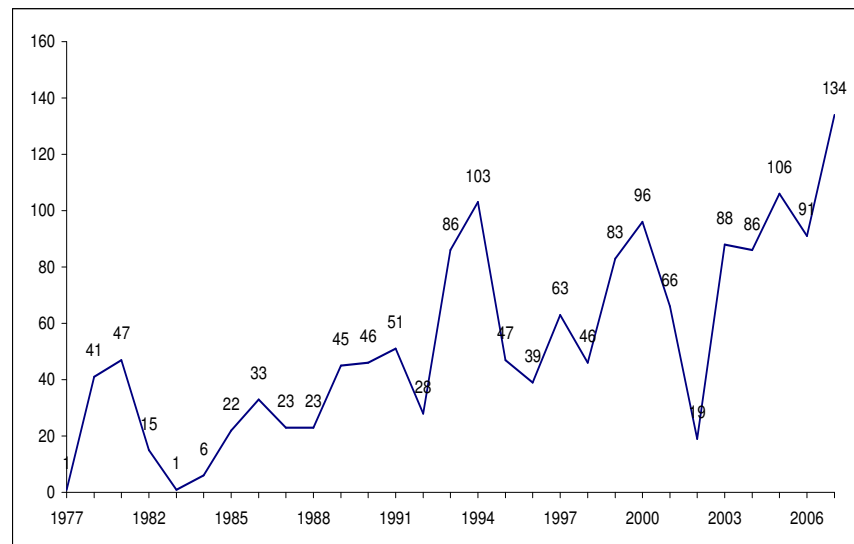
Figure 1. Annual distribution of veterinary histopathological exams performed by the Department of Pathology of the Medicine School of Unesp – Botucatu from 1977 to 2007.

Disease category

The 1,599 diagnoses were grouped and presented in Table 1 according to the classification adopted by Scott et al[1] (Figure 2). In percent values, both the total number of diagnoses and the number of diagnoses in the category are considered.

Table 1. Number of histopathological diagnoses of veterinary fragments examined from 1977 to 2007, grouped according to disease category.

Diseases	Number of diagnoses	% Category	% Total
Allergic skin diseases	**410**	**100**	**25,6**
Non-specific allergic dermatitis	337	82,2	21,1
Atopic dermatitis	29	7,1	1.8
Canine flea allergic dermatitis	13	3,2	0.8
Allergic contact dermatitis	10	2,4	0.6
Eosinophylic folicullitis	8	2,0	0.5
Feline allergic military dermatitis	4	1,0	0.3
Urticaria	4	1,0	0.3
Food allergy	3	0,7	0.2
Culicoides hypersensitivity	1	0,2	0.1
Insect bite hypersensitivity	1	0,2	0.1
Neoplastic Tumors	**370**	**100**	**23,1**
Mammary	63	17,0	**3,9**
Mast Cell Tumor	43	11,6	**2,7**
Non-epitheliotropic lymphoma	43	11,6	**2,7**
Squamous cell carcinoma	36	9,7	**2,3**
Soft tissue sarcoma	29	7,8	**1,8**

continues

Table 1 (*continued*)

