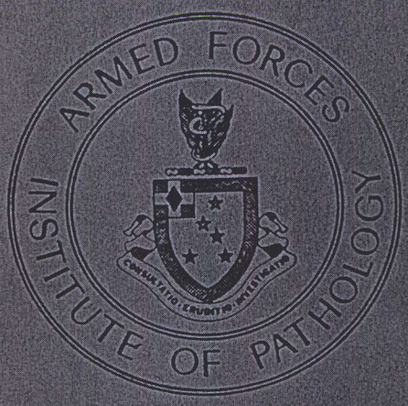
SYLLABUS

VETERINARY PATHOLOGY DEPARTMENT
WEDNESDAY SLIDE CONFERENCE
1988-1989



ARMED FORCES INSTITUTE OF PATHOLOGY
WASHINGTON, D.C. 20306-6000
1990

M90001

Slide number	Animal	Tissue	Diagnosis
87	Cow	Lung	Mycoplasma mycoides
88	Cat	Heart	Endocardial fibrosis
89	Sheep	Lung	Pulmonary adenomatosis
90	Cow	Mammary gland	Mycoplasma bovis
91	Cow	Abdominal mass	Pulmonary choristoma
92	Dog	Bone	Multilobular osteoma/chondroma
93	Monkey	Bone	Periosteal hyperostosis
94	Iguana	Bone	Vitamin D/calcium deficiency
95	Dog	Joint	Pseudogout
96	Rat	Salivary gland	Adenocarcinoma
97	Ferret	Spleen	Lymphosarcoma
98	Dog	Heart	Atherosclerosis
99	Guinea pig	Lung	Bordetella bronchiseptica
100	Dog	Kidney	Renal cell carcinoma
101	Rat	Mesenteric vessels	Polyarteritis nodosa
102	Rat	Eye	Corneal degeneration
103&104	Rabbit	Colon	Normal tissue

Slide number	Animal	Tissue	Diagnosis
105	Cat	Lung	Acute bronchitis
106	Cat	Lymph node	Atypical hyperplasia
107	Dog	Pancreas	Islet cell carcinoma
108	Horse	Eyelid	Hemangiosarcoma
109	Horse	Lung	Pneumocystis carinii
110	Rat	Uterus	Endometrial stromal polyp
111	Dog	Subcutis	Liposarcoma
112	Rat	Rectum	Leiomyosarcoma
113	Monkey	Testicle	Cytomegalovirus
114	Monkey	Intestines	Retroperitoneal fibromatosis
115	Monkey	Jejunum	Schwannoma
116	Monkey	Small intestine	Endometriosis
117	Mouse	Spleen	Extramedullary granulopoiesis
118	Rat	Spleen Liver	Mononuclear cell leukemia
119	Pig	Ileum	Proliferative enteritis
120	Dog	Mediastinal mass	Thymoma
121	Cat	Colon, Liver, Heart	Bacillis piliformis

Slide number	Animal	Tissue	Diagnosis
53	Dog	Lung	Acanthamoeba sp
			Canine adenovirus II
			Canine distemper
54	Cow	Lung	Clostridium chauvoei
55	Goat	Spinal cord	Caprine arthritis and encephalitis virus
56	Sheep	Brain	Thiamine deficiency
57	Horse	Skin	Amyloidosis
58	Goat	Lung	Brucella abortus
59	Cow	Lung	Bovine respiratory syncytial virus
			Bacterial pneumonia
60	Sheep	Lung	Ovine progressive pneumonia
61	Pig	Lung	Hemophilus pleuropneumonia
62	Baboon	Kidney	Renal cell carcinoma
63	Monkey	Liver	Hepatitis A
64	Monkey	Liver	Athesmia foci
65-67	Monkey	Liver, Lung	Mycobacterium sp
68	Cat	Liver, Spleen	Feline infectious peritonitis virus
69	Rat	Pinna	Auricular chondropathy
70	Monkey	Lung	Paragonimus sp

Slide number	Animal	Tissue	Diagnosis
71	Rat	Ovary	Mesothelioma
72	Opossum	Lung	Didelphostrongylus hayesi
73	Parrot	Liver, Kidney, Air sac, Spleen	Chlamydia psittaci
74&75	Gazelle	Lung	Nocardia sp
76	Dog	Spinal cord	Canine distemper virus
77	Dog	Brain	Meningoencephalomyelitis
78	Dog	Brain	Oligodendroglioma
79	Sheep	Brain stem	Neuraxonal dystrophy
80	Horse	Cerebellum	Cerebellar abiotrophy
81	Rat	Salivary gland Lung	Sialodacryoadenitis virus
82	Mouse	Uterus	Cystic hyperplasia
83	Monkey	Abdominal mass	Angiolipoma
84	Rabbit	Spinal cord	Pasteurella multicida
85&86	Cat	Lung, Intercostal muscle	Adenocarcinoma

LIST OF SLIDES (Cont'd)

Slide number	Animal	Tissue	Diagnosis
21	Sheep	Liver	Copper toxicity
		Kidney	
22	Fish	Entire fish	*Ichthyophthirius multifiliis*
23	Raccoon	Small intestine	*Heterobilharzia americana*
24	Cat	Mammary gland	Fibroepithelial hyperplasia
25	Horse	Skeletal muscle	Rhabdomyosarcoma
26	Horse	Small intestine	*Rhodococcus equi*
		Lymph node	
27	Horse	Skeletal muscle	Exertional myopathy
28	Horse	Kidney	*Actinobacillus equuli*
29	Horse	Lung	*Eupatorium adenophorum* toxicity
30	Cat	Lung	*Aelurostrongylus abstrusis*
31	Chicken	Lung	Marek's disease
32	Cow	Liver	Pyrrolizidine alkaloid toxicosis
33	Goat	Spinal cord	*Parelaphostrongylus tenuis*

LIST OF SLIDES (Cont'd)

Slide number	Animal	Tissue	Diagnosis
34	Monkey	Kidney	Hypertension induced nephritis
35	Chicken	Heart	Retrovirus
36	Cat	Lung	*Toxoplasma gondii*
37&38	Rat	Prostate	Adenocarcinoma
		Lung	
39	Dog	Lung	Canine adenovirus II
40	Dog	Heart	Canine parvovirus
41	Dog	Ovary	Granulosa cell tumor
42	Horse	Skin	Bullous pemphigoid
43	Dog	Skin	*Neospora caninum*
44	Squirrel	Skin	Squirrel poxvirus
45	Dog	Skin	*Leishmania* sp
46	Mouse	Liver	Mouse hepatitis virus
47	Mouse	Lymph node	Histiocytic sarcoma
48	Mouse	Intestine	*Yersinia pseudotuberculosis*
		Peritoneum	
49	Rat	Nasal cavity	Squamous cell carcinoma
50	Sheep	Kidney	Mesangiocapillary glomerulo-nephritis
51	Dog	Heart	*Trypanosoma cruzi*
52	Caribou	Skin	*Besnoitia tarandi*

LIST OF SLIDES (Cont'd)

Slide number	Animal	Tissue	Diagnosis
122&123	Dog	Kidney	Prototheca sp
124	Cat	Spleen, Lymph node, Ileum	Francisella tularensis
125&126	Dog	Lung, Liver, Kidney	Geotrichum candidum
127	Parrot	Lung	Mycobacterium sp
128	Goat	Mammary gland	Aspergillus sp Caprine arthritis and encephalitis virus
129	Dog	Gonad	Cystic testis
130	Goat	Placenta	Chlamydia psittaci
131	Cow	Kidney	Lead toxicosis
132	Chicken	Esophagus	Vitamin A deficiency
133	Dog	Bone	Chondrosarcoma
134	Dog	Kidney	Renal dysplasia

LIST OF SLIDES

Slide number	Animal	Tissue	Diagnosis
1	Dog	Skin	Sebaceous gland carcinoma
2	Rabbit	Skin	Xanthoma
3	Dog	Mediastinal mass	Endocrine carcinoma
4	Dog	Skin	Lymphosarcoma (mycosis fungoides)
5	Dog	Nasal mucosa	Rhinosporidium seeberi
6&7	Cat	Lymph node	Cryptococcus neoformans
8	Pig	Lymph node	Rhizopus oryzae
9	Dog	Testicle	Blastomyces dermatitidis
10	Horse	Spinal cord	Cervical vertebral spinal myelopathy
11&12	Sicilian ass	Colon, Lymph node	Mycobacterium paratuberculosis
13	Horse	Cerebrum	Moldy corn poisoning
14	Horse	Lung	African horsesickness
15	Rat	Jejunum	Adenocarcinoma
16&17	Rat	Liver	Staphylococcus aureus
18	Rat	Thoracic mass	Hibernoma
19&20	Guinea pig	Kidney, Cerebrum	Encephalitozoon cuniculi

Syllabus

VETERINARY PATHOLOGY DEPARTMENT, AFIP
WEDNESDAY SLIDE CONFERENCE
1988-1989

134 microslides

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M90001

PREFACE

The Department of Veterinary Pathology, Armed Forces Institute of Pathology, has conducted the Annual Wednesday Slide Conference Program for more than two decades. The cases presented each Wednesday throughout the academic year are also distributed to over 120 active participants, including military and civilian veterinary pathologists throughout the United States and Canada, as well as several foreign countries. The list of active contributors continues to grow. The diagnosis, comments, and a synopsis of the discussion for each case is forwarded to participants weekly.

This study set has been assembled in an effort to make the material presented at our weekly conferences available to a wider range of interested pathologists and other scientists. Discussion and comments are abbreviated in this syllabus for succinctness.

A selection of 121 cases, with 134 microslides has been made from cases studied during the 1988-1989 conferences.

We wish to thank each contributor for his or her participation and for the permission to use cases in this study set.

COMMENTARY ON SLIDES

Slide 1

History

Tissue from an 11-year-old, neutered female, Doberman pinscher that had multiple tumors of unknown duration on the lower eyelid, face, chest, and legs.

Diagnosis

Haired skin: Sebaceous gland carcinoma, well differentiated, with lymphatic invasion and focal ulceration, Doberman pinscher, canine.

Comment

Although sebaceous gland tumors are common in dogs, malignant forms are rare, and of carcinomas that have been previously reported, metastasis is rare. This case presents two interesting features. The tumor is highly malignant, and, contrary to most sebaceous gland carcinomas, is not predominantly basaloid.

Contributor

University of Nebraska-Lincoln, Veterinary Diagnostic Center, Fair Street & East Campus Loop, Lincoln, NE 68583-0907.

Suggested reading

Moulton, J. E.: Tumors in Domestic Animals, ed. 2. Berkeley, University of California Press, 1978, pp. 53-56.

Strafuss, A. C.: Sebaceous gland carcinoma in dogs. J. Am. Vet. Med. Assoc. 169(3): 325-326, 1976.

Slide 2

History

Tissue from a female, 5-year-old, Watanabe heritable hyperlipidemic (WHHL) rabbit (Oryctolagus cuniculus) that had bilateral alopecia over tarsal and metatarsal areas.

Gross Pathology

The skin over the plantar-medial surface of the tarsi and the plantar surface of the metatarsi were yellow with multiple (0.1-0.3 cm) focal to confluent nodules.

Laboratory Results

Serum cholesterol = 441 mg/dl.

Diagnosis

1. Haired skin: Histiocytosis, xanthomatous, diffuse, moderate, Oryctolagus cuniculus, lagomorph.

2. Haired skin: Dermatitis, interface, nonsuppurative, multifocal, mild.

Comment

WHHL rabbits develop marked hypercholesterolemia due to a single genetic defect for low-density-lipoprotein (LDL) receptors. This is the same gene that is defective in human patients with familial hypercholesterolemia. This genetic defect results in a decreased cellular uptake and the increased production of LDL.

Contributor

University of Texas Health Science Center, Division of Comparative Medicine, 5323 Harry Hines Blvd., Dallas, TX 75235.

Suggested reading

Armstrong, M. L., et al: Lipid metabolism in xanthomatous skin of hypercholesterolemic rabbits. Am. J. Pathol. 125(2): 339-348, 1986.

Goldstein, JL, et al: Defective lipoprotein receptors and atherosclerosis-lessons from an animal counterpart of familial hypercholesterolemia. New Eng. J. Med. 309(5): 288-296, 1983.

Slide 3

History

Tissue from an 8-year-old, male, mixed breed dog that died shortly after it was noted to have marked dyspnea.

Gross Pathology

Necropsy revealed an irregular, lobulated, yellowish-white, firm mass located at the base of the heart. The mass measured approximately 5.5 x 3.8 x 3.0 cm, infiltrated the mediastinum and partially surrounded the aorta and pulmonary artery.

Diagnosis

Mediastinal mass (per contributor): Carcinoma, endocrine, with vascular invasion, mixed breed, canine.

Comment

Neoplasms at the base of the heart include ectopic thyroid or parathyroid tumors, aortic body tumors, or tumors of mixed cell populations. Ultrastructural studies are valuable in the diagnosis of these tumors. Immunohistochemical analysis has also been a useful method for specifically identifying the tumor cell type.

Contributor

C.E. Kord Animal Disease Laboratory, P.O. Box 40627, Melrose Station, Nashville, TN 37204.

Suggested reading

Cheville, N. F.: Ultrastructure of canine carotid body and aortic body tumors-comparison with tissues of thyroid and parathyroid origin. Vet. Pathol. 9: 166-189, 1972.

Holscher, M. A., et al: Ectopic thyroid tumor in a dog: thyroglobulin, calcitonin, and neuron-specific enolase immunocytochemical studies. Vet. Pathol. 23: 778-779, 1986.

Slide 4

History

Tissue from a 12-year-old, spayed female, Schnauzer crossbred dog that had chronic sores on its lips and gums.

Diagnosis

Haired skin: Cutaneous lymphosarcoma, consistent with mycosis fungoides-like disease, Schnauzer mix, canine.

Comment

There is a diffuse infiltration of a monomorphic population of neoplastic lymphoid cells into the epidermis and outer root sheaths of hair follicles. Although mycosis fungoides cells were not identified, the epidermotropism is suggestive of the cutaneous T cell lymphosarcoma known as mycosis fungoides in man.

Contributor

Montana Veterinary Diagnostic Laboratory, P. O. Box 997, Bozeman, MT 59771.

Suggested reading

Muller, G. H., Kirk, R. W., and Scott, D. W.: Cutaneous lymphosarcoma. In Small Animal Dermatology. Muller, G. H. (editor), 3rd ed., Philadelphia, W.B. Saunders Co., 1983, pp. 763-770.

Shadduck, J. A., et al: A canine cutaneous lymphoproliferative disease resembling mycosis fungoides in man. Vet. Pathol. 15: 716-724, 1978.

Slide 5

History

Tissue from a 3-year-old, male, Great Dane that had a history of several recent episodes of epistaxis and was reported to make a snoring noise that had become more obvious over the last several weeks.

Gross Pathology

A pink friable multilobular polypoid mass, stippled with white foci, was surgically removed from the left nostril.

Diagnosis

Nasal mucosa: Rhinitis, chronic-active, proliferative, diffuse, severe, due to Rhinosporidium seeberi, Great Dane, canine.

Comment

The presence of the various stages (trophocytes, sporangia, endospores) of the life cycle of the fungal organism and their size and shape enables a definitive diagnosis of nasal rhinosporidiosis due to Rhinosporidium seeberi. The type of inflammatory cell response is dependent on the reproductive stage of the organism with certain immature stages eliciting a necrotizing and neutrophilic response, while more mature stages generally elicit a chronic inflammatory cell response.

Contributor

Veterinary Reference Laboratory, 3191 Commonwealth Drive, Dallas, TX 75247.

Suggested reading

Easley, J. R., Meuten, D. J., Levy, M. G., Dykstra, M. J., Breitschwerdt, E. B., Holzinger, E. A., and Cattley, R. C.: Nasal rhinosporidiosis in the dog. Vet. Pathol. 23: 50-56, 1986.

Slides 6–7

History

Tissue from a 4-year-old, spayed female, Siamese cat that had a history of sneezing and respiratory distress.

Diagnosis

Lymph node, cervical (per contributor): Lymphadenopathy, histiocytic, diffuse, severe, with lymphoid replacement by myriads of extracellular and phagocytized yeasts, consistent with Cryptococcus neoformans, Siamese, feline.

Comment

The extent and growth of fungal organisms was so extensive that the majority of the architecture of the tissue was replaced. Because inflammatory reactions around organisms was not prominent, the presence of lymphoid cells and germinal centers suggested that the tissue was lymph node. In contrast to the mucinous (hypo-reactive) host response in this case, granulomatous lesions are also common. The factor(s) which determine the elicitation of the host reaction is not known. Unusual features of C. neoformans compared to other pathogenic yeasts are that it is not dimorphic, it is generally encapsulated, it usually has a clear (H&E) mucin positive capsule, and germ tubes; pseudohyphae and branched septate hyphae are occasionally produced in tissue.

Contributor

Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA 99164-7040.

Suggested reading

Barsanti, J. A.: Cryptococcosis. In: Clinical Microbiology and Infectious Diseases of the Dog and Cat, Greene, C. E. (ed). W. B. Saunders Co., 1984, pp. 700-709.

Slide 8

History

Tissue from a 6-month-old, male, Yorkshire x Landrace pig that is from a 350-sow, farrow-to-finish, commercial herd. A left submandibular mass, noticed for 3 months, was enlarging and the pig's condition was deteriorating.

Gross Pathology

The mandibular mass was 10 cm x 6 cm and had several fistulous, draining tracts to the skin surface. There were several 1 to 3 cm abscesses scattered throughout the liver. Mesenteric lymph nodes were enlarged and necrotic.

Laboratory Results

Rhizopus oryzae was isolated from all of the above masses.

Diagnosis

1. Mandibular lymph node, salivary gland and associated soft tissue (per contributor): Granulomatous inflammation, chronic, diffuse, severe, with discrete granulomas, and associated fungal hyphae, Yorkshire-Landrace mix, porcine.

2. Mandibular lymph node: Coagulative necrosis, focally extensive, moderate, consistent with infarction.

Comment

Disseminated zygomycosis, usually affecting the submaxillary, mandibular, cervical, and mesenteric lymph nodes, and/or abdominopelvic organs, is rarely reported in pigs. This condition is occasionally misdiagnosed clinically as jowl abscesses caused by group E streptococci.

Contributor

Ontario Ministry of Agriculture and Food, Veterinary Laboratory Services, Box 3612, Guelph, Ontario, Canada NlH 6R8.

Suggested reading

Davis, C. L., Anderson, W. A., and McCrory, B. R.: Mucormycosis in food-producing animals. J. Am. Vet. Med. Assoc. 126: 261-267, 1955.

Dion, W. M., Bundza, A., and Dukes, T. W.: Mycotic lymphadenitis in cattle and swine. Can. Vet. J. 28: 57-60, 1987.

Slide 9

History

Tissue from an adult dog that had an enlarged right testis that was first noticed 2 weeks prior to its removal.

Gross Pathology

The testicular parenchyma contains two expansile, unencapsulated, cream colored masses, 2.5 and 1.5 cm in diameter.

Diagnosis

Testis: Orchitis and epididymitis, pyogranulomatous, focally extensive, severe, with associated yeasts, consistent with Blastomyces dermatitidis, breed unspecified, canine.

This case is unusual in that the enlarged testis (presumed to be due to testicular neoplasia) was the only detected clinical sign. The lung is the most consistently involved organ in canine blastomycosis with secondary dissemination to peripheral lymph nodes, eyes, skin, appendicular skeleton, and male genitalia.

Contributor

10th Medical Laboratory, Department of Veterinary Medicine, APO, NY 09180.

Suggested reading

Barsanti, J. A.: Blastomycosis. In: Clinical Microbiology and Infectious Diseases of the Dog and Cat, Greene, C. E. (ed). W.B. Saunders Co., 1984, pp. 675-686.

Slide 10

History

Tissue from a 1-year-old, male, thoroughbred, equine that had slowly developed posterior ataxia over the last few months and recently demonstrated forelimb instability.

Gross Pathology

Sagittal sectioning of the spinal column revealed a narrowing in the C4 to C5 area when the spine was flexed ventrally. There was dorsal displacement of the floor of the spinal canal with impingement of the spinal cord in this area.

Diagnosis

Spinal cord, white matter: Axonal degeneration and loss with myelin sheath swelling, diffuse, mild to moderate, thoroughbred, equine.

Comment

The lesion in this case is diffuse in the white matter tracts, especially severe in the lateral (motor) columns. There are occasional axonal spheroids and macrophages within dilated myelin sheaths. The gross and histologic lesions are consistent with cervical vertebral stenotic myelopathy. The primary differential diagnosis is equine degenerative myeloencephalopathy.

Contributor

Provincial Animal Health Center, 1874 Gladwin Road, Abbotsford, B.C.

Suggested reading

Mayhew, I. G., deLahunta, A., Whitlock, R. H., and Geary, J. C.: Equine degenerative myeloencephalopathy. J. Am. Vet. Med Assoc 170: 195-201, 1977.

Mayhew, I. G., deLahunta, A.: Neuropathology, Chapt 6, Cornell Vet. 68(Sup 6): 106-147, 1978.

Powers, B. E., et al: Pathology of the vertebral column of horses with cervical static stenosis. Vet. Pathol. 23: 392-399, 1986.

Slides 11–12

History

Tissue from a 1-1/2-year-old female Sicilian ass that had shown chronic diarrhea over a 3 month period.

Diagnosis

1. Colon: Colitis, granulomatous, diffuse, moderate, with intracellular acid fast bacilli, Sicilian ass, equine.

2. Mesenteric lymph node: Lymphadenitis, granulomatous, diffuse, moderate, with intracellular acid fast bacilli.

Comment

While unfortunately no material from this case was submitted for culture, further inquiry revealed that the ass had been sharing a pen with a West Highland cow that had died of Johne's disease approximately 6 months prior to the death of the ass.

Contributor

University of Wisconsin, Vet. Sci. Dept. and Res. Animal Res. Ctr., 121 Veterinary Science Building, 1655 Linden Drive, Madison, WI 53706.

Suggested reading

Cimprick, R. E.: Equine granulomatous enteritis. Vet. Pathol. 11: 535–547, 1974.

Larsen, A. B., Moon, H. W., and Meckel, R. S.: Susceptibility of horses to Mycobacterium paratuberculosis. Am. J. Vet. Res. 33: 2185, 1972.

Slide 13

History

Tissue from a 8-year-old, 430 kg, black gelding Tennessee walking horse that had illness of sudden onset.

Gross Pathology

The right cerebral hemisphere was markedly swollen and this was associated with edema and necrosis of parts of the corona radiata extending from the frontal to the occipital area. Numerous petechiae were visible on the natural surface of the cerebellum and on cut surface these were mainly present in the molecular and granular layers.

Diagnosis

Cerebrum, white matter: Leukoencephalomalacia, focally extensive, severe, Tennessee walking horse, equine.

Comment

The microscopic lesions are fairly typical of cases of moldy corn poisoning. Features of note in this slide are the almost exclusive necrosis of the white matter, the marked proteinaceous edema in adjacent white matter, and the multifocal perivascular hemorrhage.

Contributor

School of Veterinary Medicine, North Carolina State University, 4700 Hillsborough Street, Raleigh, NC 27606.

Suggested reading

Marasas, W. F. O., et al: Leukoencephalomalacia: A mycotoxicosis of equidae caused by Fusarium moniliforme. Sheldon. Onderstepoort J. Vet. Res. 43: 113, 1976.

Wilson, B. J., et al: Equine leukoencephalomalacia. J. Am. Vet. Med. Assoc. 163: 1293-1295, 1973.

Slide 14

History

Tissue from an adult horse that was experimentally inoculated with African horsesickness virus. He died 10 days later.

Gross Pathology

In the lungs there was severe diffuse subpleural and interlobular edema. The trachea was filled with thick froth and the pericardial sac contained approximately 250 ml of straw-colored fluid.

Diagnosis

1. Lung: Edema, interlobular septae, peribronchiolar and perivascular, diffuse, mild to moderate.

2. Lung: Pneumonia, interstitial, subacute, multifocal, mild, breed unspecified, equine.

Comment

The lack of significant edema in alveolar spaces was considered somewhat atypical of acute, fulminating, African Horse Sickness.

Contributor

Plum Island Animal Disease Center, P.O. Box 848, Greenport, L.I., NY.

Suggested reading

Maurer, F. D., and McCully, R. M.: African horsesickness - with emphasis on pathology. Am. J. Vet. Res. 24: 2355-2365, 1963.

Newsholme, S. D.: A morphological study of the lesions of African horsesickness. Onderstepoort J. Vet. Res. 50: 7-24, 1983.

Slide 15

History

Tissue from a 116-week-old male, Long-Evans rat [Crl:(LE)BR] that was euthanatized due to chronic weight loss and anorexia.

Gross Pathology

A 4.0 cm length of jejunum was firm, grey-pink and irregularly enlarged to a diameter of 1.5 cm. On cut surface, the wall was diffusely thickened, and the lumen was partially occluded by a mass that caused bulging of the serosa along the mesenteric attachment and extended through the wall to the mucosa.

Diagnosis

Jejunum (per contributor): Adenocarcinoma arising from a tubular adenoma, Long-Evans rat, rodent.

Comment

Spontaneous tumors of the rat intestinal tract are rare, although many small tumors are probably missed due to lack of routine examination of the entire intestine. Adenocarcinomas are reported to be the most common of all intestinal tumors, and tumors of the colon appear to occur more frequently than those of the small intestine.

Contributor

Pfizer Central Research, Drug Safety Evaluation, Eastern Point Road, Bldg. 174, Groton, CT 06340.

Suggested reading

Altman, N. H., and Goodman, D. G.: Neoplastic Diseases. In: Baker, H. J., Lindsey, RJ, Weisbroth, SH (eds). The Laboratory Rat, New York: Academic Press, pp 307-376, 1979.

Slides 16–17

History

Tissue from a male mouse that died during an 18-month carcinogenicity study. Several control and treated mice had a moist dermatitis and nodular skin lesions around the face and neck.

Laboratory Results

A heavy growth of non-hemolytic, coagulase positive Staphylococcus aureus was cultured from the liver.

Diagnosis

Liver: Hepatitis, pyogranulomatous and necrotizing, multifocal to coalescing, severe, with discrete pyogranulomas and associated colonies of gram-positive cocci, strain unspecified, mouse, rodent.

Comment

The morphology and staining qualities of the organism, the thin rim of Splendore-Hoeppli material, and the inflammatory response are consistent with the pyogranulomas caused by Staphylococcus aureus (traditionally referred to as botryomycosis).

Contributor

Merrell Dow Pharmaceuticals, Inc., P.O. Box 68470, Indianapolis, IN 46268-0470.

Suggested reading

Carlton, W. W., and Hunt, R. D.: Bacterial diseases. In: Pathology of Laboratory Animals. Volume II, Benirschke, Garner and Jones (Eds), Springer-Verlag, 1970, pp. 1451-1453.

Slide 18

History

This tissue is from a 25-month-old, control, male Sprague-Dawley rat used in a combined toxicity/oncogenicity study. The animal experienced a 36% body-weight loss and clinical signs of chromodacryorrhea, soft feces, inactivity, and labored breathing during the two months prior to its sacrifice.

Diagnosis

Intrathoracic mass (per contributor): Hibernoma, Sprague- Dawley rat, rodent.

Comment

Hibernomas are generally regarded as benign neoplasms with a potential for malignancy.

Contributor

CIBA-GEIGY Corporation, Subdivision of Pathology, 556 Morris Avenue, Summit, NJ 07901.

Suggested reading

Al Zubaidy, A. J., and Finn, J. P.: Brown fat tumours (hibernomas) in rats: histopathological and ultrastructural study. Lab. Anim. 17: 13-17, 1983.

Stefanski, S. A., et al: Malignant hibernoma in a Fischer 344 rat. Lab. Anim. Sci. 37: 347-350, 1987.

Slides 19–20

History

Tissue from a 7-month-old male Guinea pig (NIH strain) that lost weight, had a rough hair coat and had convulsions 3 days prior to death.

Diagnosis

1. Cerebrum: Meningoencephalitis, granulomatous and necrotizing, multifocal, moderate, with protozoal pseudocysts, Guinea pig, rodent.

2. Kidney: Nephritis, interstitial, lymphoplasmacytic, multifocal, moderate, with protozoal pseudocysts.

Comment

Encephalitozoon is distinguishable from toxoplasmosis as follows:

1) It is gram-positive; toxoplasma is gram-negative

2) At various stages it is acid fast; toxoplasma is not

3) It has a coiled polar filament (ultrastructure); toxoplasma does not

4) The cyst wall of encephalitozoon is not stainable.

Contributor

Registry of Experimental Cancers, NCI-NIH, Rm. 1020, Landow Building, Bethesda, MD 20892.

Suggested reading

Szabo, J. R., Pang, V., and Shadduck, J. A.: Encephalitozoonosis In: Clinical Microbiology and Infectious Diseases of the Dog and Cat. Greene, C. E. (Ed.), WB Saunders, 781-790, 1984.

Vetterling, J. M.: Protozoan parasites. In: Biology of the Guinea Pig. Wagner, J. E., and Manning, P. J. (Eds), Academic Press, pp. 171-172, 1976.

Slide 21

History

Tissues from two of ten affected sheep from a closed population of seventy participating in various approved research protocols. Clinical signs included icterus, kyphosis, red urine, and weakness characterized by muscle tremors, lethargy, and inattentiveness. Death occurred within 48 hours.

Gross Pathology

Consistent gross necropsy findings include icterus, blue- black kidneys, a thickened bladder containing red foul smelling urine, and an enlarged, dark red spleen.

Laboratory Results

1. Feed: Cu 45 ppm Mo 1 ppm

2. Tissue: Liver Cu averaged 750 ppm on a dry weight basis.

Diagnosis

1. Liver: Degeneration and necrosis, hepatocellular, diffuse, moderate, with marked diffuse fibrosis and mild cholestasis, breed unspecified, ovine.

2. Kidney: Necrosis, tubular, diffuse, moderate, with intraluminal brightly eosinophilic proteinaceous material (hemoglobin).

Comment

When a ruminant consumes small but excessive amounts of copper with inadequate molybdenum over weeks or months, no toxic signs are manifested until a critical level of copper is reached. The sudden release of copper from the liver into the circulation may be spontaneous or associated with stress and result in the above clinical and histopathological findings.

Contributor

Department of Veterinary Pathology, Walter Reed Army Institute of Research, Washington, DC 20307-5100.

Suggested reading

Ishmael, J., et al: Experimental chronic copper toxicity in sheep - histological and histochemical changes during the development of the lesions in the liver. Res. Vet. Sci. 12: 358-366, 1971.

VanSaun, R. J.: Copper toxicoses in sheep. Mod. Vet. Pract. 69: 3-8, 1988.

Slide 22

History

Tissue from 10, young, healthy appearing cardinal tetras that were purchased at a local fish and aquarium supply retail store. All the tetras died in a quarantine tank within 12 days after introduction.

Gross Pathology

Nine days after being placed in quarantine, multiple raised pinpoint to 3 mm white spots appeared on all ten tetras on the external body surface including fins.

Diagnosis

Gills, epithelium: Hyperplasia and hypertrophy, nodular, multifocal, moderate, with protozoal organisms, etiology consistent with Ichthyophthirius multifiliis.

Comment

The glass slides are from different individual tetras; therefore, there is much slide variation as to the numbers and locations of the protozoa and the degree of tissue response.

Contributor

Uniformed Services Univ. of the Health Sciences, Department of Laboratory Animal Medicine 4301 Jones Bridge Road, Bethesda, MD 20814-4799.

Suggested reading

Mohan, C. V.: Ichthyophthiriasis in aquarium fishes--a note on the pathogenicity and life cycle of the parasite. Cur. Sci. 55: 42-43, 1986.

Ventura, M. T., and Paperna, I.: Histopathology of Ichthyophthirius multifiliis infections in fishes. J. Fish Biol. 27: 185-203, 1985.

Slide 23

History

Several raccoons in a 2-3 mile area have died over a 2-3 month period. This mature female raccoon (Procyon lotor) was euthanized.

Diagnosis

1. Small intestine: Enteritis, granulomatous, transmural, multifocal, moderate, with multiple granulomas and trematode eggs, raccoon (Procyon lotor).

2. Small intestine, mesenteric vein: Intraluminal adult trematode.

Comment

Heterobilharzia americana is a parasitic schistosome of the raccoon (Procyon lotor), bobcat (Lynx rufus), rabbit (Sylvilagus aquaticus), nutria (Myocastor coypus), opossum (Didelphis marsupialis virginiana) and dog. Intermediate snail hosts are Lymnaea cubensis and Pseudosuccinia columella. The parasite appears limited to the Gulf Coast and southeastern United States.

Contributor

Department of Veterinary Pathology, School of Veterinary Medicine, Baton rouge, LA 70803.

Suggested reading

Bartsch, R. C., and Ward, B. C.: Visceral lesions in raccoons naturally infected with Heterobilharzia americana. Vet. Path. 13: 241-249, 1976.

Pierce, K. R.: Heterobilharzia americana infection in a dog. J. Am. Vet. Med. Assoc. 143(5): 496-499, 1963.

Slide 24

History

Tissue from an approximately 1-year-old, female, domestic short hair, stray cat that was presented for ovariohysterectomy. There was a small mass on the posterior ventral abdominal surface.

Diagnosis

Mammary gland: Fibroepithelial hyperplasia, domestic short hair, feline.

Comment

Fibroepithelial hyperplasia occurs primarily in young intact female cats. Interestingly, the condition will resolve following ovariectomy and it has been induced in neutered cats of either sex with progestrogen therapy. There are various terms used to describe this condition (fibroepithelial hyperplasia, feline mammary hypertrophy and total fibroadenomatous change).

Contributor

Battelle Columbus Division - Pathology Section, Room 6144/B, 505 King Avenue, Columbus, OH 43201-2693.

Suggested reading

Allen, H. L.: Feline primary hypertrophy. Vet. Pathol. 10: 501-508, 1973.

Hayden, D. W., Johnson, K. H., and Ghobrial, H. K.: Ultrastructure of feline mammary hyperplasia. Vet. Pathol. 20: 254-264, 1983.

Slide 25

History

This 2-year-old, female, Arabian horse had a mass in the left lateral musculature of the mid-cervical region that was surgically removed. One year later, this mass had recurred at the same site. Ultrasound revealed extension of the mass down to the cervical vertebra, with no bony invasion.

Gross Pathology

The mass was firm, grey-white, roughly circular, 12 cm in diameter, with numerous thin processes extending into the adjacent muscles.

Diagnosis

Skeletal muscle: Rhabdomyosarcoma, Arabian, equine.

Comment

Primary tumors of striated muscle are rare. Retrospective studies of equine tumors reveal a less than 1% occurrence of rhabdomyomas and rhabdomyosarcomas. This particular case is an example of a highly pleomorphic type of striated muscle tumor sometimes referred to as an embryonal rhabdomyosarcoma. The embryonal type is considered to be a highly malignant variant of rhabdomyosarcoma.

Contributor

Univ. of Pennsylvania (New Bolton Center) 382 West Street Road, Kennett Square, PA 19348.

Suggested reading

Hamir, A. N.: Striated muscle tumours in horses. Vet. Rec. 111: 367-368, 1982.

Moulton, J. E.: Tumors in Domestic Animals. 2nd ed, University of California Press, Berkeley, 1978, pp. 82-85.

Slide 26

History

Tissue from a 1-month-old, female, quarterhorse foal that experienced acute onset of ataxia and abdominal pain.

Gross Pathology

The small intestine, cecum, and colon contained small foci of ulceration surrounded by a rim of elevated mucosa. The mesenteric lymph nodes were greatly enlarged.

Laboratory Results

Corynebacterium (Rhodococcus) equi - mesenteric lymph node and small intestine. Salmonella typhimurium - small intestine, lymph node, pericardial swab. Virology - negative.

Diagnosis

1. Small intestine: Enteritis, pyogranulomatous, multifocal, moderate, with phagocytized coccobacilli, quarterhorse, equine.

2. Lymph node: Lymphadenitis, pyogranulomatous, diffuse, moderate, with phagocytized coccobacilli.

Comment

Corynebacterium (Rhodococcus) equi is a common cause of severe and fatal pneumonia in foals. Less frequently, the bacterium may cause an ulcerative enterocolitis, often in conjunction with the pneumonia. The pathogenesis of the disease has not been fully characterized. Respiratory infection is thought to be via inspired aerosols while the intestinal disease may follow ingestion of the organisms. Experimental studies have shown that enteric infection followed by bacteremia with pulmonary localization is not likely. Conversely, intestinal involvement may follow respiratory disease, possibly via ingestion of pulmonary exudates. The bacterium appears to be a facultative intracellular pathogen, surviving in macrophages while neutrophils appear to be effective in the phagocytosis and killing of the bacteria.

Contributor

Texas Veterinary Medical Diagnostic Lab., P.O. Box 3200, Amarillo, TX.

Suggested reading

Johnson, J. A., et al: The pathology of experimental Corynebacterium equi infection in foals following intrabronchial challenge. Vet. Pathol. 20: 440-449, 1983.

Johnson, J. A., et al: The pathology of experimental Corynebacterium equi infection in foals following intragastric challenge. Vet. Pathol. 20: 450-459, 1983.

Slide 27

History

Tissue from a 7-year-old thoroughbred equine that was very reluctant to move and had generalized tremors after a training session. The animal died with acute renal failure five days later.

Gross Pathology

Several muscles were swollen, edematous and some of them had multiple pale foci.

Diagnosis

Skeletal muscle: Degeneration and necrosis, multifocal, moderate, with regeneration, thoroughbred, equine.

Comment

Muscle lesions are characterized by segmental degeneration of solitary or small groups of muscle fibers. Many of the affected fibers have been removed by macrophages and those still present have a swollen, hypereosinophilic and fragmented sarcoplasm. It has been shown that lesions of exertional rhabdomyolysis in the horse affect preferably type II muscle fibers.

Contributor

Department of Pathology and Microbiology, Faculty of Veterinary Medicine, University of Montreal, C.P. 5000, St-Hyacinthe, Quebec, Canada, J2S 7C6.

Suggested reading

Bartsch, R. C., et al: A review of exertional rhabdomyolysis in wild and domestic animals and man. Vet. Pathol. 14: 314-324, 1977.

McEwen, S. A., and Hulland, J.: Histochemical and morphometric evaluation of skeletal muscle from horses with exertional rhabdomyolysis (tying-up). Vet. Pathol. 23: 400-410, 1986.

Slide 28

History

Tissue from a 3-day-old, male, Arabian foal that was born 13 days premature and was abandoned by the mare for 12 hours.

Gross Pathology

Numerous 2-3 mm, tannish-white foci were widely distributed throughout the renal cortex and were visible on capsular and cut surfaces. All joints of the limbs contained excess reddish-brown, cloudy synovial fluid. The liver was slightly enlarged and was diffusely dark red.

Laboratory Results

Microbiology: Actinobacillus equuli was isolated from kidney, liver, lung and synovial fluid.

Diagnosis

Kidney: Nephritis, suppurative, embolic, multifocal, moderate, with colonies of coccobacilli, Arabian, equine.

Comment

Microscopic lesions similar to those in the kidney were also seen in sections of lung, liver and adrenal gland. In addition, there was suppurative omphalitis and suppurative synovitis in the hock joints. Actinobacillus equuli is one of the opportunistic bacterial organisms which frequently causes septicemia in newborn foals.

Contributor

Murray State University Breathitt Vet. Ctr., P.O. Box 2000, North Drive, Hopkinsville, KY 42240.

Suggested reading

Green, E. M., and Green, S. L.: Septicemia in foals - diagnosis. Mod. Vet. Pract. 68(1): 12-18, 1987.

Slide 29

History

Tissue from a 3-year-old, male, Arabian-cross equine that was pasture fed and had access to Crofton weed, Eupatorium adenophorum. There was respiratory distress, coughing after exercise, and weight loss that progressed over a four month period.

Diagnosis

Lung: Pneumonia, interstitial, chronic, diffuse, moderate, with edema and alveolar histiocytosis, Arabian-mix, equine.

Comment

There is septal fibrosis, effusion of fluid into alveoli with organization of hyaline membranes, hyperplasia of alveolar epithelium in some areas, and mobilization of alveolar macrophages with giant cell formation. Fibrinoid thrombosis and consequent infarction, which occur in some cases of poisoning by E. adenophorum, are absent from this case.

Contributor

Regional Veterinary Laboratory, Wollongbar, New South Wales, Australia, 2480.

Suggested reading

O'Sullivan, B. M.: Crofton weed (Eupatorium adenophorum) toxicity in horses. Aust. Vet. J. 55: 19-21, 1979.

O'Sullivan, B. M.: Investigations into crofton weed. (Eupatorium adenophorum) toxicity in horses. Aust. Vet. J. 62: 30-32, 1985.

Slide 30

History

Tissue from a 2-year-old, male, domestic short hair cat that was presented to the referring veterinarian with oral ulcers. The cat was febrile (104 F) and died the following day.

Gross Pathology

Numerous (round) 1-2 mm, white, slightly raised, poorly demarcated, subpleural nodules were present in all lung lobes.

Diagnosis

1. Lung: Pneumonia, granulomatous, multifocal, moderate, with embryonating metastrongyle eggs, domestic short hair, feline.

2. Lung, bronchioles and arteries: Smooth muscle hypertrophy and hyperplasia, diffuse, moderate.

Comment

The lung contains multiple clusters of non-embryonated and embryonated nematode eggs and a few nematode larvae in alveoli. The morphology of the embryonating eggs is characteristic of a metastrongyle. No adult worms are present in these sections. Many macrophages, a few lymphocytes, and occasional foreign body giant cells surrounded the eggs and are present in many alveoli that do not contain eggs. There is moderate to severe thickening of the smooth muscle layers of small pulmonary arterioles, alveolar ducts, and small bronchioles, with partial occlusion of arteriolar lumens. Multifocal acute hemorrhage and fibrin exudation is present in alveoli.

Contributor

University of Illinois, Department of Veterinary Pathobiology, 2001 Lincoln Avenue, Urbana, IL 61801.

Suggested reading

Hamilton, J. M.: Pulmonary arterial disease of the cat. J. Comp. Pathol. 76: 133-145, 1966.

Scott, D. W.: Current knowledge of aelurostrongylosis in the cat. Cornell Vet. 63: 483-500, 1973.

Slide 31

History

Tissue from a 6-month-old, female, Sugar Charlie chicken (Gallus gallus domesticus). At various intervals since arrival, individual chickens have become ill. Signs were nonspecific, and included weight loss, lethargy, and poor feed consumption.

Diagnosis

Lung: Lymphomatosis, diffuse, moderate, Sugar Charlie chicken (Gallus gallus domesticus), avian.

Comment

The structure of the alveoli is effaced by accumulations of lymphoid cells. Some of the cells have the appearance of nearly normal small lymphocytes, but the majority are larger, with large, moderately irregular nuclei; large, usually single, irregularly shaped nucleoli; and narrow rims of basophilic cytoplasm. There are a few cells with moderate amounts of homogeneous basophilic cytoplasm that somewhat resemble plasma cells. There were collections of similar cells in the liver, mostly around portal vessels and central veins, in the lamina propria of the small intestine and proventriculus, in the parenchyma and ductal mucosa of the pancreas, and in the ovary. The nerves of the brachial and sciatic plexuses contained light to moderate multifocal coalescent accumulations of similar cells, accompanied by mild demyelination. There also were a few narrow perivascular cuffs of lymphocytes in the brain.

The principal differentials are Marek's disease and lymphoid leukosis. Both diseases can occur in birds of this age, and the eyes were not affected, as is common in Marek's disease. Our diagnosis of Marek's disease was based on the nerve lesions, which are characteristic of Marek's disease but not lymphoid leukosis, and the lack of neoplastic changes in the bursa of Fabricius, which are typical of lymphoid leukosis but not Marek's disease. Although in Marek's disease the neoplastic cells characteristically vary in morphology from small to large lymphocytes and include plasma cell-like cells and "Marek's disease cells," the morphology of the neoplastic cells in this case was somewhat less variable than in textbook descriptions of Marek's disease lesions.

Contributor

Department of Comparative Medicine, University of Alabama at Birmingham, Birmingham, AL 35294.