Histiocytoma	23	6,2	**1,4**
Actinic keratosis	22	5,9	**1,4**
Hemangioma	14	3,8	**0,9**
Perianal gland adenoma	11	3,0	**0,7**
Melanoma	10	2,7	**0,6**
Round cell tumors	7	1,9	**0,4**
Lipoma	7	1,9	**0,4**
Melanocytoma	7	1,9	**0,4**
Fibroma	6	1,6	**0,4**
Epitheliotropic lymphoma	5	1,4	**0,3**
Transmissible venereal tumor	5	1,4	**0,3**
Fibrosarcoma	4	1,1	**0,3**
Squamous papilloma	4	1,1	**0,3**
Basal cell carcinoma	3	0,8	**0,2**
Haemangioendothelioma	3	0,8	**0,2**
Sebaceous adenoma	3	0,8	**0,2**
Squamous cell carcinoma in situ	3	0,8	**0,2**
Apocrine glands carcinoma (anal sac)	2	0,5	**0,1**
Cutaneous histiocytosis	2	0,5	**0,1**
Pilomatricoma	2	0,5	**0,1**
Plasma cell tumor	2	0,5	**0,1**
Angiomixoma	1	0,3	**0,1**
Angiolipoma	1	0,3	**0,1**
Complex mixed apocrine carcinoma	1	0,3	**0,1**
Ceruminous adenoma	1	0,3	**0,1**
Lymphangioma	1	0,3	**0,1**
Equine Sarcoid	1	0,3	**0,1**
Sebaceous carcinoma	1	0,3	**0,1**
Trichoblastoma	1	0,3	**0,1**
Trichoepithelioma	1	0,3	**0,1**
Papilloma	1	0,3	**0,1**
Apocrine adenoma	1	0,3	**0,1**
Bacterial skin diseases	**214**	**100**	**13,4**
Superficial pyoderma	69	32,2	**4,3**
Deep pyodermas	62	29,0	**3,9**
Folliculitis	26	12,1	**1,6**
Pododermatitis	14	6,5	**0,9**
Mycobacterial granuloma	10	4,7	**0,6**
Callus pyoderma	5	2,3	**0,3**
Impetigo	5	2,3	**0,3**
Abscesses	5	2,3	**0,3**
Perifolliculitis	5	2,3	**0,3**
Pyogranuloma	5	2,3	**0,3**
Nocardiosis	2	0,9	**0,1**
Necrotizing fasciitis	2	0,9	**0,1**
Cutaneous pyogranuloma	1	0,5	**0,1**

Table 1 (*continued*)

Dermatophylosis	1	0,5	**0,1**
Furunculosis	1	0,5	**0,1**
Piogranulomatous dermatitis	1	0,5	**0,1**
Immune-mediated skin diseases	**119**	**100**	**7,4**
Lupus erythematosus	61	51,3	**3,8**
Pemphigus foliaceus	19	16,0	**1,2**
Interface dermatitis	9	7,6	**0,6**
Uveodermatologic syndrome	8	6,7	**0,5**
Erythema multiforme	6	5,0	**0,4**
Necrotizing diseases	4	3,4	**0,3**
Pemphigus vulgaris	3	2,5	**0,2**
Cutaneous adverse drug reaction	3	2,5	**0,2**
Lupus erythematosus discoid	2	1,7	**0,1**
Vasculitis	2	1,7	**0,1**
Bullous pemphigoid	1	0,8	**0,1**
Leukocytoclastic vasculitis	1	0,8	**0,1**
Parasitic skin diseases	**107**	**100**	**6,7**
Demodicidosis	60	56,1	**3,8**
Leishmaniasis	21	19,6	**1,3**
Habronema dermatitis	10	9,3	**0,6**
Canine scabies	5	4,7	**0,3**
Cutaneous dirofilariasis	5	4,7	**0,3**
Ancylostoma dermatitis	3	2,8	**0,2**
Loxosceles dermatitis	1	0,9	**0,1**
Feline scabies	1	0,9	**0,1**
Pelodera dermatitis	1	0,9	**0,1**
Miscellaneous skin diseases	**100**	**100**	**6,3**
Normal skin	6	6,0	**0,4**
Fibrosis	13	13,0	**0,8**
Eosinophilic granuloma	11	11,0	**0,7**
Color dilution Alopecia	7	7,0	**0,4**
Eosinophilic ulcer	6	6,0	**0,4**
Hypermelanosis	5	5,0	**0,3**
Sterile pyogranuloma	5	5,0	**0,3**
Ulcerative dermatitis	5	5,0	**0,3**
Sebaceous adenitis	5	5,0	**0,3**
Panicullitis	5	5,0	**0,3**
Follicular atrophy	4	4,0	**0,3**
Pyotraumatic dermatitis	4	4,0	**0,3**
Vitiligo	3	3,0	**0,2**
Photosensibilisation	3	3,0	**0,2**
Lipomatosis	3	3,0	**0,2**
Neutrophylic vasculitis	3	3,0	**0,2**
Equine linear alopecia	2	2,0	**0,1**
Eosinophilic plaque	2	2,0	**0,1**
Lupoid onychitis	2	2,0	**0,1**