Suggested reading

Calnek, B. W., and Witter, R. L.: Marek's disease. In Diseases of Poultry, 8th ed., ed. Hofstad, M. S., et al.; Iowa State University Press, Ames, IA, pp. 325-359, 1984.

Purchase, H. G., and Payne, L. N.: Leukosis/sarcoma group. In Diseases of Poultry, 8th ed. Hofstad, MS (ed), Iowa State University Press, pp 360-401, 1984.

Slide 32

History

Tissue from a 4-month-old, female, Holstein bovine that is one of a group of 15 calves on pasture to show failure to thrive, diarrhea, and incoordination (the last 3-4 days of life). Several of the calves showed tenesmus and partial rectal prolapse.

Diagnosis

Liver: Portal bridging fibrosis, hepatocellular megalocytosis, and bile duct hyperplasia, diffuse, moderate, Holstein, bovine.

Comment

This slide shows all the typical features of chronic pyrrolizidine alkaloidosis in cattle. The lobular architecture of the liver is altered by extensive fibrosis and bile duct proliferation that crowd the surviving hepatocytes into variably-sized clusters. The hepatocytes are largely megalocytic, with sharply defined cytoplasmic borders and markedly enlarged, hyperchromatic nuclei. Some of the centrilobular veins are obliterated by perivenular fibrosis (so-called "veno-occlusive disease").

This is a common disease in the Pacific Northwest where several millions of acres are contaminated with tansy ragwort, Senecio jacobaea. Although the plant is not very palatable, it is readily consumed in hay and silage and the occasional animal appears to become habituated to it. Neurologic signs (incoordination, continuous walking, head pressing, stupor, etc.) are frequently the initial clinical signs noted and are due to hepatic encephalopathy.

Contributor

College of Veterinary Medicine, Oregon State University, Corvallis, OR 97331.

Suggested reading

Johnson, A. E.: Toxicity of tansy ragwort to cattle. In: Symp. Pyrrolizidine Alkaloids: Toxicity, Metabolism, and Poisonous Plant Control Measures, Cheeke, P. R. ed., Oregon State Univ., 1979.

Johnson, A. E., and Molyneux, R. J.: Toxicity of threadleaf groundsel (Senecio douglasii var. longilobus) to cattle. Am. J. Vet. Res. 45: 26-31, 1984.

Slide 33

History

One week prior to necropsy this adult castrated male goat was noticed to be weak in the hindquarters. Neurologic signs progressed rapidly and the goat became recumbent. Dementia and seizures developed and the goat was euthanized.

Gross Pathology

Gross lesions were not observed in the CNS either in the fresh state or upon sectioning after formalin fixation.

Diagnosis

Spinal cord: Leukomyelomalacia, multifocal, mild, with metastrongyle parasite(s), breed unspecified, caprine.

Comment

The clinical signs, CNS lesions, and morphology of the adult nematode in spinal cord sections of this goat are consistent with the diagnosis of cerebrospinal nematodiasis due to the meningeal worm, Parelaphostrongylus tenuis. White tailed deer (Odocoileus virginianus) are the natural definitive hosts for P. tenuis but seldom show clinical signs of infection. The adult worms in deer are found in the cranial subarachnoid space, cranial venous sinuses, and occasionally the spinal subarachnoid space, where they reproduce. Eggs are usually deposited directly into venous blood and are carried to the lungs, where they embryonate into first stage larvae. (No P. tenuis eggs or first stage larvae were seen in lung sections from this case.) First stage larvae undergo tracheal migration and are passed in the feces. These resistant larvae penetrate the foot of certain terrestrial gastropod molluscs (slugs and snails) and develop to the infective stage. White tailed deer and other incidental hosts become infected following accidental ingestion of infected gastropods. Larvae released from the intermediate hosts penetrate the gastrointestinal wall and migrate via the peritoneal cavity and spinal nerves to the spinal cord. The larvae develop into adults within the dorsal grey columns of the spinal cord and then migrate from the neural parenchyma, probably via nerve rootlets, into the subarachnoid space. The intramedullary migration and development phases induce remarkably minor damage in the deer. This is not true in aberrant hosts, where these phases can lead to significant central nervous system injury, especially as the worms often fail to exit the neural parenchyma at the normal time.

Contributor

Colorado State University, Department of Pathology, Fort Collins, CO 80523.

Suggested reading

Jortner, B. S., Troutt, H. F., Collins, T., and Scarratt, K.: Lesions of spinal cord parelaphostrongylosis in sheep. Sequential changes following intramedullary larval migration. Vet. Pathol. 22: 137-140, 1985.

Mayhew, I. G., deLahunta, A., Georgi, J. R., and Aspros, D. G.: Naturally occurring cerebrospinal parelaphostrongylosis. Cornell Vet. 66: 56-72, 1976.

Slide 34

History

Tissue from a 4-year-old, female, Woolly monkey (Lagothrix lagotricha) that was found dead in its pen without any previously noted clinical problems.

Gross Pathology

On necropsy examination the following lesions were observed: 1) cardiomegaly with prominent left ventricular hypertrophy, 2) pleural and peritoneal effusions, 3) marked, diffuse pulmonary edema with excessive frothy bronchial and tracheal fluid, and 4) bilaterally shrunken, pale, firm kidneys with a finely granular cortical surface, and on cut surface, a diminished cortex and uneven corticomedullary junction.

Diagnosis

1. Kidney, arteries and arterioles: Arterial and arteriolar sclerosis, intimal, multifocal, moderate, Woolly monkey (Lagothrix lagotricha), nonhuman primate.

2. Kidney: Nephritis, interstitial, chronic, diffuse, moderate, with extensive interstitial fibrosis.

Comment

The histologic changes present are consistent with the long term effects of elevated blood pressure on renal vessels (concentric, laminated thickening (hyperplasia) of mural smooth muscle cells, and occasional subintimal hyaline deposits), with subsequent parenchymal effects. The arterial and arteriolar thickening associated with hypertension has been previously described as medial hypertrophy. Current research (Tracy, 1988) has shown that the thickening is due to fibromuscular proliferation within the intima. Spontaneously occurring hypertension in captive Woolly monkeys is well documented, and appears to occur uniformly in animals over 4 years of age. The cause of death in many animals is congestive heart failure (as in this case), renal failure, and acute cardiovascular accident (i.e., ruptured aortic aneurysm, etc.), complications similar to those seen in human hypertension.

The Woolly monkey is the first reported primate model of spontaneously occurring primary hypertension.

Contributor

Department of Laboratory Animal Resources, University of Pittsburgh, A-115 Scaife Hall, Pittsburgh, PA 15261.

Suggested reading

Giddens, W. E., et al: Spontaneous hypertension and its sequelae in woolly monkeys (Lagothrix lagotricha). Lab. An. Sci. 37: 750-756, 1987.

Tracy, R. E., et al: Two variants of nephrosclerosis separately related to age and blood pressure. Am. J. Pathol. 131: 270-282, 1988.

Slide 35

History

Tissue from an adult, female, New Hampshire Red chicken that had CNS problems. Clinically the bird showed torticollis and severely atrophied pectoral muscles.

Gross Pathology

Pectoral muscles were pale. The heart had a mottled appearance.

Diagnosis

1. Heart: Myocarditis, lymphocytic, multifocal, mild, New Hampshire red chicken, avian.

2. Heart, myocardium: Inclusions, intracytoplasmic, basophilic and pleomorphic., multiple.

3. Heart, small arteries: Mineralization, multifocal, mild.

Comment

Ultrastructural examination of the heart revealed dense, nonmembrane-bound, inclusions within the cytoplasm of myocardial cells. These inclusions were composed of numerous circular images, approximately 65-77 nm in diameter, surrounded by clusters of dense ribosome like granules. Many mature, C-type particles (approximately 100 nm in diameter) were seen in intercellular spaces. The inclusions are morphologically compatible with recently reported "viral matrix" inclusions in the cytoplasm of non-neoplastic myocardial cells of adult chickens infected with avian retrovirus (lymphoid leukosis virus). Similar inclusions have been reported in cultured cells of various neoplasms induced by avian retroviruses.

Contributor

National Veterinary Services Laboratories, P. O. Box 844, Ames, IA 50010.

Suggested reading

Gilka, F., and Spencer, J. L.: Viral matrix inclusion bodies in myocardium of lymphoid leukosis virus-infected chickens. Am. J. Vet. Res. 46: 1953-1960, 1985.

Nakamura, K., Abe, F., Hihara, H., and Taniguchi, T.: Myocardial cytoplasmic inclusions in chickens with hemangioma and lymphoid leukosis. Avian Pathol. 176: 3-10, 1988.

Slide 36

History

Tissue from a 4-year-old, male domestic short-hair feline that had severe dyspnea. Radiographs revealed several pulmonary masses.

Gross Pathology

The lung tissue contained numerous small, grey nodules.

Diagnosis

Lung: Pneumonia, interstitial, fibrinonecrotic, subacute, diffuse, severe, with type II pneumocyte hyperplasia and intra and extracellular protozoal tachyzoites, domestic short-hair, feline.

Comment

The pulmonary tissue is diffusely infiltrated by a subacute inflammatory infiltrate. This infiltrate consists principally of neutrophils and histiocytes. Many of the alveoli are almost completely filled by inflammatory cells and necrotic debris. Focal areas of pulmonary necrosis are present. The alveoli are lined by cuboidal pneumocytes. Toxoplasma tachyzoites are present in these alveolar lining cells and scattered alveolar macrophages.

Contributor

Experimental Pathology Laboratories, Inc., P.O. Box 12766, Research Triangle Park, NC 27709.

Suggested reading

Greene, C. E., and Prestwood, A. K.: Coccidial infections. In: Clinical Microbiology and Infectious Diseases of the Dog and Cat, Greene, C. E. (ed) W. B. Saunders Co., 1984, pp. 824-840.

Slides 37–38

History

Tissue from a male Crl:(LE)BR Long-Evans rat (Rattus norvegicus) that was a control rat in a 2 year study. It was necropsied at about 66 weeks of age due to poor condition and marked weight loss.

Gross Pathology

A 40 x 30 x 30 mm firm mass with a grey cut surface occupied the posterior abdominal cavity in the region of the prostate gland. Similar but considerably smaller masses were also located in the omentum, lung, liver, heart, and kidney.

Diagnosis

Prostate: Adenocarcinoma, tubular, with pulmonary metastasis, Long-Evans rat, rodent.

Comment

Although the incidence of spontaneous prostatic carcinoma has been reported to be high in ACI (ACI/segHapBR) rats, in general prostatic carcinoma is an uncommon spontaneous neoplasm in the rat. In the case submitted, it is interesting that the neutrophils and cellular debris in the lumina of glandular structures in the primary neoplasm are also a feature of the metastases. These accumulations of cellular debris and neutrophils are reminiscent of the prostatitis commonly seen in the prostate gland of rats.

Contributor

Pfizer Central Research, Drug Safety Evaluation, Eastern Point Road, Bldg. 174, Groton, CT 06340.

Suggested reading

Bosland, M. C.: Adenocarcinoma, prostate, rat In: Monographs on Pathology of Laboratory Animals - Genital System. Jones, T. C., Mohr, U., and Hunt, R. D. (Eds.) New York, Springer-Verlag, 1987, pp 252-259.

Ward, J. M., Reznik, G., Stinson, S. F., Lattuada, C. P., Longfellow, D. G., and Cameron, T. P.: Histogenesis and morphology of naturally occurring prostatic carcinoma in the ACI/segHapBR rat. Lab. Invest. 43: 517-522, 1980.

Slide 39

History

Tissue from a 4-week-old, Doberman mix, female, canine. Five of eight puppies from this litter had a heavy mucopurulent nasal discharge. Despite four days of antibiotic therapy, the pups did not improve and this animal was found dead.

Gross Pathology

The cranioventral portion of both the right and left lungs are firm and dark red.

Diagnosis

Lung: Bronchitis/bronchiolitis, necrotizing, acute, diffuse, moderate, with intranuclear inclusion bodies, Doberman-mix, canine.

Esophagus: Intraluminal ascarid larvae, multiple.

Comment

The pulmonary lesions are consistent with canine adenovirus type II infection. Other lesions in this pup included eosinophilic, intracytoplasmic inclusions in the epithelium of the urinary bladder and gastrointestinal tract. The necrotizing bronchiolitis is caused by CAV Type II, which is an opportunistic invader in this immunocompromised animal. Additionally, in some slides large numbers of Toxocara canis larvae are present in the esophagus and stomach. Several conference participants identified, small (2-5 u) eosinophilic intracytoplasmic globules suggestive of distemper inclusions. These findings and the information provided by the contributor suggest that the dog may have been immunocompromised by a concomitant paramyxovirus infection.

Contributor

UT Southwestern Medical Center at Dallas, Division of Comparative Medicine/Department of Pathology, 5323 Harry Hines Blvd., Dallas, TX 75235.

Suggested reading

Castleman, W. L.: Bronchiolitis obliterans and pneumonia induced in young dogs by experimental adenovirus infection. Am. J. Pathol. 119: 495-504, 1985.

Ducatelle, R., et al: Pathology of natural canine adenovirus pneumonia. Res. Vet. Sci. 31: 207-212, 1981.

Glickman, L. T., et al: Canine and human toxocariasis-review of transmission, pathogenesis, and clinical disease. J. Am. Vet. Med. Assoc. 175: 1265-1268, 1979.

Slide 40

History

These tissues are from a 3-1/2-week-old female Shar Pei dog. Three female puppies from a larger litter died acutely within 2 days.

Diagnosis

Heart: Myocarditis, subacute, diffuse, mild, with myodegeneration and intranuclear inclusion bodies, Shar Pei, canine.

Comment

The minimal inflammatory infiltrate and the severity of degenerative and necrotic myofiber changes were considered unusual for parvoviral myocarditis. Except for mild perivascular edema, the lungs were interpreted as essentially normal considering the animal's age and artifactual tissue compression.

Contributor

Comparative Medical and Veterinary Services, 12824 Erickson Avenue, Downey, CA 90242.

Suggested reading

Mulvey, J. J., Bech-Nielsen, S., Haskins, M. E., Jezyk, F. F., Taylor, H. W., and Eugster, A. K.: Myocarditis induced by parvoviral infection in weanling pups in the United States. J. Am. Vet. Med. Assoc. 177: 695-698, 1980.

Robinson, W. F., Huxtable, C. R., and Pass, D. A.: Canine parvoviral myocarditis: a morphological description of the natural disease. Vet. Pathol. 17: 282-293, 1980.

Slide 41

History

Tissues from a mature bitch that had a history of infertility and behavioral signs of hyperestrogenism. Ovariohysterectomy was performed and the reproductive tract submitted for pathological examination.

Gross Pathology

One ovary is replaced by a pale, firm, homogeneous 6 cm diameter spherical mass.

Diagnosis

1. Ovary: Granulosa cell tumor, breed unspecified, canine.

2. Uterus, endometrium: Glandular hyperplasia, hemorrhage and edema, multifocal, mild.

Comment

This mass consists of 90% solid granulosa cell tumor with a Sertoli-like pattern at the periphery; there is an abundant stroma. The uterus is interpreted as essentially normal for a bitch under the influence of estrogens.

Contributor

University of Melbourne, Veterinary Clinical Centre, Werribee, Victoria 3030. Australia.

Suggested reading

Jergens, A. E., and Shaw, D. P.: Tumors of the canine ovary. Comp. Sm. Animal 9: 489-495, 1987.

Nielsen, S. W.: Classification of tumors in dogs and cats. J. Amer. Anim. Hosp. Assoc. 19: 13-60, 1983.

Slide 42

History

This tissue is from the neck of a horse that had a skin problem suspected clinically to be onchocerciasis.

Laboratory Results

Indirect immunofluorescence was positive for deposition of immunoglobulin at the basement membrane zone.

Diagnosis

1. Haired skin: Subepidermal vesicle, with multifocal, mild, subacute dermatitis, breed unspecified, equine, consistent with bullous pemphigoid.

2. Haired skin: Intracorneal pustules with acanthocytes, multiple.

Comment

The intracorneal pustules are not present on all sections. This lesion is consistent with a second diagnosis of pemphigus foliaceous or pemphigus erythematosus.

Contributor

Experimental Pathology Laboratories, Inc., P.O. Box 12766, Research Triangle Park, NC 27709.

Suggested reading

George, L. W., and White, S. L.: Autoimmune skin disease of large animals. Vet. Clin. of N. Amer.: Large Animal Pract. 6: 79-86, 1984.

Scott, D. W., et al: The comparative pathology of non-viral bullous skin diseases in domestic animals. Vet. Pathol. 17: 257-281, 1980.

Slide 43

History

Tissue from a 9.5 kg, 15-year-old, spayed female mixed breed dog that developed rapidly spreading, pruritic, ulcerative, and fistulous cutaneous lesions beginning ventrolateral to the anus.

Diagnosis

Haired skin: Dermatitis and panniculitis, suppurative, focally extensive, severe, with ulceration and intracellular protozoa, breed unspecified, canine.

Comment

Necropsy findings included sessile, ulcerated, or deeply umbilicated skin lesions on the perineum, sides of thorax, dorsum of neck and upper eyelid. Neospora caninum was identified in skin, liver and lungs. The main feature distinguishing N. caninum from T. gondii in tachyzoite induced lesions is the presence of a parasitophorus vacuole containing the organism in T. gondii infections and its absence in N. caninum infections. Cysts of N. caninum have been observed only within the central nervous system. One way to differentiate these cysts from those of T. gondii is by the thickness of the cyst wall; with toxoplasmosis it is very thin while with N. caninum it is at least as thick as a bradyzoite.

Contributor

Angell Memorial Animal Hospital, 350 S. Huntington Avenue, Boston, MA 02130.

Suggested reading

Dubey, J. P., Carpenter, J. L., Speer, C. A., Topper, M. J., and Uggla, A: Newly recognized fatal protozoan disease of dogs. J. Amer. Vet. Med. Assoc. 192: 1269-1285, 1988.

Dubey, J. P., Hattel, A. L., Lindsay, D. S., and Topper, M. J.: Neonatal Neosporum caninum infection in dogs: Isolation of the causative agent and experimental transmission. J. Am. Vet. Med. Assoc. 193: 1259-1263, 1988.

Slide 44

History

Tissue from an orphan, juvenile, female, gray squirrel (Sciurus carolinensis) that was presented to a wildlife rehabilitation clinic. Shortly after admission rapid developing skin lesions were noted around the eyes and the extremities. The condition quickly progressed and involved other areas of the body.

Gross Pathology

The skin, especially on the face and limbs, had multiple thickened and nearly hairless elevated plaques; some of these were reddened.

Diagnosis

Haired skin: Proliferation, epidermal and fibrohistiocytic, multifocal, moderate, with intracytoplasmic inclusion bodies, gray squirrel (Sciurus carolinensis), rodent.

Comment

Proliferative changes are seen in both epidermis and dermis. The epidermis is markedly thickened primarily by expansion of the stratum spinosum with rete peg formation (acanthosis). The stratum corneum is also expanded with or without retention of nuclei (hyperkeratosis/parakeratosis). Epidermal cells have prominent cytoplasmic vacuoles (ballooning degeneration) and large eosinophilic inclusion bodies; these changes also are evident in the sheath of hair follicles. The dermis is filled with fibroblasts which dissect bundles of skeletal muscle fibers. Many fibroblasts have cytoplasmic vacuoles and eosinophilic inclusion bodies. Degenerative changes (vacuolation) may be seen in some cutaneous muscle fibers and nerves. Variable numbers of inflammatory cells, mainly lymphocytes and plasma cells, are in the dermis. Acute to pyogranulomatous folliculitis, involving a large hair follicle, is present on some slides. Coccoid organisms are noted within the degenerating hair shaft of this diseased follicle.

Suggested reading

Hirth, R. S., et al: Epidermal changes caused by squirrel poxvirus. J. Am. Vet. Med. Assoc. 155: 1120-1125, 1969.

King, J. M., et al: Naturally occurring squirrel fibroma with involvement of internal organs.

Slide 45

History

Tissue from a 3-year-old, spayed-female, Doberman pinscher that was presented with sudden onset of multiple firm cutaneous and subcutaneous nodules over the trunk and extremities.

Diagnosis

Haired skin: Dermatitis and panniculitis, granulomatous; chronic, diffuse, moderate with phagocytized protozoal amastigotes, Doberman pinscher, canine.

Comment

Comment

Comment

Leishmaniasis is an almost worldwide zoonotic disease. It is caused by a diphasic protozoan in the genus Leishmania. Two forms of disease (cutaneous and visceral) are caused by different species in the New and Old Worlds. The invertebrate hosts are several species of sandflies which carry the flagellated promastigote. After injection into the vertebrate host, the nonflagellated amastigotes form and are taken up by macrophages where they undergo binary fission. They appear to cause rapid depletion of T-cell regions and proliferation of B-cell regions in lymphoid organs. Immunoglobulin levels and circulating immune complexes are often greatly elevated, are ineffective in controlling the parasites, and can be harmful to the host. Cell-mediated immunity appears to be necessary for control.

Contributor

Veterinary Reference Labs, Inc., 3191 Commonwealth, Dallas, TX 75247.

Suggested reading

Keenan, C. M., Hendricks, L. D., Lightner, L., Webster, H. K., and Johnson, A. J.: Visceral leishmaniasis in the German shepherd dog. I. Infection, clinical disease, and clinical pathology. Vet. Pathol. 21: 74-79, 1984.

Keenan, C. M., Hendricks, L. D., Lightner, L., and Johnson, A. J.: Visceral leishmaniasis in the German shepherd dog. II. Pathology. Vet. Pathol. 21: 80-86, 1984.

Swenson, C. L., et al: Visceral leishmaniasis in an English foxhound from an Ohio research colony. J. Am. Vet. Med. Assoc. 193: 1089-1092, 1988.

Slide 46

History

Tissue from a 2-month-old female CB17 SCID/SCID mouse that was from a research colony. The laboratory was studying different types of immunological diseases. Recently the investigators noticed that mice of this particular strain had a higher morbidity and mortality rate than other strains in the colony. Clinically, mice of this strain would first exhibit a rough pelage, anorexia, and hunched posture; later they became lethargic, dehydrated, emaciated, and moribund, before finally dying.

Gross Pathology

The liver was dark red and had an irregular capsular surface; numerous small (1 mm diameter), randomly distributed, tan-white, necrotic foci were present throughout the liver.