Table 1 (*continued*)

Lymphadenitis	2	2,0	**0,1**
Alopecia-X	1	1,0	**0,1**
Scleroderma	1	1,0	**0,1**
Paronychia	1	1,0	**0,1**
Autolysis material	1	1,0	**0,1**
Endocrine Metabolic skin diseases	**71**	**100**	**4,4**
Non specific endocrine diseases	23	32,4	**1,4**
Hypothyroidism	18	25,4	**1,1**
Hyperadrenocorticism	15	21,1	**0,9**
Non specific sex hormonal dermatosis	7	9,9	**0,4**
Necrolytic migratory erythema	4	5,6	**0,3**
Hyperestrogenism	2	2,8	**0,1**
Dermatitis responsive to castration	1	1,4	**0,1**
Superficial necrolytic dermatitis	1	1,4	**0,1**
Fungal skin diseases	**50**	**100**	**3,1**
Dermatophytosis	27	54,0	**1,7**
Sporotrichosis	10	20,0	**0,6**
Malassezia dermatitis	4	8,0	**0,3**
Cryptococcosis	3	6,0	**0,2**
Hyalohyphomycosis	1	2,0	**0,1**
Hystoplasmosis	1	2,0	**0,1**
Onychomycosis	1	2,0	**0,1**
Phaeohyphomycosis	1	2,0	**0,1**
Equine Phycomycosis	1	2,0	**0,1**
Pythiosis	1	2,0	**0,1**
Non-neoplastic tumors	**46**	**100**	**2,9**
Infundibular cyst	14	30,4	**0,9**
Nodular sebaceous hyperplasia	9	19,6	**0,6**
Calcinosis cutis	5	10,9	**0,3**
Nevus colagenous	3	6,5	**0,2**
Cutaneous papillomatosis	3	6,5	**0,2**
Lipomatosis	3	6,5	**0,2**
Fibroepithelial polyp	2	4,3	**0,1**
Apocrine cyst	2	4,3	**0,1**
Cutaneous histiocytosis	2	4,3	**0,1**
Cutaneous inverted papilloma	1	2,2	**0,1**
Nodular perianal gland hyperplasia	1	2,2	**0,1**
Cutaneous lymphocitosis	1	2,2	**0,1**
Keratinization defects	**46**	**100**	**2,9**
Seborrheic dermatitis	41	89,1	**2,6**
Zinc-responsive dermatosis	4	8,7	**0,3**
Vitamin A-responsive dermatitis	1	2,2	**0,1**
Psychogenic skin diseases	**24**	**100**	**1,5**
Acral lick dermatitis	19	79,2	**1,2**
Feline psychogenic alopecia	5	20,8	**0,3**

Table 1 (*continued*)