Laboratory Results

Serum from this mouse was negative for mouse hepatitis virus (MHV) by the ELISA technique. However, transmission electron microscopy revealed viral particles characteristic of coronavirus in the liver. In addition, coronavirus antigen was detected in fixed sections of liver with the avidin-biotin immunoperoxidase method.

Diagnosis

1. Liver: Hepatitis, necrotizing, acute, diffuse, severe, with syncytial cells and mineralization, SCID mouse, rodent.

2. Liver: Extramedullary hematopoiesis, multifocal, mild.

Comment

The MHV lesions in this severe combined immunodeficient strain of mouse closely resemble those observed in athymic (nude) mice.

Most of the hepatic parenchyma is necrotic. Only small widely scattered islands of degenerative hepatocytes remain. The extensive loss of hepatocytes in some areas has collapsed the lobular architecture and caused some infolding of the capsular surface. Large amounts of cellular and nuclear debris are in the necrotic areas. Many hepatocytes are undergoing cytolysis or hyalinization, pyknosis and karyorrhexis of hepatocytes are common and some necrotic hepatocytes are becoming mineralized. The majority of the inflammatory cells tend to localize near the periportal areas. These include substantial focal infiltrates of neutrophils as well as mild diffuse mixed infiltrates of predominantly neutrophils and lesser numbers of macrophages and lymphocytes. Occasional degenerative multinucleated syncytial giant cells are scattered within the lesions. The massive destruction of liver and the presence of the syncytial cells are consistent with MHV infection in a severely immunocompromised mouse. Severe combined immunodeficient (SCID) mice are deficient in T and B lymphocytes; therefore, the negative serological test is not unexpected. The EMH is characterized by numerous maturing neutrophils and fewer megakaryocytes.

Contributor

Comparative Pathology Section Bg 28A Rm 111, National Institutes of Health, Bethesda, MD 20892.

Suggested reading

Barthold, S. W., and Smith, A. L.: Mouse hepatitis strain-related patterns of tissue tropism in suckling mice. Arch. Virol. 81: 103-112, 1984.

Barthold, S. W., Smith, A. L., and Povar, M. L.: Enterotropic mouse hepatitis virus infection in nude mice. Lab. Anim. Sci. 35: 613-618, 1985.

Ward, J. M., Collins, M. J., and Parker, J. C.: Naturally occurring mouse hepatitis virus infection in the nude mouse. Lab. Anim. Sci. 27: 372-376, 1977.

Slide 47

History

Tissue from a 19-month-old, female, Crl:CD-1 (ICR)BR mouse that was a control on an 18 month carcinogenicity study.

Diagnosis

Mesenteric lymph node (per contributor): Histiocytic sarcoma, CD-1 mouse, rodent.

Comment

The tissue is characterized by a proliferation of neoplastic histiocytic cells intermixed with morphologically normal lymphocytes. This tumor is unusual because of the numerous multinucleated giant cells which in some areas are the predominant cell type. Although a megakaryocytic sarcoma was included as a differential diagnosis, the evidence of phagocytic activity in the tumor supports a histiocytic origin for the neoplastic cells. Immunohistochemical procedures useful to distinguish histiocytic from megakaryocytic neoplasms are lysozyme, alpha-1 antitrypsin (histiocytes are positive for each) and Factor VIII-related antigen (megakaryocytes are positive).

Contributor

Merrell Dow Pharmaceuticals Inc., P.O. Box 68470, Indianapolis, IN 46268-0470.

Suggested reading

Dunn, T. B.: Normal and pathologic anatomy of the reticular tissue in laboratory mice, with a classification and discussion of neoplasms. J. Nat. Cancer Inst. 14: 1281-1433, 1954.

Slide 48

History

Tissue from a 6-month-old C_3H mouse that was one of many used for antibody production to Aspergillus sp. fungal elements. Fungal cultures were grown and then sonicated to inactivate the culture and then injected intraperitoneally into mice. Mice were then sacrificed, bled and the spleen removed and examined.

Gross Pathology

At necropsy, upon opening the abdominal cavity it was observed that the abdominal contents adhered to the ventral body wall. The omentum, liver, spleen, intestine and kidneys were covered with a pale green fibrinous material and tightly adhered to one another. The liver and spleen were dissected away and the intestine submitted in mass.

Laboratory Results

A pure culture of Yersinia pseudotuberculosis was isolated when cultures were grown at 25°C.

Diagnosis

Abdominal viscera: Peritonitis, pyogranulomatous, chronic, diffuse, severe, with discrete colonies of coccobacillary bacteria, C_3H mouse, rodent.

Comment

With Gram's stain, the bacteria stained gram-negative and are filamentous to bacillary.

Contributor

Food and Drug Administration/D.V.M.R., Bldg. 328A BARC East, Beltsville, MD 20705.

Suggested reading

Obwolo, M. J.: A review of yersiniosis. Vet. Bul. 46: 167-171, 1976.

Slide 49

History

This tissue is from an adult, male Sprague-Dawley rat.

Gross Pathology

There was a mass on the left side of the snout, 1.2 cm. diameter, filled with tan caseous material.

Diagnosis

Nasal cavity: Squamous cell carcinoma, Sprague-Dawley rat, rodent.

Comment

Nasal squamous cell carcinomas in rats usually originate in the anterior nasal cavity, are unilateral, rarely metastasize, and occur primarily as an experimentally induced lesion. In this example, the squamous cell carcinoma is remarkably well differentiated.

Contributor

Bio/dynamics, Inc., Mettlers Road, East Millstone, NJ 08873.

Suggested reading

Kerns, W. D.: Squamous Cell Carcinoma, Nasal Mucosa, Rat. In: Respiratory System, Jones, TC, Mohr, U, Hunt, RD (eds.), Springer-Verlag, pp. 54-61, 1984.

Pour, P., Stanton, M. F., Kuschner, M., Laskin, S., and Shabad, L. M.: Tumours of the Respiratory Tract. In: Pathology of Tumours in Laboratory Animals, Turusov, VS (ed.), Vol. 1-Tumours of the Rat, Part 2, IARC, Lyon, pp. 1-40, 1986.

Slide 50

History

This 35-day-old, male, Finnish-Landrace cross lamb was killed following a two day episode of anorexia and depression.

Gross Pathology

The kidneys were approximately two times normal size, edematous and contained multiple cortical petechiae. Mild to moderate hydronephrosis was present.

Laboratory Results

serum panel:

total protein =	4.4 g/dl
albumin =	3.3 g/dl
serum urea nitrogen =	204.0 mg/dl
creatinine =	14.7 mg/dl
calcium =	8.4 mg/dl
phosphorous =	17.4 mg/dl

WBC: WBC = Normal
RBC = 5.47 x 10^6/ul

HgB = 7.3 g/dl
PCV = 18.2%
thrombocytes = normal

Urine: protein = +4

Diagnosis

Kidney: Glomerulonephritis, membranoproliferative (mesangiocapillary), diffuse, moderate, Finnish-Landrace mix, ovine.

Comment

Synechiation, crescent formation, abundant neutrophils within capillaries, increased cellularity (presumably due to mesangial cells), thickening of the capillary walls due to increased mesangium and subendothelial and intramembranous electron dense deposits are the observed light and electron microscopic glomerular changes in this case, which are characteristic of membranoproliferative (MCGN type I) glomerulonephritis. The lesions within the cortex, subacute interstitial nephritis, and degeneration and necrosis of tubular epithelial cells, are considered secondary changes.

spontaneous mesangiocapillary glomerulonephritis (MCGN) has been documented in Finnish and Finnish-cross lambs in both Scotland and North America. The disease is similar to MCGN Type 1 in man. In lambs the cause is unknown but is thought to represent a recessive inherited genetic defect in complement (C'3) synthesis.

Affected lambs die in renal failure by 4 months of age. Clinical signs may be absent or include central nervous signs of circling, convulsions or muscle tremors. Nervous signs may be the result of spongy transformation of the cerebral white matter sometimes present in affected lambs.

Contributor

Department of Veterinary Pathology, College Vet. Med., Texas A&M University, College Station, TX 77843-4463.

Suggested reading

Angus, K. W., Gardiner, A. C., Mitchell, B., and Thomson, D.: Mesangiocapillary glomerulonephritis in lambs: The ultrastructure and immunopathology of diffuse glomerulonephritis in newly born Finnish landrace lambs. J. Path. 131: 65-74, 1980.

Angus, K. W., Sykes, A. R., Gardiner, A. C., Morgan, K. T., and Thomson, D.: Mesangiocapillary glomerulonephritis in lambs 1. Clinical and biochemical findings in a Finnish landrace flock. J. Comp. Path. 84: 309-317, 1974.

Frelier, P. F., Pritchard, J., Armstrong, D. L., Nagge, W. T., and Lewis, R. M.: Spontaneous mesangiocapillary glomerulonephritis in Finn cross lambs from Alberta. Can. J. Comp. Med. 48: 215-218, 1984.

Slide 51

History

This 10-week-old, female bloodhound developed acute depression, tachycardia, arrhythmia and ascites. Radiographically, cardiomegaly and hepatomegaly were documented.

Laboratory Results

The animal is serologically positive for Trypanosoma cruzi.

Diagnosis

Heart: Pancarditis, subacute, diffuse, severe, with intrasarcoplasmic protozoal amastigotes, bloodhound, canine.

Comment

This case is an excellent example of canine American trypanosomiasis or Chagas' Disease. The organism has a propensity to invade myocardial cells and, in the section submitted, numerous amastigotes are present in clusters within myofibers. The disease is endemic in Central and South America and is reported sporadically in the southwestern United States. The vectors are reduviid (kissing) bugs of the genus Triatoma. Dogs, cats and armadillos can act as reservoirs.

Contributor

Univ. of Texas Southwestern Medical Center at Dallas, Division of Comparative Medicine/Dept. Pathology, 5323 Harry Hines Blvd., Dallas, TX 75235.

Suggested reading

Chapman, W. L., and Hanson, W. L.: American trypanosomiasis. In: Clinical Microbiology and Infectious Diseases of the Dog and Cat, Greene, CE (ed.). WB Saunders, Co., pp. 757-763.

Slide 52

History

The leg from an adult barren-ground caribou (Rangifer tarandi) was submitted by an Inuit (Eskimo) hunter, King William Island, Northwest Territories, Canada, due to abnormal appearance.

Gross Pathology

There were areas of encrustation over the hock joint, metatarsus and fetlocks. The skin was thickened and the skin, subcutaneous fascia and periosteum had a finely granular appearance and texture due to large numbers of small spherical structures less than 1 mm in diameter.

Diagnosis

1. Skin: Dermatitis, chronic, diffuse, severe, with intracellular protozoal cysts and multifocal necrosuppurative epidermitis, acanthosis and hyperkeratosis, barren-ground caribou (Rangifer tarandi).

2. Arteries and veins: Subintimal proliferation, multifocal and segmental, with chronic mild perivasculitis and subintimal protozoal cysts.

Comment

Besnoitia tarandi is a common parasite of caribou and reindeer. Its definitive host is not known. Many infected animals have no clinical disease, but a few are severely debilitated and secondary infection of ulcerated skin can lead to debility as well. B. besnoitii causes an important disease in cattle in Africa and Asia.

Contributor

Department of Veterinary Pathology, University of Saskatchewan, Saskatoon, Saskatchewan S7N OWO Canada.

Suggested reading

Choquette, L. P. E., et al: Besnoitiosis in barren-ground caribou in northern Canada. Can. Vet. J. 8: 282-287, 1967.

Slide 53

History

This 11-month-old, male, greyhound, is one of forty-five young greyhound dogs that died on a farm during the fall of 1985. All affected dogs were between 3 months and 1 year of age. Affected dogs showed acute respiratory distress and neurologic signs. Neurologic signs included incoordination and convulsions.

Diagnosis

1. Lung: Pneumonia, necrohemorrhagic, multifocal, severe, with amoebic trophozoites and cysts, greyhound, canine.

2. Lung: Pneumonia, interstitial, subacute, multifocal, mild with type II pneumocyte hyperplasia and intranuclear and intracytoplasmic inclusion bodies.

3. Lung: Bronchitis/bronchiolitis, necrotizing, subacute, multifocal, mild, with intranuclear and intracytoplasmic inclusion bodies.

Comment

Acanthamebic pneumonia and encephalitis was diagnosed in greyhound dogs on three farms during the fall of 1985. The amoebae range from 10 to 25 um in diameter and have spherical, sharply outlined eccentric nuclei with dense central nucleoli. Sections of several of these dogs were submitted to CDC for fluorescent antibody tests. These FA tests were positive for A. culbertsoni.

Large basophilic intranuclear inclusion bodies, characteristic of adenovirus (canine adenovirus type II), are frequently observed in bronchiolar and bronchial epithelial cells and type II pneumocytes; infrequently within the same cell types are eosinophilic cytoplasmic inclusion bodies suggesting the possibility of a concomitant morbillivirus (canine distemper) infection.

Acanthamoeba can be distinguished from Entamoeba based on the morphology of the nucleus (karyosome). The nucleus of Acanthoameba is open and contains a large and prominent endosome (nucleolus); Entamoeba is characterized by peripheral chromatin plaques and a small endosome.

Contributor

Veterinary Diagnostic & Invest. Lab., P.O. Box 1389, Tifton, GA 31793.

Suggested reading

Ayers, K. M., Billups, L. H., and Garner, F. M.: *Acanthamoeba* in a dog. Vet. Path. 9: 221-226, 1972.

Slide 54

History

Two 600 pound Angus beef calves died of acute respiratory disease. They came from a herd of 175 animals.

Laboratory Results

Anaerobic cultures yielded a heavy growth of Clostridium chauvoei. Fluorescent antibody testing of the lung for C. chauvoei was positive.

Diagnosis

Lung: Pleuropneumonia, fibrinohemorrhagic, acute, diffuse, severe, with bacillary bacteria, Angus, bovine.

Comment

Although blackleg typically produces necrotizing hemorrhagic myositis, visceral involvement can occasionally occur. Viscera most commonly involved include lung, myocardium, and pericardium. In the lung, hemorrhagic pleuritis, characterized by vasculitis and fibrinopurulent inflammation, is typical. Tissue gram stains revealed scattered gram positive bacilli in the lung. Interestingly, this case presented as a respiratory problem with no mention of lameness.

Contributor

Department of Veterinary Science, South Dakota State University Box 2175, Brookings, SD 57007.

References

Hulland, TJ: Muscles and tendons. In: Pathology of Domestic Animals. Jubb, Kennedy, Palmer (ed.) pp 180-185, 1985.

Slide 55

History

This 3 to 4-month-old, crossbred goat had acute onset of hemiparesis which progressed over 6 weeks to include loss of motor function to the front left leg and loss of proprioception to the left hind. It was unable to support its own weight and walk for more than a few steps. The animal was bright, alert and had a good appetite for the entire duration.

Gross Pathology

Upon trimming the fixed spinal cord, the left hemi-cord was gray from C6 to C8.

Diagnosis

Spinal cord: Meningomyelitis and leukomyelomalacia, nonsuppurative, unilateral, diffuse, moderate, breed unspecified, caprine.

Comment

The white matter of the left half of the cord at C7 is almost totally malacic with large numbers of macrophages and the vessels are cuffed by large numbers of lymphocytes. Central nervous involvement with caprine lentivirus (caprine arthritis and encephalitis) is usually limited to kids under 6 months of age.

Contributor

Veterinary Laboratory Services, OMAF, Box 3612, Guelph, Ontario N1H 6R8 Canada.

Suggested reading

Banks, K. L., et al: Experimental infection of sheep by caprine arthritis-encephalitis virus and goats by progressive pneumonia virus. Am. J. Vet. Res. 44: 2307-2310, 1983.

Slide 56

History

This 3-month-old mixed breed, neutered male lamb was found down in the pen. Froth was present around the mouth and breathing was labored. Other lambs in the pen were normal.

Diagnosis

Deep cerebral cortex, gray matter: Laminar necrosis, diffuse, moderate, breed unspecified, ovine.

Comment

The predominant change was widespread laminar cortical necrosis of the cerebral gray matter. These degenerative changes were most pronounced in the deep cortical lamina. The yellowish discolored areas seen grossly and some adjacent areas were fluorescent when exposed to ultraviolet light. The cortical distribution of lesions is typical for ruminant polioencephalomalacia and differs from the periventricular location of lesions which characterizes thiamine deficiency in non-ruminants. The proposed pathogenesis in our case is ruminal acidosis and destruction of thiamine by microbial thiaminase.

Contributor

Iowa State University, Department of Veterinary Pathology, South 16th Street, Ames, IA 50011.

Suggested reading

Smith, M. C.: Polioencephalomalacia in goats. J. Am. Vet. Med. Assoc. 174: 1328-1332, 1979.

Slide 57

History

This 3-year-old thoroughbred castrated male horse had a mass on its sheath, scrotum and inguinal region that was growing rapidly over the past 4 weeks.

Gross Pathology

There is a firm mass 3-4 cm in diameter in the sheath, at the level of reflection of the sheath on to the shaft of the penis.

Diagnosis

Skin, prepuce (per contributor): Dermatitis, chronic, granulomatous, focally extensive, severe, with abundant amyloid, thoroughbred, equine.

Comment

The mass is composed of a background of lymphocytes, fibroblasts and collagen, to which there are added large and small irregularly-shaped islands of a relatively acellular fairly homogeneous eosinophilic matrix in many places is bordered by macrophages and multinucleate giant cells. With congo red stain the eosinophilic matrix stains red and under polarized light has many apple green fibers. Cutaneous amyloidosis is a rare disease of horses and is unassociated with systemic amyloidosis. There is a granulomatous response to the amyloid. Nodules are found mostly on the head, neck and chest. A skin form and an upper respiratory tract form can exist separately or together.

Contributor

University of Pennsylvania, School of Veterinary Medicine, New Bolton Center, 382 West Street Road, Kennett Square, PA 19348.

Suggested reading

Cohen, A. S., and Connors, L. H.: The pathogenesis and biochemistry of amyloidosis. J. Pathol. 151: 1-10, 1987.

Mullowney, P. C.: Dermatologic diseases of horses--allergic, immune-mediated, and miscellaneous skin diseases. Comp. Cont. Ed. 7: S217-S228, 1985.

Slide 58

History

This aborted fetus was from a study in which pregnant goats were inoculated with an infectious agent in midgestation. No clinical signs were evident until the third trimester of gestation, when goats prematurely delivered dead fetuses.

Laboratory Results

Brucella abortus strain 2308 was isolated from lung, stomach contents, liver, kidney, and thymus of this fetus and from the placenta. This is a virulent strain of B. abortus used in experimental bovine brucellosis studies.

Diagnosis

Lung: Pneumonia, bronchointerstitial, histiocytic, subacute, multifocal to diffuse, moderate, breed unspecified, caprine.

Comment

Lung lesions in this goat fetus are characteristic of Brucella abortus infection in the bovine. Pregnant goats and cows abort in the third trimester of gestation following exposure in early to midgestation to a pathogenic strain of B. abortus. Pulmonary lesions are initially perivascular, and then involve the alveolar interstitium and interlobular septae. Brucellae localize in macrophages and neutrophils in lung parenchyma, and are free in vascular lumens.

Contributor

National Animal Disease Center, P. O. Box 70, Dayton Road, Ames, IA 50010.

Suggested reading

Anderson, T. D., Meador, V. P., and Cheville, N. F.: Pathogenesis of placentitis in experimental brucellosis. I. Gross and histologic lesions. Vet. Path. 23:219-226, 1986.

Anderson, T. D., Cheville, N. F., Meador, V. P.: Pathogenesis of placentitis in experimental brucellosis. II. Ultrastructural studies. Vet Path. 23:227-239, 1986.

Meador, V. P., Hagemoser, W. A., and Deyoe, B. L.: Histopathologic findings in Brucella abortus-infected, pregnant goats. Am. J. Vet. Res. 49:274-280, 1988.

Slide 59

History

This tissue is from a female bovine.

Laboratory Results

Lung – No bacteria isolated.

Lung – Fluorescent antibody (FA) positive for respiratory syncytial virus (RSV) ELISA positive for RSV using pulmonary homogenate and a commercially available human RSV kit.

Diagnosis

1. Lung: Pneumonitis, fibrinosuppurative, diffuse, moderate, with multifocal necrotizing bronchiolitis and syncytial cells containing eosinophilic intracytoplasmic inclusion bodies, breed unspecified, bovine.

2. Lung: Pneumonia, fibrinonecrotic, chronic-active, multifocal and focally extensive, moderate.

Comment

In the present case, there is evidence of both a chronic bacterial pneumonia suggestive of that caused by Pasteurella hemolytica and a more acute pneumonitis consistent with RSV infection. Syncytial cells are numerous in bronchioles and are rarely demonstrable in alveoli in some sections. Cytoplasmic inclusions, which are only occasionally evident in the sections, are in both syncytial cells and bronchiolar epithelium. Bovine parainfluenza virus should be considered as a differential diagnosis of viral pneumonia with syncytia and cytoplasmic inclusion bodies.

Contributor

Texas Veterinary Medical Diagnostic Lab., P.O. Box 3200, Amarillo, TX 79116-3200.

Suggested reading

Bryson, D. G., et al: Respiratory syncytial virus pneumonia in young calves: Clinical and pathological findings. Am. J. Vet. Res. 44: 1648-1655, 1983.

Slide 60

History

This tissue is from an adult, female, Suffolk-cross ovine. Several sheep have been lost in this flock; most have died with no outward signs.

Laboratory Results

A lung swab of the pulmonary abscess yielded a mixed culture of Pseudomonas aeruginosa, Pasteurella haemolytica, and Corynebacterium pseudotuberculosis. Listeria were not isolated from CSF. Nutritional examination revealed selenium of 0.25 ug/g dry weight (normal 1.2-2.0). Vitamin E could not be determined due to lipid interference.

Diagnosis

Lung: Pneumonia, interstitial, peribronchiolar and perivascular, lymphohistiocytic, multifocal, mild, Suffolk-cross, ovine.

Comment

The lung had a patchy interstitial pneumonia characterized by thickening of alveolar septa, with proliferation of type II pneumocytes. Alveolar lumens contained bizarre large mononuclear cells felt to be of type II cell origin. Within these regions and multifocally present elsewhere was a marked lymphoid hyperplasia, principally in perivascular peribronchiolar, and occasionally in subpleural locations.

The ovine progressive pneumonia virus and the Visna/Maedi virus belong to the subfamily Lentivirinae of the family Retroviridae and typically produce progressive pulmonary alterations and CNS lesions. This group of viruses is closely related to the caprine arthritis. encephalitis virus.

Contributor

Michigan State University, P.O. Box 30076, Lansing, MI 48909-7576.

Suggested reading

Banks, K. L., et al: Experimental infection of sheep by caprine arthritis- encephalitis virus and goats by progressive pneumonia virus. Am. J. Vet. Res. 44: 2307-2311, 1983.

Cutlip, R. C., et al: Lesions of ovine progressive pneumonia-interstitial pneumonitis and encephalitis. Am. J. Vet. Res. 40: 1370-1374, 1979.

Slide 61

History

This tissue is from a 58 pound, female porcine with a history of respiratory disease. She was found dead.

Laboratory Results

Hemophilus pleuropneumoniae was isolated from the lungs.

Diagnosis

Lung: Bronchopneumonia, fibrinous, acute, diffuse, severe, with multifocal necrotizing vasculitis and thrombosis, fibrinous pleuritis and bacilli, breed unspecified, porcine.

Comment

Gram staining revealed small to large numbers of gram negative bacilli within the inflammatory/necrotic debris. The lesions in this case are comparable to pulmonary pasteurellosis in cattle. The "swirl cells" bordering the necrotic foci are thought to be neutrophils.

Contributor

Mobil Oil Corporation, Toxicology Division, P.O. Box 1029, Princeton, NJ 08540.

Suggested reading

Didier, P. J., Perino, L., and Urbance, J.: Porcine Haemophilus pleuropneumonia - microbiologic and pathologic findings. J. Am. Vet. Med. Assoc. 184: 716-719, 1984.

Sebunya, T. N. K., and Saunders, J. R.: Haemophilus pleuropneumonia infection in swine--a review. J. Am. Vet. Med. Assoc. 182: 1331-1337, 1983.

Slide 62

History

This adult male baboon (Papio cynocephalus) was wild caught as an adult in 1979.

Gross Pathology

The left kidney was pear shaped, 10 cm pole to pole, 7 cm wide across the rounder cranial pole and 4 cm across the caudal pole. It was tan/brown. On cross-section, the cranial pole was filled with a well delineated round bulging cream-colored firm mass. The mass contained multiple 1-2 mm cystic structures which contained a yellow clear fluid. The mass displaced the renal pelvis caudally and compressed the cortex.

Diagnosis

1. Kidney: Renal cell carcinoma, baboon (Papio cynocephalus), nonhuman primate.

2. Kidney: Nephritis, interstitial, chronic, diffuse, mild, with multifocal amyloidosis.

Comment

Polycythemia, hypercalcemia, and hypertension are 3 paraneoplastic syndromes reported in animals and man associated with renal cell carcinoma. A feature of this neoplasm in dogs (and man) is cutaneous metastasis; cutaneous masses may be confused with apocrine gland neoplasms.

Contributor

Johns Hopkins University School of Medicine, Department of Pathology, Baltimore, MD 21205.

Suggested reading

Jones, S. R., and Casey, H. W.: Primary renal tumors in nonhuman primates. Vet. Path. 18(supp. 6): 89-104, 1981.

Slide 63

History

This juvenile to young adult, female, cynomolgus monkey (Macaca fascicularis) was in the control group of a subchronic toxicology experiment. She was killed by intravenous injection of sodium pentobarbital after five weeks on test.

Laboratory Results

Clinical Pathology	ALT (U/L)	AST (U/L)
Pre-test	37	17
Four weeks on test	504	104
Five weeks on test	457	130

Serology	Hepatitis A Titers (by RIA method)
Five weeks on test	IgG positive
	IgM negative

Diagnosis

Liver: Hepatitis, portal and periportal, lymphoplasmacytic, diffuse, mild, with random individual hepatocellular necrosis, cynomolgus monkey (Macaca fascicularis), nonhuman primate.

Comment

Hepatitis A infection in non-human primates is a mild, almost subclinical, disease with a spontaneous recovery having no serious sequelae. Elevations in serum hepatic enzyme activities are often the only indication of disease. The virus is believed to be transmitted by the fecal-oral route, and can persist on contaminated surfaces. The potential of enzootic infection with hepatitis A virus must be considered when analyzing data from toxicologic studies with non-human primates.

Contributor

Sterling-Winthrop Research Institute, Columbia Turnpike, Rensselaer, NY.

Suggested reading

Lankas, G. R., and Jensen, R. D.: Evidence of hepatitis A infection in immature rhesus monkeys. Vet. Pathol. 24: 340–344, 1987.

Slighter, R. G., Kimball, J. P., Barbolt, T. A., Sherer, A. D., and Drobeck, H. P.: Enzootic hepatitis A infection in cynomolgus monkeys. Am. J. Primatol. (in press).

Tabor, E., Purcell, R. H., and Gerety, R. J.: Primate animal models and titred inocula for the study of human hepatitis A, hepatitis B, and non-A non-B hepatitis. J. Med. Primatol. 12: 305–318, 1983.

Slide 64

History

This adult, female, cynomolgus monkey was a control animal in a feeding study.

Diagnosis

Liver: Cholangitis and pericholangitis, eosinophilic and chronic, diffuse, mild, with intraductal trematode, cynomolgus monkey (Macaca fascicularis), nonhuman primate.

Comment

A. foxi is a common parasite within the bile ducts of predominantly new world monkeys. There are insufficient morphologic features within these tissue sections to positively identify this trematode.

Contributor

Biodynamics, Inc., Mettlers Road, East Millstone, NJ 08873.

Suggested reading

Chitwood, M., and Lichtenfels, J. R.: Identification of parasitic metazoa in tissue sections. Exp. Parasitol. 32: 419-425, 1972.

Slides 65–67

History

A wild-caught 4-1/2-year-old female cynomolgus monkey (Macaca fascicularis) was obtained from a vendor. Prior to delivery all animals had at least three consecutive negative tuberculin tests. After delivery all animals were held in quarantine for six months. While in quarantine this animal was negative in response to intrapalpebral injections of tuberculin (mammalian) on six occasions. The last test was performed two days before the monkey was found dead.

Gross Pathology

The carcass was characterized by generalized muscle wasting and absence of body fat (weight-1.7Kg). The lung was firm and had numerous coalescing grey-white caseous foci (0.1 to 5.0 cm dia.). Similar lesions were present in the mesenteric lymph nodes and liver. In addition, several discrete white nodules (0.1 cm dia.) were present in the kidneys and spleen.

Diagnosis

1. Liver: Granulomas, multiple and coalescing, moderate, with granulomatous hepatitis, cynomolgus monkey (Macaca fascicularis), nonhuman primate.

2. Lung: Pneumonia, fibrinonecrotic, chronic-active, multifocal and focally extensive, moderate.

Comment

The macroscopic and histomorphologic appearance of the lesions for this monkey are fairly typical of an advanced and overwhelming mycobacterial infection. Acid-fast staining (Kinyoun's) revealed numerous relatively short slender acid-fast rods which were located principally among cellular debris within areas of necrosis or within the cytoplasm of macrophages. This differs from the more commonly observed form of tuberculosis in nonhuman primates which is characterized by discrete granulomatous lesions and vey few microorganisms. Microbial culture and identification is the only way to determine the etiologic agent.

Contributor

Sterling-Winthrop Research Institute, 81 Columbia Turnpike, Rensselaer, NY.

Suggested reading

Goodwin, B. T., Jerome, C. P., and Bullock, B. C.: Unusal lesion morphology and skin test reaction for Mycobacterium avium complex in macaques. Lab. An. Sci. 38:20-24, 1988.

Slide 68

History

This 8-month-old, male castrate, domestic shorthair cat had become lethargic, was not eating and appeared depressed. The cat was losing weight but the abdomen was greatly distended. The cat had chronic diarrhea.

Gross Pathology

The abdomen was filled with a golden colored fluid. There were fibrin adhesions between the organs and intestine. The peritoneal lining had fibrin strands.

Laboratory Results

FeLV positive; FIP positive.

Diagnosis

1. Spleen: Splenitis and capsulitis, pyogranulomatous, diffuse, moderate, domestic shorthair cat, feline.

2. Liver: Subcapsular hepatitis and capsulitis, pyogranulomatous and fibrinous, multifocal, mild to moderate.

Comment

Feline infectious peritonitis (FIP) is characterized by the development of fibrinous inflammation of serous membranes and/or the formation of disseminated pyogranulomas. This disease has a high morbidity and low mortality. The pathogenesis of FIPV infection is complex and not completely understood. The infection can be subdivided into a primary and a secondary reaction: Most cats clear the disease during the primary phase which is characterized by a mild upper respiratory infection and never proceed to the secondary phase which leads to the proper picture of FIP.

FIPV multiplies first in the epithelial cells of the upper respiratory tract and the intestine. Once the virus crosses the mucosal barrier, FIP occurs. The virus is associated with blood monocytes. This disease is an immune mediated disease. This cell association with macrophages leads to increased synthesis and release of complement, interleukin 1, and increased stimulation of T and B cells.

Cell mediated immunity appears to be the only beneficial protective response. Antibody seems to enhance virus uptake by phagocytic cells. The net effect is to enhance the level of virus expression. Antibody also reacts with antigen and complement, thus resulting in localized arthus-like hypersensitivity responses.

Contributor

FSIS, SCI, Path Br Bldg 318C - BARC-3, Beltsville, MD 20705.

Suggested reading

Lutz, H., Hauser, B., and Horzinck, M. C.: Feline infectious peritonitis (FIP) - the present state of knowledge. J. Sm. Anim. Pract. 27: 108-116, 1986.

Slide 69

History

This tissue is from a 7-month-old, male Sprague-Dawley rat that was an untreated control on a reproduction study.

Gross Pathology

The ears are thickened.

Diagnosis

Pinna: Chondritis, pyogranulomatous, chronic, diffuse, severe, with nodular chondromatous hyperplasia and osseous metaplasia, Sprague-Dawley rat, rodent.

Comment

Auricular lesions, as noted in this case, have been reported as spontaneous lesions in Sprague-Dawley derived rats (3.7%) as well as fawn-hooded rats (15%). Experimentally, similar lesions have been reproduced in Wistar-Lewis rats sensitized to type II collagen with bovine type II collagen. It is not known if the spontaneous rodent lesions are associated with autoantibodies to type II collagen as are the lesions of polychondritis of man. Similarities of the human and rodent condition are the primary involvement of cartilage and chondrolysis seen in the early lesions. The dissimilarities include the additional involvement of cartilage of the nose, larynx, trachea and bronchi, the pain associated with the lesion and the acute inflammatory response response observed in polychondritis of humans.

Contributor

Hazleton Laboratories America, Inc., 9200 Leesburg Turnpike, Vienna, VA 22180.

Suggested reading

Chiu, T., and Lee, K. P.: Auricular chondropathy in aging rats. Vet. Pathol. 21: 500-504, 1984.

Prieur, D. J., Young, D. M., and Counts, D. F.: Auricular chondritis in fawn-hooded rats. Am. J. Pathol. 116: 69-76, 1984.

Slide 70

History

This tissue is from a clinically normal, young adult, male cynomolgus monkey (Macaca fascicularis).

Diagnosis

1. Lung: Pneumonia, granulomatous and eosinophilic, chronic, multifocal, moderate with trematode eggs and encapsulated adults, cynomologus monkey (Macaca fascicularis) nonhuman primate; etiology--consistent with Paragonimus sp.

2. Lung: Pleuritis, chronic, eosinophilic, focally extensive, mild.

Comment

Examination of histologic material did not allow for speciation of this trematode.

Suggested reading

Flynn, R. J.: Parasites of Laboratory Animals. Iowa State University Press, Ames, 1973, pp. 123-125.

Slide 71

History

This tissue is from an 84-week-old, female Crl:CD Sprague-Dawley rat. It was a control rat that died during week 78 of a 104 week study.

Diagnosis

Ovary: Mesothelioma, bilateral, Sprague-Dawley rat, rodent.

Comment

Lewis recently reported 2 cases of benign and 5 cases of malignant mesothelioma out of 210 spontaneous ovarian tumors from 7748 untreated control Sprague-Dawley rats. Alison and Morgan reported 2 benign mesotheliomas out of 204 primary ovarian tumors from 39,851 control and treated F344 female rats from the National Toxicology Program.

Contributor

Hazleton Laboratories, 9200 Leesburg Turnpike, Vienna, VA 22180.

Suggested reading

Alison, R. H., and Morgan, K. T.: Ovarian neoplasms in F344 rats and B6C3F1 mice. Environmental Health Perspectives 73: 91-106, 1987.

Lewis, D. J.: Ovarian neoplasia in the Sprague-Dawley rat. Environmental Health Perspectives 73: 77-90, 1987.

Slide 72

History

This 3-month-old male, wild-caught opossum (Didelphis virginiana) was presented for evaluation of depression and dyspnea of two weeks duration. A jugular venipuncture was performed for a complete blood count and the animal expired on the examination table.

Diagnosis

Lung: Bronchopneumonia, pyogranulomatous, multifocal to coalescing, moderate, with intrabronchiolar adult and larval metastrongyles, Virginia opossum (Didelphis virginiana), marsupial.

Comment

Didelphostrongylus hayesi, a metastrongyloid nematode, has been reported only in the opossum from the southeastern United States. Didelphostrongylus has an indirect life cycle typical of most metastrongyloid nematodes; intermediate hosts include terrestrial snails of the genera Triodopsis and Mesodon.

Trichostrongyles are characterized by platymyarian musculature and external cuticular ridges. Although the musculature in this case is not classical coelomyarian, the absence of external cuticular ridges allows the diagnosis of a metastrongyle to be made. In addition, trichostrongyles do not produce larvae within the uterus of the female. Careful study of the larvae revealed eccentric tail tips (caudal spine) that are characteristic of metastrongyles.

Contributor

University of Tennessee, College of Veterinary Medicine, Department of Pathobiology, P.O. Box 1071, Knoxville, TN 37901-1071.

Suggested reading

Anderson, C., Little, M. D., and Strelive, U. R.: The unique lungworms (Nematoda: Metastrongyloidea) of the opossum (Didelphis marsupialis Linnaeus). System Parasitol. 2: 1-8, 1980.

Slide 73

History

This 8-month-old blue fronted parrot (Amazona amazonica) was weak, anorexic, emaciated, and had profuse, watery cloacal droppings.

Gross Pathology

There was a swollen liver, enlarged spleen, and roughened, thickened air sacs.

Diagnosis

1. Liver: Hepatitis, plasmacytic, multifocal, random, moderate, with individual cell necrosis, multiple necrogranulomas, and intracytoplasmic bacterial colonies, blue fronted amazon parrot (Amazonia amazonica) avian; etiology--consistent with Chlamydia psittaci.

2. Kidney: Nephritis, tubulointerstitial, plasmacytic, multifocal, moderate with intracytoplasmic bacterial colonies.

3. Spleen: Splenitis, plasmacytic, diffuse, moderate, with diffuse reticuloendothelial hyperplasia.

Comment

Large numbers of elementary bodies consistent with those of Chlamydia psittaci were visible in sections stained with the PVK technique (i.e., Gimenez stain for Rickettsia and Pierce-Vanderkamp modification for Chlamydia in sections). These were particularly numerous in the spleen. Smaller numbers of organisms were seen in sections of the kidney, but few organisms were evident in the sections of the lung sac.

Contributor

Consultants in Veterinary Pathology, P.O. Box 68, Murrysville, PA 15668-0068.

Suggested reading

Cartwright, M., et al: Psittacine inclusion body hepatitis in an aviary. J. Am. Vet. Med. Assoc. 187: 1045-1046, 1985.

Slides 74–75

History

During routine physical examination, this 1-year-old, male, slenderhorn gazella (Gazella leptoceros leptoceros) was found to have a coccidia infestation. Treatment consisted of Amprolium and Chloramphenicol. Eight days subsequently, the animal was found moribund and died 8 hours later.

Gross Pathology

Numerous solid white foci were scattered throughout the lung parenchyma. Many of these lesions coalesced to form large caseous-like nodules, some measuring 3 to 4 cm in diameter. The area surrounding these lesions was red and had a firm consistency. The ventral portion of both left and right lungs had the most severe involvement.

Diagnosis

Lung: Pneumonia, pyogranulomatous and necrotizing, focally extensive, severe, with multifocal mineralization and branching filamentous bacteria, slenderhorn gazelle (Gazella leptoceros leptoceros), bovine.

Comment

This organism was acid fast positive with Cotes-Fite and Gram positive suggesting Nocardia sp.; however, culture is necessary for definitive diagnosis.

Contributor

Comparative Pathology, University of Texas Health Science Center at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235.

Suggested reading

Chandler, F. W., Kaplan, W., and Ajello, L.: Actinomycosis. In Color Atlas and Text of the Histopathology of Mycotic Diseases. Year Book Medical Publishers, Inc., Chicago, pp. 26-29, 1980.

Slide 76

History

This 8-month-old, male, mixed breed dog had a rear leg weakness when running, which progressively worsened until the dog was unable to rise and bear weight on his rear legs.

Laboratory Results

Fluorescent antibody examination of the brain for rabies virus was negative.

Diagnosis

Spinal cord: Myelitis, nonsuppurative, multifocal, mild, with spongiosis and glial eosinophilic intranuclear inclusion bodies, breed unspecified, canine.

Comment

Lesions of canine distemper were confined to the brain and spinal cord and consisted of multifocal areas of spingiosis, lymphocytic perivascular cuffing, increased numbers of glial cells and intranuclear eosinophilic inclusion bodies within glial cells. Lesions were present within cerebellar peduncles and, to a variable degree, within all funiculi of all segments of spinal cord. The choroid plexus was infiltrated by lymphocytes.

Contributor

Animal Health Diagnostic Laboratory, Post Office Box 30076, Lansing, MI.

Suggested reading

Vandevelde, M., Kristensen, F., Kristensen, B., Steck, A. J., and Kihm, U.: Immunological and pathological findings in demyelinating encapsulitis associated with canine distemper virus infection. Acta Neuropathol. 56: 1-8, 1982.

Vandevelde, M., Higgins, R. J., Kristensen, B., Kristensen, F., Steck, A. J., and Kihm, U.: Demyelination in experimental canine distemper virus infection: Immunological, pathologic, and immunohistological studies. Acta Neuropathol. 56: 285-293, 1982.

Slide 77

History

This tissue is from a female Chinese pug canine that had acute onset of seizures, behavioral changes and ataxia.

Diagnosis

Cerebrum: Meningoencephalitis, nonsuppurative, multifocal and focally extensive, moderate, Chinese pug, canine.

Comment

The lesions of canine granulomatous meningoencephalitis are most severe in cerebral and cerebellar white matter and the cervical spinal cord; the disease occurs in adult dogs. In contrast, "pug" encephalitis occurs in younger dogs (9 months to 4 years of age).

Contributor

North Carolina State University College of Veterinary Medicine, 4700 Hillsborough Street, Raleigh, NC 27606.

Suggested reading

Cordy, D. R.: Canine granulomatous meningoencephalomyelitis. Vet. Pathol. 16: 325-333, 1979.

deLahunta, A: Veterinary Neuroanatomy and Clinical Neurology, W. B. Saunders Co, pp. 384-385, 1983.

Slide 78

History

This 6-year-old male, white German shepherd dog had recent history of disorientation and ataxia. Clinical examination was consistent with encephalitis. The animal was euthanized for progressive CNS signs.

Diagnosis

Cerebrum: Oligodendroglioma, German shepherd dog, canine.

Comment

Cells were identified as malignant oligodendrocytes by their round to oval, hyperchromatic nuclei and clear perinuclear halo. This tumor appears to have originated in the septal nucleus and extends dorsally to the corpus callosum and laterally to the internal capsule. Further caudally, the tumor crossed the internal capsule to invade the putamen and globus pallidus. The mesencephalic aqueduct was severely narrowed and surrounded by tumor. Blockage of the aqueduct apparently induced hydrocephalus secondarily. Grossly, oligodendrogliomas often appear well demarcated; however, their pattern of growth can be highly infiltrative, as in this case.

Contributor

Johns Hopkins University School of Medicine, Department of Pathology, Baltimore, MD 21205.

Suggested reading

Cordy, D. R.: Tumors of the nervous system and eye. In: Tumors in Domestic Animals. Moulton, J. E. (ed), University of California Press, Berkeley, pp 430-433, 1978.

Slide 79

History

This tissue is from a 3-month-old male Coopworth lamb. Each year several lambs in this flock develop a syndrome of progressive hindlimb ataxia commencing at approximately two to three months of age.

Diagnosis

Brainstem, dorsal nuclei: Axonal degeneration and swelling (spheroids), multifocal, bilateral, moderate, Coopworth, ovine.

Comment

Neuraxonal dystrophy has been diagnosed on several properties throughout New Zealand in Coopworth, Perrendale and Romney breeds of sheep. Clinically and histologically it resembles the systemic neuraxonal dystrophy described in Suffolk sheep in California by Cordy et al (1967). Similar syndromes have also been described in cats, dogs and horses.

Contributor

Palmerston North Animal Health Laboratory, P.O. Box 1654, Palmerston North, New Zealand.

Suggested reading

Beech, J.: Neuraxonal dystrophy of the accessory cuneate nucleus in horses. Vet. Pathol. 2: 384-393, 1984.

Cordy, D. R., Richards, W. P. C., Bradford, G. E.: Systemic neuraxonal dystrophy in Suffolk sheep. Acta Neuropath. 8: 133-140, 1967.

Slide 80

History

This 1-year-old, female Arabian equine had progressive forelimb hypermetria, intention tremors, no menace reflex and normal cranial nerve function; all compatible with cerebellar dysfunction.

Diagnosis

Cerebellum: Purkinje cell degeneration and loss, multifocal, moderate, with diffuse hypocellularity of the granular cell layer, Arabian, equine.

Comment

The principal alteration is randomly distributed cerebellar atrophy and Purkinje cell degeneration, consistent with cerebellar abiotrophy. Random folia have mild degeneration and absence of Purkinje cells. Remaining Purkinje cells have eosinophilic granular cytoplasm and eccentric nuclei. Affected areas have decreased cellularity in the granular layer and increased cellularity in the molecular layer. The persistence of the external granular cell layer is interpreted as an abnormal finding in a 1-year-old horse.