Acquired alopecias	**19**	**100**	**1,2**
Follicular dysplasia	6	31,6	**0,4**
Injection reaction	4	21,1	**0,3**
Postvaccinal alopecia	4	21,1	**0,3**
Acquired pattern alopecia	3	15,8	**0,2**
Postclipping alopecia	1	5,3	**0,1**
Seasonal flank alopecia	1	5,3	**0,1**
Genodermatosis	**8**	**100**	**0,5**
Acanthosis nigricans	4	50	**0,3**
Canine dermatomyositis	1	12,5	**0,1**
Congenital hypotrichosis	1	12,5	**0,1**
Lymphoedema	1	12,5	**0,1**
Ehlers-danlos syndrome	1	12,5	**0,1**
Nutritional skin diseases	**1**	**100**	**0,1**
Generic dog food dermatosis	1	100	**0,1**
Others	**14**	**100**	**0,9**
Inconclusive	10	71,4	**0,6**
Biopsy inadequate	4	28,6	**0,3**
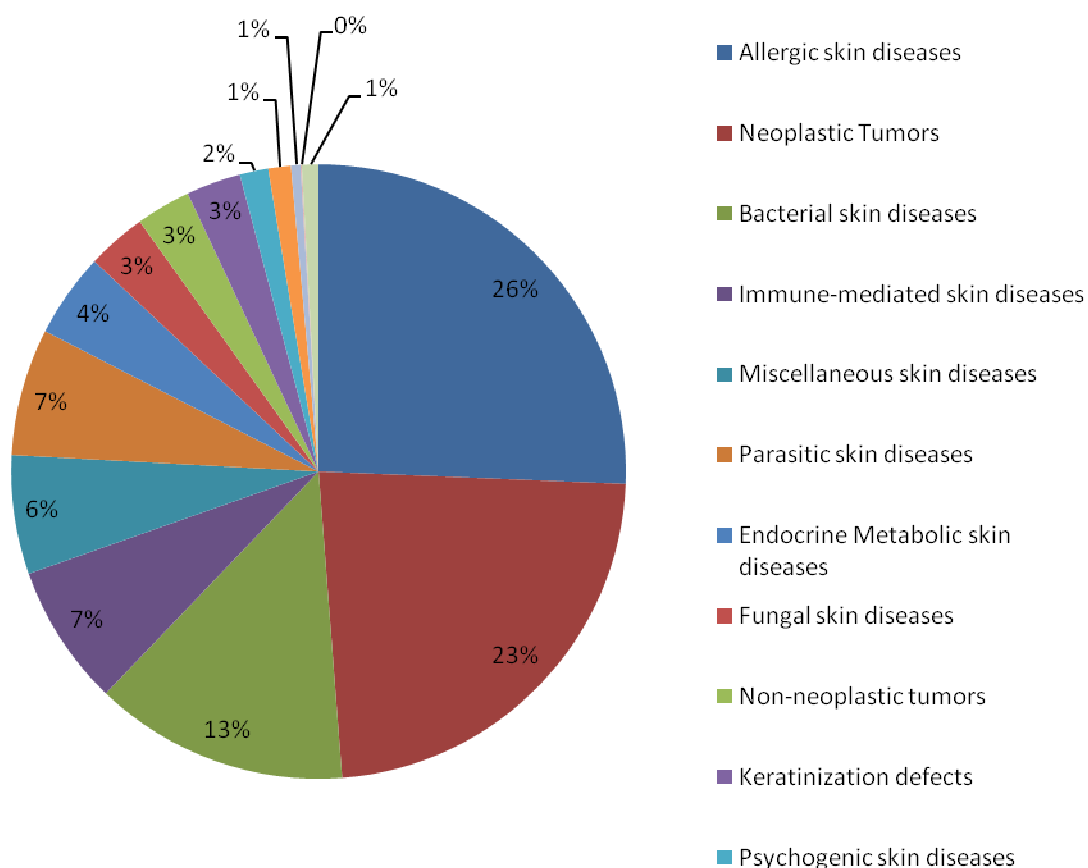
Figure 2: Diagnostic groups

DISCUSSION

In the present historical research, 1,534 histopathological exams were evaluated, representing all of the veterinary cases registered at the Pathology Department of UNESP Botucatu Medical School between the years of 1977 and 2007. The evaluation of these data allowed us to consider several things. First, in agreement with literature reports[3,5-7], was that the high number of cases lacking important information in the exam requisition might hinder the establishment of histopathological diagnosis, as the correlation of clinical and microscopical findings is crucial. This study evidenced the need for standardization of collection, fixation, sending, and requisition-filling procedures, in order to avoid that diagnoses are lost or prejudiced because of previous mistakes.