Contributor

School of Veterinary Medicine, Purdue University, West Lafayette, IN 47907.

Suggested reading

Montgomery, D. L., and Storts, R. W.: Hereditary striationigral and cerebello-olivary degeneration of the Kerry blue terrier. Vet. Path. 20: 143-159, 1983.

Yasuba, M., et al: Cerebellar cortical degeneration in beagle dogs. Vet. Pathol. 25: 315-317, 1988.

Slide 81

History

This 3-month-old, adrenalectomized, male Lewis rat was received from a vendor at 9 weeks of age.

Laboratory Results

Immunoperoxidase stains are positive for SDAV.

Diagnosis

1. Salivary gland, submandibular: Sialoadenitis, necrotizing, subacute, diffuse, moderate, with associated periglandular inflammation, Lewis rat, rodent.

2. Salivary gland, parotid: Atrophy, diffuse, moderate, with multifocal necrosis.

~~3. Lung: Bronchopneumonia, subacute, multifocal, mild.~~

Comment

The changes seen in this case are consistent with early infection by sialodacryoadenitis virus (SDAV) in rats). There is scattered necrosis of the ducts and acini of the submaxillary gland with minimal inflammation. Edema of the capsule and septae is moderate. The adjacent sublingual gland is not affected. Involvement of Harderian gland usually occurs after the salivary glands. Resolution is accompanied by squamous metaplasia of ducts and is usually complete 3-4 weeks after infection. Viral sialodacryoadenitis is a common self-limiting disease affecting the seromucous glands of the head of rats. It is caused by a coronavirus and is characterized by variable morbidity and low mortality.

Contributor

Pathobiology and Primatology Laboratory, Division of Product Quality Control, Center for Biologics Evaluation and Research, Food and Drug Administration, 8800 Rockville Pike, Bethesda, MD 20892.

Suggested reading

Jacoby, R. O., Bhatt, P. N., and Jones, A. M.: Pathogenesis of sialodacryoadenitis in gnotobiotic rats. Vet. Path. 12: 196, 1975.

Wojeinski, Z. W., and Percy, D. H.: Sialodacryoadenitis virus associated lesions in the lower respiratory tract of rats. Vet. Pathol. 23: 278-286, 1986.

Slide 82

History

This is tissue from a virgin B6C3F1 female mouse used as a control in a 2-year carcinogenesis bioassay.

Diagnosis

Uterus, endometrium: Hyperplasia, cystic, diffuse, severe B6C3F1 mouse, rodent.

Comment

Many of the ovary sections also present various lesions as mild atrophy, "brown degeneration" of interstitial cells and cysts.

Contributor

National Institute of Environmental Health Sciences, P.O. Box 12233, Research Triangle Park, NC.

Suggested reading

Burek, J. D., Moello, J. A., and Warner, S. D.: Selected non-neoplastic disease. In: The Mouse in Biomedical Research Vol II., Ed Foster, H. L., Small, J. D., and Fox, J. G. Academic Press, New York, pp. 425-440, 1982.

Slide 83

History

This 7-year-old, male, patas monkey (Erythrocebus patas) was part of a study on transplacental carcinogenesis with N-nitrosoethylurea (0.1 mm ENU/kg beginning at 30 days of gestation, 12 doses) and postweaning phenobarbital treatment for 33 months (@ 15mg/kg/day).

Gross Pathology

The left lumbar muscle was enlarged intraabdominally (8x5 cm) by infiltrative tissue mass. The mass was gray-white in color, of soft consistency, and was confined to the lumbar muscle.

Diagnosis

Skeletal muscle, lumbar (per contributor): Angiolipoma, Patas monkey (Erythrocebus patas), nonhuman primate.

Comment

Angiolipomas are locally aggressive, do not metastasize, remain within the skeletal muscle, and have a high recurrence rate.

Contributor

National Cancer Institute, FCRF Bldg 538, Frederick, MD 21701-1013.

Suggested reading

Allen, P. W.: Tumors and Proliferations of Adipose Tissue. A Clinicopathological Approach. Masson Publ. USA Inc., NY, 1981.

Slide 84

History

This 3.5-year-old, male rabbit (Oryctolagus cuniculus) had been used as an antibody producer for the past three years. Examination revealed the animal to be hypothermic (98.5 degrees Fahrenheit), to have a white nasal-ocular discharge, to be unable to walk and right himself and to have intermittent muscle twitching.

Laboratory Results

Pasteurella multocida was isolated from the middle ear and the brain.

Diagnosis

Spinal cord: Abscess, focal, moderate, rabbit.

Comment

Pasteurellosis is most commonly associated with infection of the upper nasal cavity ("snuffles") and pneumonia; however, the organism has been isolated from lesions at many sites including metritis, cutaneous abscesses, otitis media and otitis interna.

There is a mild meningitis secondary to the abscess.

Contributor

St. Jude Children's Research Hospital, Animal Resources Center, 332 N. Lauderdale, Memphis, TN 38101.

Suggested reading

Benirschke, K., Garner, F. M., and Jones, T. C.: Pasteurella. In: Pathology of Laboratory Animals. Springer-Verlag, New York, 1433-1437, 1978.

Slides 85–86

History

These tissues are from an 11-year-old, spayed female, domestic shorthair cat.

Gross Pathology

There were small firm nodules in the apical areas of both lungs with adhesions to the pleura.

Diagnosis

1. Lung: Adenocarcinoma, sclerosing, domestic shorthair, feline.
2. Skeletal muscle and pleura: Adenocarcinoma, sclerosing, metastatic.

Comment

The tumor was considered to originate from the bronchial tree. Abortive cilia can be seen in a few glands on the muscle slide.

Contributor

Ortho Pharmaceutical Corporation, Route 202, Raritan, NJ 08869.

Suggested reading

Moulton, J. E.: Tumors of the respiratory system. In: Tumors in Domestic Animals. pp 216–230, 1978.

Slide 87

History

This tissue is from a 12 to 18-month-old bovine. It was part of a herd that was slaughtered after several cattle showed signs of pneumonia and had positive complement fixation titres against contagious bovine pleuropneumonia.

Gross Pathology

A portion of the lung had a marbled appearance which resulted from the intermingling of lobules showing varying stages of red and grey hepatization, with relatively normal lobules. The marbled effect was accentuated by the distention of interlobular septa, and the interstitium surrounding the vessels and airways.

Laboratory Results

Mycoplasma mycoides was cultured from specimens of lung and positive immunofluorescence was obtained on impression smears made from the same tissue. Routine aerobic bacteriological isolations were negative. A titre of 1:80 was found in the serum with the complement fixation test.

Diagnosis

Lung: Bronchopneumonia, subacute to chronic, diffuse, severe, with severe interlobular fibrinonecrotic lymphangitis and thrombosis, breed unspecified, bovine.

Comment

Several histopathological features typical of contagious bovine pleuropneumonia are noticeable. There are different stages of inflammation in the lung and within lobules. The interlobular septa are markedly distended associated with dilation of lymphatics, necrosis of the walls of the lymphatics and thrombosis. A distinct inflammatory zone is frequently appreciable along the margins of the septa. Arteritis of intra- and interlobular blood vessels with occasional thrombosis is evident, and parts of lobules are necrotic which indicate early sequestrum formation. There is organization of interlobular septa, as well as peribronchial and perivascular areas.

Contributor

Section of Pathology, Veterinary Research Institute, P.O. Box 12502, Onderstepoort 0110, Republic of South Africa.

Suggested reading

Provost, A., Perreau, P., Breard, A., Le Goff, C., Martel, J. L., and Cottew, G. S.: Contagious bovine pleuropneumonia. Rev. Sci. Tech. Off. Int. Epiz. 6: 625-679, 1987.

Slide 88

History

This 8-year-old, male castrated domestic shorthair cat was previously healthy. It was placed in a carrier and became dyspneic. The cat died 15 minutes later.

Diagnosis

Heart, endocardium: Fibrosis, diffuse, moderate, with multifocal chondromatous change, subendocardial myocardial fibrosis, and myocardial atrophy, degeneration and loss, domestic shorthair, feline.

Comment

Gross and microscopic findings of the cat, including extensive endocardial and myocardial fibrosis of the left ventricular free wall, ventricular septum, and left atrium are typical lesions of the cat with restrictive cardiomyopathy.

Contributor

The Animal Medical Center, Department of Pathology, 510 East 62nd Street, New York, NY 10021.

Suggested reading

Liu, S. K.: Acquired cardiac lesions leading to congestive heart failure in the cat. Am. J. Vet. Res. 31: 2071-2088, 1970.

Slide 89

History

This mature crossbred ewe was culled from a large Wyoming flock because of severe respiratory distress. The ewe had copious clear nasal exudate when the rear quarters of the animal were elevated.

Gross Pathology

The pulmonary parenchyma had multiple white to gray raised firm nodules of up to 5-10 cm in diameter in both lungs. The cut surfaces of these nodules contained granular grayish foci often associated with frothy fluid.

Diagnosis

Lung: Carcinoma, bronchiolo-alveolar, breed unspecified, ovine.

Comment

Sheep pulmonary adenomatosis is a contagious lung carcinoma of a worldwide distribution. Coexistance of SPA and OPP infections in the same flocks and even in the same animal has been reported in different areas of the world.

Contributor

Department of Pathology, Colorado State University, Fort Collins, CO 80523.

Suggested reading

Rosadio, R. H., et al: Retrovirus-associated ovine pulmonary carcinoma (sheep pulmonary adenomatosis) and lymphoid interstitial pneumonia. I. Lesion development and age susceptibility. Vet. Pathol. 25: 475-483, 1988.

Slide 90

History

This 2-year-old Holstein cow was presented for weight loss, mastitis in both front quarters and left displaced abomasum.

Gross Pathology

The right cranial mammary gland was firm with caseous-like material in duct system; other quarters appeared normal.

Laboratory Results

Mycoplasma spp. without growth of bacteria were cultured antemortem from secretions from the front two quarters.

Diagnosis

Mammary gland: Mastitis, suppurative, diffuse, mild, Holstein-Freisian, bovine.

Comment

The culture of mycoplasma from both front quarters in the absence of bacteria was considered significant. The lack of prominent interstitial change, the marked exudation of granulocytes into alveolar and ductular lumens and the absence of parenchymal necrosis are compatible with acute stages of mastitis due to Mycoplasma bovis.

Contributor

The Ohio State University, Department of Veterinary Pathobiology, 1925 Coffey Road, Columbus, OH 43210.

Suggested reading

Jasper, D. E.: Bovine Mycoplasma mastitis. Adv. Vet. Sci. Comp. Med. 25: 121-159, 1981.

Slide 91

History

This tissue is from a 3-week premature female, simmental bovine fetus.

Gross Pathology

The fetus was delivered by caesarean section and had a distended abdomen, containing abundant straw-colored fluid and a large, discoid, lobulated mass which according to the submitting veterinarian was free floating in the abdomen of the fetus.

Diagnosis

Intra-abdominal mass: Pulmonary choristoma, simmental, bovine.

Comment

Sections from multiple sites of this large mass were similar, consisting of lobules of pulmonary-like alveolar parenchyma and numerous, irregular, terminal bronchiolar structures, which often are anastomosing. The bronchioles have a typical single layer of cuboidal, ciliated epithelium and walls of smooth muscle and/or collagenous tissue which vary in thickness. No distinct bronchi with cartilaginous rings are visible but the larger bronchi-like structures appear to contain two to three layers of lining epithelium cells.

Contributor

Veterinary Pathology, Western College of Veterinary Medicine, University of Saskatoon, Saskatchewan, Canada S7N OWO.

Suggested reading

Thomson, R. G.: Congenital bronchial hypoplasia in calves. Path. Vet. 3: 89-109, 1966.

Slide 93

History

This male rhesus monkey (Macaca mulatta) was delivered stillborn by caesarean section at full term following observed dystocia. The 11-year-old mother of the fetus was born at the New England Regional Primate Research Center, and displayed diaphyseal enlargement of both femurs at birth, as well as markedly elevated serum alkaline phosphatase (SAP). Both the bony lesions and elevated SAP regressed during the first year of life. The animal has had six pregnancies prior to the present one, with no skeletal abnormalities reported.

Gross Pathology

The diaphyses of all long bones were symmetrically and markedly enlarged, and surrounding soft tissues appeared atrophic and compressed.

Diagnosis

Bone, radius and ulna: Hyperostosis, periosteal, circumferential, severe, rhesus monkey (Macaca mulatta), nonhuman primate.

Comment

Periosteal new bone formation has been associated with hypertrophic (pulmonary) osteopathy, metabolic bone disease, trauma, avian (retroviral) osteopetrosis, fluoride toxicity, Hepatozoon canis, or Spirocerca lupi infections. In this case, in utero bacterial or viral infection, metabolic bone disease and fluoride toxicity would be primary concerns.

Most of the bone in these sections is lamellar bone with no compact cortex indicating skeletal immaturity. There also is marked remodeling of bones.

Contributor

New England Regional Primate Research Center, One Pine Hill Drive, Southborough, MA 01772.

Suggested reading

Cicmanec, J. L., Enlow, D. H., and Cohen, B. J.: Polyostotic osteophytosis in a rhesus monkey. Lab. Anim. Sci. 22: 237-241, 1972.

Thornburg, L. P.: Infantile cortical hyperostosis. Animal Model: Cranial mandibular osteopathy. Am. J. Pathol. 95: 575-579, 1979.

Slide 94

History

This 3-year-old, female green iguana (Iguana iguana) had a swollen left rear leg for about 1 month prior to dying.

Gross Pathology

The left femur was irregularly thickened about 3-4 fold in diameter and had a dense fibrous tissue consistency upon cutting. The other femur and the humeri had a similar consistency but were only about 2-fold thickened. The mandible was rubbery and uniformly thickened.

Diagnosis

Bone: Osteocartilaginous and fibrous proliferation, periosteal, circumferential, severe, with associated muscle atrophy, green iguana (Iguana iguana), reptile.

Comment

The radiating bony spicules with numerous, large haphazardly arranged osteocytes represents woven bone compared to the preexistent lamellar bone of the cortex. These spicules were formed by intramembranous ossification within the periosteum. In addition to the periosteal changes, there are abnormal features along the endosteal surface of the bone. There are 2 to 3 layers of fibrous connective tissue (mild fibrosis) between the marrow and a layer of endosteal osteoblasts. In addition there was a reversal line and evidence of new bone formation along the endosteal surface inwardly suggesting a response to corrective modification of the animal's diet. A normal control would be helpful in assessing these more subtle changes.

The primary affect of the dietary imbalance is osteopenic fibrous osteodystrophy with thinning of the bony cortices. The marked periosteal proliferation is considered to be secondary to physical stress. Such a lesion may take up to 3 months to develop. Owners often put captive iguanas on calcium deficient diets which the iguanas readily eat.

Contributor

Los Angeles County Comparative Medical and Veterinary Services, 12824 Erickson Avenue, Downey, CA 90242.

Suggested reading

Anderson, M. P., and Capen, C. C.: Nutritional osteodystrophy in captive green iguanas. Virch. Arch. Cell. Path. 21: 229-247, 1976.

Zwart, P., and Van de Watering, C. C.: Disturbance of bone formation in the common Iguana (Iguana iguana L): Pathology and etiology. Acta. Zool. Pathol. 48: 333-356, 1969.

Slide 95

History

This 15-year-old castrated male pointer-mix canine had a mass over the right carpus that was growing slowly for 4 years. Mild lameness occurred during the past year. The mass was hard, nodular, and surrounded the carpus. The overlying skin was freely movable.

Gross Pathology

The mass was 4.6 x 3.8 x 3.0 cm. It surrounded the distal radius and ulna and all carpal joints. Cut surfaces of the mass disclosed irregular and variably sized regions consisting of hard, white, granular chalky material separated by whitish to tan 0.1 to 0.2 cm. wide septa. The lobulated mass extended outward from the joint capsules; the articular surfaces were not involved.

Diagnosis

Periarticular connective tissue: Anisotropic crystalline material with associated granulomatous inflammation and chrondromatous metaplasia, diffuse, severe, pointer-mix, canine.

Comment

Scanning electron microscopy revealed rectangular to rhomboidal crystals; identification of calcium pyrophosphate dihydrate was made with X-ray diffraction. The pathogenesis of pseudogout is not known, but inhibition or deficiency of pyrophosphatases in involved tissues may be contributing factors.

Contributor

Angell Memorial Animal Hospital, 350 S. Huntington Avenue, Boston, MA 02130.

Suggested reading

Gibson, J. P., and Roenigk, W. J.: Pseudogout in a dog. J. Am. Vet. Med. Assoc. 161: 912-915, 1972.

Markel, S. F., and Hart, W. R.: Arthropathy in calcium pyrophosphate dihydrate crystal deposition disease. Arch. Pathol. Lab. Med. 106: 529-533, 1982.

Roberts, E. D., et al: Calcium pyrophosphate deposition in nonhuman primates. Vet. Pathol. 21: 592-596, 1984.

Slide 96

History

This female, F-344 rat was a terminal necropsy control in a 2 year toxicity and oncogenicity study.

Diagnosis

Submandibular salivary gland: Adenocarcinoma, F344 rat, rodent.

Comment

The most likely presumptive gross diagnosis for subcutaneous nodular masses in rats is a mammary gland neoplasm, specifically a fibroadenoma. In this case, thyroid neoplasia should also be considered.

Salivary gland tumors are quite rare in rats and mice. The distinct cytoplasmic granularity and well defined acini are histologic features distinguishing this neoplasm from one of mammary gland origin.

Contributor

Letterman Army Institute of Research, Presidio of San Francisco, CA 94129-6800.

Suggested reading

Frith, C. H., and Heath, J. E.: Adenoma, adenocarcinoma, salivary gland, mouse. In: Monographs on Pathology of Laboratory Animals - Digestive System. Jones, T. C., Mohr, U., and Hunt, R. D. (eds), Springer-Verlag, New York, pp 190-192, 1986.

Slide 97

History

This 3-1/2-year-old, spayed female, ferret (Mustela putorius) had been losing weight and was weak in the hindquarters. The popliteal lymph nodes were enlarged. Serology result for Aleutian disease was weakly positive.

Diagnosis

Spleen: Lymphosarcoma, ferret (Mustela putorius), mustelid.

Comment

The differential diagnosis includes myeloproliferative disorders and mast cell tumor.

Contributor

Washington State University, Department of Veterinary Microbiology and Pathology, Pullman, WA 99164-7040.

Suggested reading

Chesterman, F. C., and Pomerance, A.: Spontaneous neoplasms in ferrets and polecats. J. Path. Bact. 89: 529-533, 1965.

Smith, S. H., and Bishop, S. P.: Diagnostic exercise: Lymphoproliferative disorder in a ferret. Lab. Anim. Sci. 35: 291-293, 1985.

Slide 98

History

This 6-year-old intact male, Doberman pinscher, canine was presented to the clinic with signs of disorientation, anorexia, and lethargy. Physical examination revealed obesity, poor haircoat, cold extremities, pale mucous membranes, and a rapid, weak, irregular heart beat.

Diagnosis

1. Epicardial and myocardial coronary arteries; intima and media: Atherosclerosis with mineralization, segmental to circumferential, multifocal, severe, Doberman pinscher, canine.

2. Heart, myocardium: Hemosiderosis, interstitial, multifocal, moderate.

Comment

There is extensive involvement of the media and variable intimal involvement in canine atherosclerosis in contrast to the subendothelial formation of atheromatous plaques in man. These plaques contain extracellular lipid, foam cells, proliferating smooth muscle, collagen, elastin, and proteoglycans; eventually they may calcify, result in thrombosis, or cause aneurysmal dilatation. The foam cells are derived from macrophages and smooth muscle cells.

Suggested reading

Mahley, R. W., et al: Canine hyperlipoproteinemia and atherosclerosis. Am. J. Pathol. 87: 205-219, 1977.

Munro, J. M., and Cotran, R. S.: The pathogenesis of atherosclerosis- atherogenesis and inflammation. Lab. Invest. 58: 249-261, 1988.

Steinberg, D.: Underlying mechanisms in atherosclerosis. J. Pathol. 133: 75-87, 1981.

Slide 99

History

This 10-month-old, inbred strain 2N, male guinea pig was found dead in its cage.

Laboratory Results

Bordetella bronchiseptica was cultured from the lungs.

Diagnosis

Lung: Bronchopneumonia, fibrinosuppurative, focally extensive, severe, guinea pig, rodent.

Comment

Lesions typically seen with B. bronchiseptica pneumonia but not seen in this case are extensive hemorrhage at the periphery of the lesion, abundant fibrin deposition and "oat cells" within alveolar septa; thrombosed vessels are occasionally observed. In this case, the nuclei of many cells (macrophages and type II pneumocytes) are eosinophilic; this is interpreted as a degenerative or necrotic change.

Pneumonia caused by Klebsiella pneumoniae is the principal differential in this case. K. pneumoniae possesses a capsule that imparts a characteristic moth-eaten histologic appearance to the inflammatory exudate.

Contributor

NIH, Comparative Pathology Section, Bldg. 28A, Room 111, 9000 Rockville Pike, Bethesda, MD 20892.

Suggested reading

Manning, P. J., et al: Biology and diseases of guinea pigs. In: Laboratory Animal Medicine. Fox, J. G., Cohen, B. J., and Loew, F. M. (eds). Academic Press, New York, pp 158-159, 1984.

Trahan, C. J., et al: Airborne-induced experimental Bordetella bronchiseptica pneumonia in strain 13 guinea pigs. Laboratory Animals 21: 226-232, 1987.

Slide 100

History

This 1-year-old male beagle was a test animal on a toxicology study for 90 days.

Diagnosis

Kidney: Renal cell carcinoma, beagle, canine.

Comment

Conference participants' diagnoses of this neoplasm were not in agreement. Those diagnosing nephroblastoma interpreted the solid, densely cellular areas as mesenchyme with the epithelial component occasionally forming primitive glomeruli. Those favoring renal cell carcinoma interpreted the neoplasm as composed of tubular epithelial cells in solid and tubulopapillary patterns; the latter pattern occasionally resembling glomerular-like structures.

Contributor

Lilly Research Laboratories, Box 708, Pathology, Greenfield, IN 46140.

Suggested reading

Baskin, G. B., and DePaoli, A.: Primary renal neoplasms of the dog. Vet. Pathol. 14: 591-605, 1977.

Slide 101

History

This sentinel, male, greater than 1-year-old, Sprague-Dawley rat was noticed to be gradually losing weight was killed for pathological evaluation.

Diagnosis

Mesenteric arteries: Arteritis, proliferative, chronic, diffuse, severe, with fibrinoid necrosis and subacute perivasculitis, Sprague-Dawley rat, rodent.

Comment

In rats, polyarteritis nodosa occurs primarily in mesenteric, pancreatic and spermatic arteries with considerable variation in the morphology and severity of the lesions. The exact cause of polyarteritis nodosa in the rat is unknown.

Contributor

St. Jude Children's Research Hospital, 332 North Lauderdale, Memphis, TN.

Suggested reading

Young, Y. H.: Polyarteritis nodosa in lab rats. Lab. Invest. 14: 81-88, 1965.

Slide 102

History

Ocular slit lamp examination of a colony of 6-month-old F-344 rats revealed that over 90% of both sexes exhibited irregular to linear areas of corneal opacity.

Diagnosis

1. Eye, substantia propria: Superficial corneal degeneration and mineralization, multifocal, mild, F344 rat, rodent.

2. Eye, blood vessels: Mineralization, intimal, multifocal, mild to moderate.

Comment

The staff of the Department of Ophthalmic Pathology believes that the deposits within the cornea represent elastotic degeneration of collagen. In humans, this is believed to be a secondary degeneration, not a primary dystrophy, and is frequently seen following inflammation, actinic damage and chronic irritation. In some sections there is a small focus of granulomatous inflammation in response to the degenerative material; this should not be confused with a corneal sequestrum. Bowman's membrane is absent in the eyes of rats and rabbits; this membrane is not synonymous with the basement membrane of the corneal epithelium.

Contributor

The Procter & Gamble Company, P.O. Box 398707, Cincinnati, OH 45239.

Suggested reading

Bellhorn, R. W., et al: Spontaneous corneal degeneration in the rat. Lab. Anim. Sci. 38: 46-50, 1988.

Losco, P. E., and Troup, C. M.: Corneal dystrophy in Fischer 344 rats. Lab. Anim. Sci. 36: 576, 1986.

Slides 103–104

History

This male adult, New Zealand albino rabbit (Oryctolagus cuniculus) was on a study with a tropical ophthalmic antibiotic solution.

Diagnosis

Cecum: Essentially normal tissue, New Zealand albino rabbit, lagomorph.

Comment

The peculiarity of the adult rabbit cecum, is the presence of numerous Gram positive and PAS positive bacteria and macrophages, arranged individually and in sheets, within the lymphoid follicle. The presence of these microbes within the cecal wall produces no inflammation and is evidently a normal event unassociated with enteric infection. M cells in the epithelium covering Peyer's patches phagocytize luminal bacteria and carry them into lymphoid follicles where they are taken up by macrophages and lymphoblasts. Migrating macrophages and lymphoid cells carry bacteria deeper into the germinal center where immune recognition is thought to occur.

The following is a partial list of pathogenic agents believed to pass the mucosal epithelium via the M cells: reovirus, Mycobacterium paratuberculosis, Chlamydia, Vibrio cholera, certain strains of E. coli, and Brucella abortus.

Contributor

Parke Davis Pharmaceutical Research Division, Warner Lambert Co., 2800 Plymouth Road, Ann Arbor, MI.

Suggested reading

Friedenstein, A., and Gonecharenko, I.: Morphologic evidence of immunological relationship in the lymphoid tissue of rabbit appendix. Nature 206: 1113–1115, 1965.

Wolf, J. L., and Bye, W. A.: The membranous epithelial (M) cell and the mucosal immune system. Ann. Rev. Med. 35: 95–12, 1984.

Slide 105

History

This 13-year-old, spayed female, domestic shorthair cat had a history of a cough and nasal discharge for one year. The condition was unresponsive to therapy. The clinical diagnosis was mycotic pneumonia with sinusitis. The owner requested euthanasia.

Laboratory Results

ELISA test for Chlamydial antigen was positive. No bacterial growth was evident.

Diagnosis

Lung: Bronchitis and bronchiolitis, acute, multifocal, mild, with marked lymphoplasmacytic peribronchial infiltrates, domestic shorthair, feline.

Comment

Special stains failed to reveal a cause for the bronchitis and bronchiolitis. The associated lymphoplasmacytic infiltrate with occasional follicle formation is indicative of chronic antigenic stimulation such as is seen with pulmonary mycoplasmosis in many species and ovine progressive pneumonia. There was also discussion about the positive ELISA for chlamydia. Many attendees felt that these positive results did not necessarily confirm that this lesion was associated with a previous or concurrent chlamydial infection.

Contributor

Department of Pathology, Veterinary Medical Center, Kansas State University, Manhattan, KS 66506.

Suggested reading

Hoover, E. A., Kahn, D. E., and Langloss, J. M.: Experimentally induced feline chlamydial infection (feline pneumonitis). Am. J. Vet. Res. 39: 541-547, 1987.

Slide 106

History

This 1-year 11-month-old, male, Abyssinian cat experienced recurrent lymphadenopathy for over a 3 month period. There was no response to antibiotics. All peripheral nodes were enlarged.

Diagnosis

Lymph node, peripheral (per contributor): Hyperplasia, atypical, follicular and paracortical, diffuse, severe, Abyssinian, feline.

Comment

The lymph nodes exhibited focal to diffuse infiltration by large histiocytic and lymphoblastic cells which often effaced the nodal architecture. Mild fibrosis around prominent vessels in these regions was also present. The history, age, histological features and negative culture results are consistent with distinctive peripheral lymph node hyperplasia of young cats. This condition is believed to be viral in origin due to the similarity to the lymphadenopathy in experimental FeLV and FIV infections.

Contributor

Experimental Pathology Laboratories, P.O. Box 12766, Research Triangle Park, NC 27709.

Suggested reading

Moore, F. M., et al: Distinctive peripheral lymph node hyperplasia of young cats. Vet. Path. 23: 386-391, 1986.

Yamamoto, J. K., et al: Pathogenesis of experimentally induced feline immunodeficiency virus infection in cats. Am. J. Vet. Res. 49: 1246-1258, 1988.

Slide 107

History

This 9-year-old, spayed female, Labrador retriever dog fainted after exercise and had a blood glucose of 41 mg/100 ml.

Laboratory Results

Blood glucose determinations, made at 2 weeks, 1 month and 2 months post surgery were 54, 46, and 52 mg/100 ml, respectively. The dog has shown a moderate clinical improvement over the past three months (since surgery).

Diagnosis

Pancreas: Islet cell carcinoma, Labrador retriever, canine.

Comment

This case was selected because the morphologic diagnosis, in the absence of the clinical history, was thought to present a moderate challenge since some areas of the neoplasm have an adenomatous pattern more reminiscent of an exocrine carcinoma. The difficulties in differentiating benign from malignant islet cell neoplasms are well known. This tumor was classified as a carcinoma based on its multicentric nature, vascular invasion, and the fact that some of the extra pancreatic tumor nodules were thought to be consistent with metastases to (and replacement of) pancreatic lymph nodes.

Contributor

Consultants in Veterinary Pathology, BRRC, RD#4, Mellon Road, Export, PA 15632.

Suggested reading

Hawkins, K. L., Summers, B. A., Kuhajda, F. P., and Smith, C. A.: Immunohistochemistry of normal pancreatic islets and spontaneous islet cell tumors in dogs. Vet. Pathol. 24: 170-179, 1987.

O'Brien, T. D., Hayden, D. W., O'Leary, T. P., Caywood, D. D., and Johnson, K. H.: Canine pancreatic endocrine tumors: Immunohistochemical analysis of hormone content and amyloid. Vet. Pathol. 24: 308-314, 1987.

Slide 108

History

This 13-year-old, cross-bred Arab gelding had a fluctuating swelling of the lower left eyelid for 5 months and a bloody discharge from the medial canthus. When examined, both upper and lower left eyelids were swollen and the conjunctiva was discolored. The eyes were unremarkable.

Gross Pathology

Skin. Beneath the angle of the jaw there is a fresh hematoma, in the ventral part of which a distorted bullet is found. Elsewhere subcutaneous tissues are remarkable with a moderate excess of yellow fat.

Left submaxillary lymph node. This tissue is in the bullet track. The node is surrounded by recent hemorrhage in which there are bone fragments. Cortical follicular lymphoid hyperplasia is conspicuous. In the larger section much of the node is replaced by angiosarcoma tissue similar to that described elsewhere.

Diagnosis

Haired skin, periorbital: Hemangiosarcoma, Arabian-mix, equine.

Comment

There is involvement of both upper and lower left eyelids with metastasis to the regional lymph node. This tumor is a newly recognized entity with characteristic clinical and histological features. The tumour arises in the conjunctiva of aging horses, is locally invasive and eventually metastasizes despite excision and irradiation.

Contributor

Department of Veterinary Pathology, University of Liverpool, P.O. Box 147, Liverpool, England L69 3BX.

Suggested reading

Hacker, D. V., Moore, P. F., and Buyukmihci, N. C.: Ocular angiosarcoma in four horses. J. Am. Vet. Med. Assoc. 189: 200-203, 1986.

Moore, P. F., Hacker, D. V., and Buyukmihci, N. C.: Ocular angiosarcoma in the horse: morphological and immunohistochemical studies. Vet. Pathol. 23: 240-244, 1986.

Slide 109

History

This 3-month-old, male, thoroughbred colt died after a 5 day illness with pneumonia-like symptoms.

Diagnosis

Lung: Pneumonia, interstitial, subacute, proliferative, diffuse, moderate, with intra-alveolar histiocytosis and eosinophilic flocculent material, thoroughbred, equine.

Comment

The section of lung showed a severe interstitial pneumonia with thickening and necrosis of alveolar walls and alveolar luminal plugs of a proteinaceous material suggestive of fibrin which contained fragmented cellular debris.

GMS silver stains revealed pleomorphic silver positive organisms within the alveolar exudate. The organisms were approximately 5u in diameter and were often "teacup"- or "saucer"-shaped. Morphologically the organisms were consistent with Pneumocystis carinii.

The differential diagnosis should include perilla mint and crofton weed toxicities.

Contributor

Michigan State University, P.O. Box 30076, Lansing, MI 48909-7576.

Suggested Reading

Buergett, C. D., et al: A retrospective study of proliferative interstitial lung disease of horses in Florida. Vet. Pathol. 233: 750-756, 1986.

Cushion, M. T., Ruffulo, J. J., and Walzer, P. D.: Analysis of the developmental stages of Pneumocystis carinii, In vitro. Lab. Invest. 58: 324-332, 1988.

Edmon, J. C., et al: Ribosomal RNA sequence shows Pneumocystis carinii to be a member of the fungi. Nature 334: 519-522, 1988.

Slide 110

History

Tissue from a virgin female Fischer 344 rat euthanized at 110 weeks of age.

Gross Pathology

The right uterine horn was distended by a pedunculated 25 x 13 mm firm mass which protruded into the lumen.

Diagnosis

Uterus: Endometrial stromal polyp, Fischer 344 rat, rodent.

Comment

Uterine endometrial stromal polyps are common spontaneous lesions in aging Fischer 344 rats. This case demonstrates typical histologic features such as superficial lining epithelium resembling endometrial mucosa, edematous stroma supporting scattered, sometimes cystic endometrial-like glands, and prominent vascularization. In many sections, a few scattered foci of small mononuclear inflammatory cells and rare neutrophils are also present.

Contributor

National Institute of Environmental Health Science, National Toxicology Program, P.O. Box 12233, Research Triangle Park, NC 27709.

Suggested Reading

Goodman, D. G., and Hildebrandt P. K.: Stromal polyp, endometrium, rat. In: Genital System - Monograph on Pathology of Laboratory Animals eds. Jones, TC, Mohr, V, Hunt RD. Springer-Verlag, Berlin; pp 146-148, 1987.

Slide 111

History

This 11-1/2-year-old, spayed female, terrier-mix canine had a large mass located in the region of the left flank.

Diagnosis

Subcutis (per contributor): Liposarcoma, terrier-mix, canine.

Comment

Liposarcomas are rare neoplasms in most species. Besides the obvious presence of microvesicles and/or vacuoles representing fat accumulation in the cytoplasm, neoplastic lipocytes usually have large, prominent nucleoli. Mitotic figures are usually infrequent. Liposarcomas are locally aggressive and will often recur following incomplete excision, but are slow to metastasize.

Contributor

Battelle Columbus Division, 505 King Avenue, Columbus, OH 43201-2693.

Suggested Reading

Bevier, D. E., and Goldschmidt, M. H.: Skin tumors in the dog Part II: Tumors of the soft (mesenchymal) tissues. Comp. Cont. Ed. 3: 506-515, 1981.

Saik, J. E., Diters, R. W., and Wortman, J. A.: Metastasis of a well- differentiated liposarcoma in a dog and a note on nomenclature of fatty tumours. J. Comp. Path. 97: 369-373, 1987.

Slide 112

History

This adult male, Sprague-Dawley rat had red exudate coming from the anus. The abdomen was firm and distended.

Diagnosis

Anus and rectum: Leiomyosarcoma, Sprague-Dawley rat, rodent.

Comment

The concentric mass consisted of broad interlacing bundles of smooth muscle cells which replaced and displaced the tunica muscularis. The nuclei were elongated and exhibited numerous mitotic figures. Areas of necrosis were common. The mucosa was congested with multiple areas of hemorrhage. Denuded mucosa contained numerous bacteria. The mass extended to the anus and the epithelium in this area showed prominent rete peg formation.

Contributor

Bio/dynamics, Inc., Mettlers Road, East Millstone, NJ 08873.

Suggested Reading

Pozharisski, K. M.: Tumors of the intestines. In: Pathology of Tumours in Laboratory Animals, Turusov, VS (ed.), Vol. 1 - Tumours of the Rat, Part 1, IARC, Lyon, pp. 119-140, 1973.

Slide 113

History

This adult, male, rhesus monkey (Macaca mulatta) was found dead in his cage. It showed signs of weight loss and diarrhea, but otherwise was in fair condition. The animal was SRV culture positive and SIV antibody negative.

Gross Pathology

Within the thorax, all pleural surfaces and the pericardium were covered by dense mats of fibrin.

Laboratory Results

Klebsiella pneumoniae was isolated in pure culture from the thoracic cavity.

Transmission Electron Microscopy: Sections of testicle containing intranuclear and intracytoplasmic inclusions were examined for the presence of viral particles. Typical Herpesvirus particles were found both within the nuclei and cytoplasm of affected cells.

Diagnosis

1. Testis: Orchitis, suppurative, multifocal to coalescing, moderate with cytomegalic and karyomegalic cells containing intracytoplasmic and intranuclear inclusion bodies, rhesus monkey (Macaca mulatta), nonhuman primate.

2. Testis, tunica vaginalis: Perididymitis, suppurative, focal, mild with bacilli.

3. Tunica vaginalis and epididymis, vessels: Fibrin thrombi with bacilli, multiple.

Comment

The juvenile appearance of the testis was considered abnormal if the animal was sexually mature; the morphology is not consistent with age related atrophy. Gram stains revealed gram-negative bacilli morphologically consistent with the Klebsiella pneumoniae cultured from the animal associated with fibrin thrombi and extravascularly.

Contributor

NIH, Comparative Pathology Section, Bldg. 28A, Rm. 111, 9000 Rockville Pike, Bethesda, MD 20892.

Suggested Reading

Baskin, G. B.: Disseminated cytomegalovirus infection in immunodeficient rhesus monkeys. Amer. J. Pathol. 129: 345-352, 1987.

Slide 114

History

This male cynomolgus monkey was euthanized because of severe vomiting and a soft palpable mass in the abdomen.

Diagnosis

Small intestine, serosa and mesentery: Fibromatosis, cynomolgus monkey (Macaca fascicularis), nonhuman primate.

Comment

Simian retrovirus, type 2, is associated with retroperitoneal fibromatosis (RF). Morphologic changes in the small intestine believed to be secondary to RF are goblet cell hyperplasia and lymphangiectasia. Abdominal cavity lesions may occur as solitary nodules or become progressive and extend throughout the abdominal cavity. In addition, they may penetrate the diaphragm and involve the pleural cavity.

Contributor

Merrell Dow Pharmaceuticals Inc., P.O. Box 68470, Indianapolis, IN 46268.

Suggested Reading

Giddens Jr., W. E., Tsai, C. C., Ochs, H. D., Knitter, G. H., and Blakley, G. A.: Retroperitoneal fibromatosis and acquired immunodeficiency syndrome in macaques: Pathologic observations and transmission studies. Amer. J. Pathol. 119: 253-263, 1985.

Slide 115

History

This greater than 20-year-old, female, rhesus monkey (Macaca mulatta) was wild-caught and maintained in captivity for more than 20 years. The monkey was culled from the research colony because of age and general condition, and was killed by intravenous injection of sodium pentobarbital.

Gross Pathology

The only macroscopic observation at necropsy was a mottled white and dark mass (5.0 x 3.5 x 2.5 cm) attached to the jejunum.

Diagnosis

Jejunum (per contributor): Schwannoma (neurolemmoma), malignant, Macaca mulatta, nonhuman primate.

Comment

Antoni A and B arrangements and Verocay bodies are histologic features of schwannoma. Ultrastructural features include a basement membrane, desmosomes, and myelin whorls (±). Immunocytochemically, schwannoma exhibits S100, NSE, and vimentin positivity. Neurofibroma is characterized by subplasmalemmal pinocytotic vesicles, a discontinuous basement lamina, desmosomes, and vimentin filaments.

Contributor

Sterling-Winthrop Research Institute, 81 Columbia Turnpike, Rensselaer, NY.

Suggested Reading

Harkin, J. C., and Reed, R. J.: Tumors of the peripheral nervous system. In: Atlas of Tumor Pathology, Second Series, Fascicle 3. AFIP, Washington, D.C., pgs. 29-51, 1968.

Slide 116

History

This aged female, Macaca mulatta (Rhesus monkey) stopped eating, experienced weight loss of 2 weeks duration, had no response to supportive therapy and was euthanatized.

Diagnosis

Small intestine, serosa and tunica muscularis: Endometriosis, Macaca mulatta, nonhuman primate.

Comment

Adenomyosis is the extension of endometrial glands into the myometrium. Endometriosis is the proliferation of endometrial glands and stroma outside the uterus.

Grossly, no blood-filled endometrial cysts (aka "chocolate" cysts) were seen. Instead, only extensive fibrous adhesions were seen throughout the abdomen. It is believed that the viability of ectopic endometrial tissue is reliant on endogenous estrogen as demonstrated by the regression of lesions in women after menopause. This monkey was not known to be cycling, most likely as a result of her advanced age. We speculate that this lack of hormonal stimulation resulted in this nearly pathognomonic lesion of reddish-brown endometrial cysts not being present.

Contributor

Pathobiology and Primatology Laboratory, DPQC/OPRB/CBER/FDA, 8800 Rockville Pike, Bethesda, MD 20892.

Suggested Reading

Fanton, J. W., et al: Endometriosis: Clinical and pathologic findings in 70 rhesus monkeys. Am. J. Vet. Res. 47: 1537-1541, 1986.

Slide 117

History

This 1-year-old CD1 mouse was found dead.

Gross Pathology

The spleen was enlarged and pale, there were two masses in the liver, two tan areas on the right kidney, enlarged mesenteric lymph nodes, and there was a tan area on the skin of the neck.

Diagnosis

Spleen, red pulp: Extramedullary granulopoiesis, diffuse, marked, CD1 mouse, rodent.

Comment

The distinction between extramedullary granulopoiesis and granulocytic leukemia is not always clear. There may be a mixture of cells showing different stages of maturation with leukemia, but one stage usually predominates and typically there is cellular atypia. The identification of a concurrent inflammatory lesion may be a key feature in differentiating between granulopoiesis and neoplasia.

Contributor

CIBA-GEIGY Corporation, 556 Morris Avenue, SEF Building, Summit, NJ 07901.

Suggested Reading

Frith, C. H., Pattengale, P. K., and Ward, J. M.: A Color Atlas of Hematopoietic Pathology of Mice, Toxicology Pathology Associates, Little Rock Arkansas, pp 4 and 12, 1985.

Slide 118

History

A 24-month-old male Fischer 344 rat at necropsy was observed to have weight loss, pale eyes, emaciation, and rough hair coat.

Diagnosis

1. Spleen, red pulp; liver, sinusoids: Lymphoid leukemia, Fischer 344 rat, rodent.
2. Spleen, red pulp: Congestion, diffuse, moderate.
3. Liver, portal tracts: Fibrosis and bile duct hyperplasia, diffuse, moderate.

Comment

Large granular cell lymphocyte (mononuclear cell) leukemia is the most likely diagnosis in this case; however the cellular morphology in paraffin embedded sections is insufficient for definitive diagnosis. Portal fibrosis and biliary hyperplasia are common old age lesions in rats. The dilatation of hepatic sinusoids is attributable to the leukemia.

Contributor

The Procter & Gamble Company, 11810 East Miami River Road, Ross, OH 45061.

Suggested Reading

Stromberg, P. C., and Vogtsberger, L. M.: Pathology of the mononuclear cell leukemia of Fischer rats. I. Morphologic studies. Vet. Pathol. 20: 698-708, 1983.

Stromberg, P. C., et al: Pathology of the mononuclear cell leukemia of Fischer rats. II. Hematology. Vet. Pathol. 20: 709-717, 1983.

Slide 119

History

This approximately 3-month-old porcine cross is from a herd with a low incidence of chronic scours.

Gross Pathology

In the terminal ileum, the intestinal wall is dark red, thickened and the mucosal surface is roughened and irregular. The associated mesentery is thickened, opaque and wet.

Laboratory Results

Bacterial culture of the intestine included Campylobacter sputorum and C. hyointestinalis.

Diagnosis

Ileum (per contributor): Ileitis, chronic, diffuse, moderate, with erosions and marked crypt epithelial hyperplasia, breed unspecified, porcine.