In relation to the geographical origin of the fragments, São Paulo corresponds to the majority of the cases. Many other regions of the country were also verified, including very distant places, which demonstrates not only the dissemination of the technique, but also the lack of qualified professionals to perform histopathological exams and reach reliable diagnoses in veterinary dermatology.

The majority of cases involved small animals, which agrees to our casuistic, mainly composed of dogs and cats, followed by horses and cows. This result demonstrates that histopathology still needs to be explored and developed in large animal dermatology.

In a general evaluation of breeds, it is possible to verify that most animals do not have a defined breed; however, when we exclude mongrel animals, most observed breeds were those that are traditionally common in this country, i.e. Poodle, Boxer and German Shepherd among dogs, Siamese and Persian among cats, Brazilian Jumping, Thoroughbred and Quarter Horse among horses and Holstein and Nelore among cows. Although some requisitions did not provide breed, this information is very important as many diseases may present breed predilection.

Age varied greatly in all species, which demonstrates that, although dermatological conditions are more common in adults as they tend to be chronic, this technique is also useful in young animals.

Gender distinction was not verified in other species except bovine, in which the number of females is naturally higher than the number of males in the herds, as males are slaughtered early.

Annual distribution of histopathology exams allowed us to verify an increasing pattern along years, which demonstrates that this complementary technique has proliferated and been accepted.

Fragments have been collected from all body sites, demonstrating a multifaceted characteristic of skin lesions, and also that this technique is valid, independently of the localization of lesions. Again there were about 12% of cases without information concerning anatomical localization of lesions, interfering with the evaluation of findings.

In agreement to the report of Linder[4], one of the aspects that we observed was that, in many cases, there was more than one fragment sent for examination from a same case (436/28.4%). The importance of collecting material from several apparent lesions was confirmed by the fact that in 65 of those cases (4.2%) there was more than one diagnosis for the same animal.

In the present study, the most frequent group of cases was allergic skin diseases. According to the literature, the fleabite allergy is the most frequent allergic disease observed in small animal clinics[16,17]. In our study, however, non-specific allergic dermatitis was more frequent because histopathological findings may be confused among allergic dermatitis, and differentiation requires a detailed report of clinical findings, anamnesis and, sometimes, response to treatment. It is possible that diagnoses would be more precise and specific if exam requisitions had been filled out completely.

The second more frequent group was neoplastic tumors. In the present study, we decided to separate tumors into non-neoplastic and neoplastic and to include mammary tumors in the second group. After mammary tumors, the most frequent diagnoses were mast cell tumors, non-epitheliotropic lymphoma, squamous cell carcinoma and soft tissue sarcoma, respectively, in agreement to other reports[1,18,19]. Other study of 761 cases of cutaneous tumors reported mesenchymal, epithelial and melanocytic tumors as the most frequent in dogs, respectively[20].

The group of bacterial skin diseases was the third most common in this study and superficial pyoderma and deep pyoderma were the two most frequent diagnoses in this group. The correct diagnosis and classification of bacterial lesions is important to avoid the recurrence of symptoms[1,21].

Some of the bacterial skin disease diagnoses evidenced the necessity of sending a fragment to bacterial culture and to inform the pathologist because special staining may be necessary. This was the case of mycobacterial granulomas, nocardiosis, necrotizing fasciitis and one case of rhodococcosis in a cat.

In the present report, there was a high incidence of lupus erythematosus and pemphigus foliaceous, which are also common in literature reports. This demonstrates that autoimmune diseases, especially pemphigus foliaceous, lupus erythematosus (cutaneous and systemic), pemphigus erythematosus and bullous pemphigoid, have been diagnosed in veterinary clinic routine. Many of those cases did not present a clear determination of the disease, being reported as interface dermatitis. When the clinical history of those cases was examined, we observed that the fragments were collected over diverse treatments and the use of steroidal anti-inflammatories, which were frequently referred to, mayhave covered the signs and masked diagnosis.