Comment

Warthin-Starry (pH 4.0) impregnation revealed numerous silver positive, often curved, bacilli within crypt lumina and the apical cytoplasm of many enterocytes. In addition to the pathologic changes diagnosed above, there were other less significant changes present in varying degrees on many participant's slides. These include loss of villi, dysplasia of crypts, hyperplasia of the muscularis mucosa, and a prominent, dilated tortuous and congested submucosal vasculature.

Contributor

Texas Vet. Med. Diag. Lab., P.O. Box 3200, Amarillo, TX 79116-3200.

Suggested Reading

Bossinger, T. R., et al: Campylobacter sputorum subsp mucosalis and Campylobacter hyointestinalis (infections in gnotobiotic pigs). Am. J. Vet. Res. 46: 2152-2156, 1985.

Rowland, L., Lawson, G. H. K., and Rowland, A. C.: Intestinal adenomatosis complex (porcine proliferative enteropathies. In: Disease of Swine, 5th, AD Leman et al (ed), Ames, Iowa, University Press, pp 517-529, 1981.

Slide 120

History

When this 12-year-old female German Shepherd dog was examined for recurrent dermatophytosis, the clinician observed that the dog also was panting heavily and that the heart sounds were muffled. In chest radiographs, there was evidently a large anterior mediastinal mass which displaced the heart and lungs dorsally and caudally. The dog was euthanized.

Diagnosis

Mediastinal mass (per contributor): Thymoma, German shepherd dog, canine.

Comment

The mass contained numerous small lymphocytes, which varied from a small proportion of the cells in some areas to the majority in others. The other major component was fusiform to rounded cells with pale pink cytoplasm and round to oval nuclei with single nucleoli and finely clumped chromatin. These cells were arranged in a vague interlacing bundle pattern with little or no intercellular matrix or collagen. The more rounded cells had very pale to clear cytoplasm and distinctly demarcated cytoplasm, and were closely packed in sheets. There were few mitotic figures.

There were no distinct Hassal's corpuscles, but there were a few individual cells that resembled epithelial cells of Hassal's corpuscles. Also in some sections were small acinar and ductular structures lined by cuboidal epithelium; these are interpreted as pre-existent, most likely of pharyngeal pouch origin. Immunocytochemistry revealed numerous cells that contain keratin intermediate filaments. There are frequent mast cells.

Thymomas have a well-recognized association with myasthenia gravis and other autoimmune conditions in animals and man.

Contributor

Department of Comparative Medicine, University of Alabama at Birmingham, University Station, Birmingham, AL 35294.

Suggested Reading

Aronsohn, M. D., et al: Clinical and pathologic features of thymoma in 15 dogs. J. Am. Vet. Med. Assoc. 184: 1355-1362, 1984.

Parker, G. A., and Casey, H. W.: Thymomas in domestic animals. Vet. Pathol. 13: 353-364, 1976.

Slide 121

History

This 8-week-old, male domestic shorthair cat was lethargic and depressed progressing within a day to acute collapse. The cat was housed indoors with several other cats (number 6-12) including the sire and dam.

Laboratory Results

The animal died shortly after presentation to the veterinary hospital and because of its shocky state only several drops of blood were available for examination. It was determined the animal had a low blood glucose. Few, all toxic, neutrophils were observed on blood smear.

Electron microscopic examination of feces revealed numerous rotavirus particles. No parvovirus particles were observed.

Aerobic culture of lung, spleen, and liver revealed mixed growth of Proteus sp., beta-hemolytic Escherichia coli and a few beta-streptococci.

Diagnosis

1. Liver: Hepatitis, necrotizing, acute, random, multifocal to coalescing, moderate, with hepatocellular intracytoplasmic filamentous bacteria, domestic short-hair feline, etiology - consistent with Bacillus piliformis.

2. Colon: Colitis, necrotizing, acute, multifocal, mild with enterocytic intracytoplasmic filamentous bacteria.

3. Colon, tunica muscularis: Myositis, necrotizing, acute, focally extensive, moderate.

4. Heart, myocardium: Myocarditis, necrotizing, subacute, focal, mild.

5. Stomach, duodenum and pancreas: Essentially normal tissue.

Comment

A diagnosis of Tyzzer's Disease was made based on the lesions present and the presence of numerous long slender gram negative rods within cells and between cells in and around lesions. The rods were most easily seen within viable hepatocytes at the margins of lesions and stained with Warthin-Starry silver stain. Silver stains also revealed organisms in the colon and heart. In addition, there was an acute mild meningoencephalitis in which organisms were observed.

Initial enteric infection is important in the pathogenesis of Tyzzer's disease. The organism gains access to the liver via the portal circulation. The shedding of spores in the feces is believed to be the natural mode of transmission. The ileum is the most common site of enteric infection but colonic involvement has been reported.

Contributor

Department of Veterinary Pathobiology, 1971 Commonwealth Avenue, St. Paul, MN 55108.

Suggested Reading

Bennett, A. M., et al: Tyzzer's Disease in cats experimentally infected with feline leukemia virus. Vet. Microbiol. 2: 49-56, 1977.

Kovatch, Robert M., et al: Naturally occurring Tyzzer's Disease in a cat. J. Am. Vet. Med. Assoc. 162: 136, 1973.

Wilkie, J. S. N., and Baker, I. K.: Colitis due to Bacillus piliformis in two kittens. Vet. Pathol. 22: 649-652, 1985.

Slides 122-123

History

This 2-year-old, male, collie, canine was presented from the referring veterinarian after a three month history of chronic hemorrhagic diarrhea and weight loss.

Diagnosis

1. Kidney: Nephritis, interstitial, embolic, lymphoplasmacytic, multifocal, moderate with myriads of algae, collie, canine, etiology - consistent with Prototheca sp.

2. Kidney, papilla: Nephritis, interstitial, necrotizing, subacute, focally extensive, moderate, with algae.

3. Kidney, vessels: Thromboemboli, organizing, multiple, with algae.

Comment

Histologically, pleomorphic unicellular organisms were present through many tissues. Ulcerative, necrotizing colitis and typhlitis were present with an abundance of organisms extending into the submucosa, muscular layers and associated with lymphatics. The organisms were present in paracortical and medullary sinuses of the cecocolic lymph nodes. Multifocal accumulations were present in hepatic portal triads, in the myocardium and throughout the brain. The pale foci seen on gross examination, corresponded to massive accumulations of the organism in the interstitium of the kidneys.

The organism was round to oval, 5 to 15 u with a refractile wall, single large nucleus and granular cytoplasm. The organism had endosporulated in areas forming 2-10 sporangiospores within a single sporangium.

Prototheca is an ubiquitous colorless alga and should be differentiated from Chlorella, the blue green alga. Chlorella contains PAS positive cytoplasmic granules which become PAS negative after diastase digestion. These granules are not present in Prototheca.

The presence of Prototheca in glomeruli and blood vessels indicates hematogenous (embolic) dissemination. The focus of papillary necrosis may represent infarction.

Contributor

Pathology Department, School of Veterinary Studies, Murdoch University, Murdoch Western Australia 6150.

Suggested Reading

Gaunt, S. D., McGrath, R. K., and Cox, H. U.: Disseminated protothecosis in a dog. J. Am. Vet. Med. Assoc. 185: 906-907, 1984.

Migaki, G., et al: Canine protothecosis - review of the literature and report of an additional case. J. Am. Vet. Med. Assoc. 181: 794-796, 1982.

Slide 124

History

This 1-year-old, male, domestic short-hair feline was found dead in the spring after a three-day observed illness characterized by severe lethargy, weakness and anorexia.

Laboratory Results

A tiny, Gram-negative, non-fermentative coccobacillary organism was isolated from a lymph node. The isolate was identified as Francisella tularensis by FA technique (Dr. William Fales, University of Missouri-Columbia and the Missouri Department of Public Health).

Diagnosis

1. Spleen, lymph node and Peyer's patch: Lymphoid necrosis, follicular, diffuse, severe, domestic short-hair, feline.

2. Small intestine: Enteritis, subacute, diffuse, moderate, with villus blunting, fusion and erosion.

3. Mesenteric veins: Phlebitis/periphlebitis, necrotizing, subacute, multifocal, mild.

Comment

The case is interesting because of the marked lymphoid necrosis especially affecting follicles. Warthin-Starry stain best demonstrated large numbers of tiny coccobacillary organisms in the necrotic foci. The lesions are similar to those produced by Yersinia sp. except for the absence of prominent bacterial colonies.

Contributor

Montana Veterinary Diagnostic Laboratory, P.O. Box 997, Bozeman, MT 59771.

Suggested Reading

Moe, J. B., et al: Pathogenesis of tularemia in immune and nonimmune rats. Am. J. Vet. Res. 36: 1505-1510, 1975.

Rohrbach, B. W.: Tularemia. J. Am. Vet. Med. Assoc. 193: 428-431, 1988.

Slides 125–126

History

This 3-year-old, male, Labrador retriever dog died following a 10-day illness characterized by fever (102.6–106.2°F), progressive dyspnea, anorexia, listlessness, and polydipsia. Previous history was unremarkable except for receiving multiple wounds from a raccoon 1 month prior to illness. Dog was free-ranging with access to river-bottom land.

Laboratory Results

Identification of the fungus as Geotrichum candidum was confirmed by fluorescent antibody technique on paraffin sections (Francis W. Chandler, D.V.M., Ph.D., CDC, Atlanta, GA).

Diagnosis

1. Liver: Hepatitis, necrogranulomatous, random, multifocal, moderate with myriads of fungal organisms, Labrador retriever, canine.

2. Kidney: Nephritis, subacute, multifocal, moderate, with multifocal thrombophlebitis and fungal organisms.

3. Lung: Pneumonia, granulomatous, multifocal to coalescing, moderate with multifocal pleuritis and fungal organisms.

4. Liver: Congestion, diffuse, moderate.

5. Lung: Edema and hemorrhage, multifocal, moderate.

Comment

The histopathological findings were identical to the case in the Labrador retriever dog reported by Lincoln and Adcock. The predominant fungal form (on PAS) is a round to oval 4-12 um yeast frequently forming pseudohyphae; less frequently there are rectangular forms forming short septate hyphal structures. The differential diagnosis based solely on fungal morphology on H&E should include histoplasmosis (H. capsulatum), sporotrichosis, and systemic candidiasis. Several of the dematiacious (pigmented) fungi (Phialophora sp and Cladosporium sp) have similar morphologic features on PAS.

Contributor

Montana Veterinary Diagnostic Laboratory, P.O. Box 997, Bozeman, MT 59771.

Suggested Reading

Lincoln, S. D., and Adcock, J. L.: Disseminated geotrichosis in a dog. Path. Vet. 5: 282-289, 1968.

Slide 127

History

This adult male Amazon parrot died following a nonspecific illness.

Diagnosis

1. Lung: Bronchopneumonia, necrosuppurative, multifocal to coalescing, severe, with necrotizing vasculitis and fungal hyphae, Amazon parrot, avian.

2. Lung: Pneumonia, histiocytic, multifocal, moderate, with phagocytized bacilli.

Comment

The morphology of the fungal hyphae (dichotomous branching at acute angles, parallel walls of uniform width [4–6um], and septations) are characteristics of Aspergillus sp. Although there is a necrotizing vasculitis with associated hyphae the distribution of the lesion suggests an inhalation exposure.

The bacteria within the histiocytic aggregates are acid fast. The presence of numerous, phagocytized, acid fast bacteria is characteristic of Mycobacterium avium. Psittacines are unique among birds in that they are more susceptible to M. bovis and M. tuberculosis than to M. avium. The perivascular to random orientation of the histiocytic lesions suggest a hematogenous dissemination. Contrasted to mammalian tuberculosis, granulomas with large areas of necrosis and mineralization are uncommon in birds.

Contributor

California Veterinary Diagnostics, Inc., 3911 West Capitol Avenue, West Sacramento, CA 95691.

Suggested Reading

Britt, J. O., et al: Psittacine tuberculosis. Cornell Vet. 70: 218–225, 1980.

Chandler, FW, Kaplan, W, Ajello, L: Aspergillosis. In: Histopathology of Mycotic Diseases, Wolfe Medical Publ., Weert, Netherlands pp 34–37, 1980.

Slide 128

History

This adult female goat was from a milking herd of 150 Nubian goats. Several mature goats in this herd were lame and some of the affected animals had carpal hygromas.

Gross Pathology

The most important gross lesions were present in the tarsal joints and are characterized by thick joint capsules with excessive amounts of synovial fluid. Small carpal hygromas were also present. The mammary gland was dry.

Laboratory Results

The CAE virus was isolated from the affected joints and the mammary gland.

Diagnosis

Mammary gland: Mastitis, lymphoplasmacytic, chronic, diffuse, moderate, Nubian, caprine.

Comment

Unusual features of this case are the inflammatory involvement of the alveoli and the absence of large lymphoid aggregates. The most common differential was mycoplasmal mastitis. The absence of suppuration is the key feature supporting the diagnosis of CAEV infection.

Contributor

Department of Pathology & Microbiology, Faculty of Veterinary Medicine, C.P. 5000, St-Hyacinthe, Quebec Canada, J2S 7C6.

Suggested Reading

Cork, L. C., et al: The pathogenesis of viral leukoencephalo-myelitis-arthritis in goats. Lab. Investigation 42: 596-602, 1980.

Kennedy-Stoskopf, S., et al: The mammary gland as a target organ for infection with caprine arthritis-encephalitis virus. J. Comp. Path. 95: 607-617, 1985.

Slide 129

History

This 6-month-old cocker spaniel canine was presented for a routine ovariohysterectomy. The clitoris was noted to be markedly enlarged (approximately 3 cm). The uterus appeared to be grossly normal, but the ovaries were abnormal in appearance.

Diagnosis

Gonad: Ovotestis, cocker spaniel, canine.

Comment

Key features distinguishing this entity from granulosa cell tumor with a Sertoli pattern are the uniformly distributed interstitial cells, the absence of infiltration or parenchymal compression, and its central location within the gonad. There are several polyovular follicles; however, these are occasionally observed in normal ovaries of carnivores.

This animal is believed to be either an XX/XY chimera or an XX true hermaphrodite. True hermaphroditism is familial in cocker spaniels and beagles; the proposed mechanism is that a segment of the Y chromosome is transposed to the X chromosome. By definition a hermaphrodite is an individual with male and female gonad tissue, a pseudohermaphrodite has gonads of one sex but phenotypically appears as the opposite sex.

Contributor

Consultants in Veterinary Pathology, P.O. Box 68, Murrysville, PA 15668-0068.

Suggested Reading

Kolata, G.: Maleness pinpointed on Y chromosome. Science 234: 1076-1077, 1986.

Meyers-Wallen, V. N., and Patterson, D. F.: Disorders of sexual development in the dog. In: Current Therapy in Theriogenology II. Morrow, DA (Ed), WB Saunders, Philadelphia, pp 567-574, 1986.

Slide 130

History

This 2-year-old, mixed breed, female goat (Capra hircus) was one of several which were inoculated with an infectious agent and were necropsied 18 days post inoculation.

Gross Pathology

Lesions were limited to the placenta; there were edema and ecchymotic hemorrhages of the chorioallantoic membrane and periplacentomal chorioallantoic exudate.

Laboratory Results

Chlamydia psittaci was isolated from placental and fetal tissues.

Diagnosis

1. Placenta: Placentitis, periplacentomal, necrosuppurative, focally extensive, severe, with multifocal vasculitis and intratrophoblastic bacterial colonies, breed unspecified, caprine.

2. Uterus: Endometritis, acute, diffuse, mild with intraepithelial bacterial colonies.

Comment

Chlamydia psittaci, like Brucella abortus, enters the ovine and caprine placenta via the erythrophagocytic area of the placentome and spreads in the periplacentomal chorioallantoic membrane by infecting trophoblasts. Chlamydia psittaci however, unlike B. abortus also replicates in endometrial epithelium. C. psittaci is present in both the trophoblasts and endometrial epithelium of this section. In experimentally inoculated goats, the lesions of C. psittaci appear like those of brucellosis, except, for the presence of hemorrhages and vasculitis in the chlamydial-infected placentae. The placental lesions induced by Brucella abortus and Coxiella burnetti have similarities with chlamydial placentitis.

Contributor

National Animal Disease Center, P.O. Box 70, Ames, IA 50010.

Suggested Reading

Anderson, T. D., et al: Pathogenesis of placentitis in the goat inoculated with Brucella abortus I and II. Vet. Pathol. 23: 219-239, 1986.

Jones, G. E., and Anderson, I. E.: Chlamydia psittaci: Is tonsillar tissue the portal of entry in ovine enzootic abortion? Res. Vet. Sci. 44: 260-261, 1988.

Novilla, M. N., and Jensen, R.: Placental pathology of experimentally induced enzootic abortion in ewes. Am. J. Vet. Res. 31: 1983-1999, 1970.

Slide 131

History

This 11-week-old Hereford-cross, male calf was presented with signs of gastrointestinal tympany, pain and lethargy that had first been noticed four days previously.

Laboratory Results

Metabolic acidosis and increased serum levels of phosphorus, urea and creatinine indicated renal failure. The increased serum levels of creatinine phosphokinase and glutamic-oxaloacetic transaminase were unexplained. Gross or microscopic lesions were not seen in skeletal muscle. Hematology findings indicated a nonregenerative microcytic anemia with anisocytosis and poikilocytosis. The level of lead in a formalin fixed portion of kidney was 170 ug/g on a wet weight basis. Electron probe microanalysis confirmed the presence of lead within the renal tubular intranuclear inclusions. These inclusions were moderately acid-fast-positive.

Diagnosis

Kidney, tubules: Degeneration and necrosis, diffuse, moderate with intranuclear inclusions, Hereford-mix, bovine.

Comment

The most common manifestation of lead poisoning in cattle is acute encephalopathy characterized by laminar cortical necrosis; however, severe nephrosis with extensive fibrosis may occur in young calves.

Intranuclear inclusions in renal tubular epithelial cells are a characteristic finding in lead intoxication. Renal fibrosis with formation of intranuclear inclusions also occurs in intoxication by other heavy metals such as gold and bismuth, but lead inclusion bodies have distinguishing characteristics. The number of lead inclusions decreases as renal disease progresses.

The inclusion bodies in this case are remarkable by their size and number. Nervous lesions were not seen in this calf. The source of lead was not identified.

Contributor

Department of Pathology and Microbiology, Atlantic Veterinary College, University of PEI, Charlottetown, PEI C1A 4P3.

Suggested Reading

Goyer, R. A.: Lead and the kidney. Curr. Topics Pathol. 55: 147–176, 1971.

Goyer, R. A., May, P., Cates, M. M., and Krigman, M. R.: Lead and protein content of isolated intranuclear inclusion bodies from kidneys of lead-poisoned rats. Lab. Invest. 22: 245–51, 1970.

Slide 132

History

This adult, female, White Leghorn chicken (Gallus domesticus) was fed an experimental diet complete in all trace elements and vitamins, except vitamin A. It was maintained on the diet for 20 weeks.

Diagnosis

Esophagus, submucosal glands: Squamous metaplasia and ectasia, diffuse, severe with multifocal lymphoplasmacytic inflammation, white leghorn, avian.

Comment

Other lesions associated with vitamin A deficiency in other species are: squamous metaplasia of mucosal surfaces (including salivary ducts), retinal lesions resulting in night blindness, keratoconjunctivitis sicca, edema of the optic nerve due to increased CSF pressure, blindness due to atrophy of the optic nerve resulting from stenosis of the optic foramen (young male cattle), and deafness in dogs resulting from stenosis of the auditory foramen.

Contributor

The Ohio State University, Department of Veterinary Pathobiology, 1925 Coffey Road, Columbus, OH 43210.

Suggested Reading

Austic, R. E., and Scott, M. L.: Nutritional deficiency diseases. In: Diseases of Poultry, Eighth Edition, edited by M.S. Hofstad et al., Iowa State University Press, Ames, pps. 41-46, 1984.

Slide 133

History

This 3 to 5-year-old, 30 kg, female, Doberman pinscher canine had a large mass involving the distal left femur.

Gross Pathology

There was a 10 x 17 x 6 cm, firm, smooth mass incorporating the distal 1/4 of the left femur and extending into the joint space, displacing tendons and the patella.

Diagnosis

Bone, distal femur (per contributor): Chondrosarcoma, Doberman pinscher, canine.

Comment

Histologic evaluation of the mass revealed a cartilage forming neoplasm. The neoplasm replaced a majority of trabecular bone in the medullary cavity as well as a considerable amount of cortical bone. There is marked periosteal new bone growth. Chondrosarcomas in dogs comprise less than 10% of all bone sarcomas and usually involve the flat bones.

Contributor

USAF School of Aerospace Medicine, Comparative Pathology Branch (VSP), Veterinary Sciences Division, Brooks AFB, TX 78235-5301.

Suggested Reading

Brodey, RS, et al: Canine skeletal chondrosarcoma. A clinicopathologic study of 35 cases. J Am Vet Med Assoc 165: 68-78, 1974.

Jongeward, J: Primary bone tumors. Vet Clin N.A. Small Ani Pract 15: 609-641, 1985.

Slide 134

History

This 8-month-old, male beagle canine was presented with vomiting and diarrhea. It was treated symptomatically but died two days after presentation.

Diagnosis

1. Kidney: Dysplasia, with tubular degeneration, necrosis, hyperplasia and mineralization, beagle, canine.

2. Kidney: Interstitial nephritis, chronic, multifocal, mild.

Comment

Renal dysplasia and associated degenerative and inflammatory lesions were severe in this dog and are considered to have caused its death. The primary features of dysplasia are 1) asynchronous differentiation of nephrons; 2) persistent mesenchyme; 3) atypical tubular epithelium 4) persistent metanephric ducts and 5) dysontogenic metaplasia, as described by Picut and Lewis. The only lesion of dysplasia observed in this animal as described by Picut and Lewis, is asynchronous differentiation of nephrons. Tubular changes are interpreted as compensatory hyperplasia, and secondary degeneration and necrosis.

Contributor

Walter Reed Army Institute of Research, Division of Pathology, Washington, DC 20307-5100.

Suggested Reading

O'Brien, T. D., et al: Clinicopathologic manifestations of progressive renal disease in Lhaso apso and Shih Tzu dogs. J. Am. Vet. Med. Assoc. 180: 658-664, 1982.

Picut, C. A., and Lewis, R. M.: Microscopic features of canine renal dysplasia. Vet. Path. 24: 156-163, 1987.