Observation of parasitic skin diseases demonstrated a high frequency of canine demodicosis, diagnosed by the presence of perifolliculitis, mural folliculitis and follicle rupture, besides the presence of the parasite, in agreement with literature reports[1]. The second most frequent parasitic skin disease was leishmaniasis, which is a very important zoonotic disease whose main reservoir is the dog[22]. In the present study, cases were considered positive when fragments presented amastigot forms of the parasite on histopathology, confirmed by serological indirect immunofluorescent assay.

With regard to canine scabies, histopathology is usually inconclusive, unless the parasite is seen in the biopsy[23] and, although this is a very common condition in veterinary dermatology in Brazil, there were few diagnoses of this disease in the present study. This may have been due to the fact that this condition is commonly diagnosed by skin scrapings. When we verified the anamnesis and clinical findings of the cases diagnosed as scabies in this study, however, we observed that they did not present the typical clinical pattern and that they pointed to other clinical suspicions, thus demonstrating the importance of histopathological exams to diagnose these cases.

The most frequent endocrine skin diseases observed in the present study were hypothyroidism and hyperadrenocorticism, but when we consider the number of non-specific endocrine skin diseases and non-specific sex hormonal dermatosis, we can verify that there was difficulty in safely differentiating endocrine diseases by histopathology. It is known that if specific findings for a definite endocrinopathy (e.g. mucinosis for hypothyroidism or acromegaly, calcinosis cutis for hyperadrenocorticism) are not present, histopathological findings of endocrinopathies are similar and may not reveal the origin of the problem. Part of this difficulty may have been worsened by the poor description of anamnesis, clinical and laboratorial findings, thus it was preferable to confirm only endocrine disease and suggest clinical re-evaluation and more specific tests.

According to the literature, dermatophytosis is a follicular disease and its clinical signs are essentially a reflex of damages caused to hair follicles and subsequent inflammation[24].

Definitive diagnosis may be established by direct mycological examination[25] or fungal culture[26], although histopathology may be used[27]. In the present study, we observed that histopathology was useful in cases where fungal culture presented negative results for dermatophytes and even in cases in which this exam was not performed. We also verified that other fungal diseases undetectable in culture for dermatophytes were observed, such as sporotrichosis, malassezia dermatitis and criptococcosis.

Among psychogenic skin diseases, only two diseases were found and markedly separated according to species, being acral lick dermatitis in dogs, and feline psychogenic alopecia in cats. From the histopathology point of view, acral lick dermatitis lesions often demonstrate characteristics of this disturbance, but they are not diagnostic *per se*[1,8].

In smaller number of cases, acquired alopecias, genodermatosis and nutritional skin diseases were also diagnosed and the most frequent were follicular dysplasia, acanthosis nigricans and generic dog food dermatosis, respectively.

Histopathology techniques have passed through evolution along the years and have led to the development of immunohistochemistry, in which specific cell markers are used and alterations are classified according to immunomorphological characteristics. This technique is not yet widely spread in veterinary medicine due to the high cost of markers and the lack of known specific markers[28]. This technique is, however, being widely studied for many purposes and, in our routine, has been used in cases of neoplastic tumors, especially canine round cell tumors, which may optimize treatment and prognosis.

Another use of the images obtained in histopathology is the attempt to establish patterns of relationship between cells. Although there is a tendency to consider live beings as complex machines guided by their DNA, it is nowadays accepted that this DNA is reorganized in response to alterations inside or outside these organisms[29]. This knowledge has allowed the establishment of the "cell sociology" concept, which proposes the investigation of an inter-relationship between cell function and its position inside the tissue[30].

It is probable, therefore, that in a short period of time, both techniques – immunohistochemistry and cell sociology – will become part of routine histopathology exams in veterinary dermatology.

The present study demonstrates the importance of histopathology as a diagnostic tool in veterinary dermatology, and to standardize this technique of sampling and data collection history is essential to ensure reliable results. This report also presents an overview of the history of histopathology in veterinary dermatology. With this report we hope to have contributed to the development of veterinary dermatology, which is increasingly important in veterinary clinics and hospitals worldwide.

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