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Trends in Reptilian Neoplasia: a Diagnostician's Perspective (13-Nov-2004)

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Introduction

Neoplasia is commonly encountered in captive reptiles [1]. The prevalence of neoplasia is probably highest in snakes, followed by lizards, chelonians and crocodylians. This article draws on recently published observations of neoplasia in reptiles submitted as biopsy or necropsy specimens to a private exotic species pathology service (Northwest ZooPath, Monroe, WA.) [1].

In snakes, neoplasia appears to be most common in aged colubrids, followed by crotalids, vipers, and boids. For lizards, neoplasia appears to be most common in monitors followed by skinks, agamids, geckos, iguanas, miscellaneous spp., and chameleons. Neoplasia is uncommon in chelonians (with few exceptions) and rare in crocodylians.

Tumor Types by System

Renal tumors - Renal Adenocarcinoma has been commonly reported in snakes but uncommonly reported in lizards and chelonians. In the study population, renal adenocarcinoma was most prevalent in colubrids, especially in king snakes. These tumors were generally large solitary unilateral tumors that replaced much of the normal renal parenchyma. Because these tumors may be slow to metastasize and are usually unilateral, nephrectomy may be a useful form of therapy for some cases.

Renal tubular adenomas have been described in a several species of snakes and iguanas. Renal tubular adenoma seems to be most common in lizards, particularly iguana, and geckos. These tumors generally are associated with little or no clinical signs of renal disease and may be are incidental findings at necropsy.

Hepatic Tumors - Biliary adenocarcinomas with and without metastasis have been described in snakes, and lizards. Biliary adenocarcinoma seems to be most common in lizards, but is also relatively common in colubrids and crotalids. Typically these tumors are multicentric within the liver Metastasis is uncommon.

Biliary adenoma has been described in a variety of snakes and iguanas, and seems to be particularly common in colubrids. They are typically small, well differentiated, often cystic, and may not be associated with clinical disease. Hepatocellular carcinoma is a malignant tumor that has been described primarily in snakes, particularly colubrids. The tumors are also occasionally seen in lizards. These tumors can be solitary or multicentric and generally are well differentiated. Metastasis is uncommon.

Hepatomas (hepatocellular adenomas) have been described in lizards and in snakes. Hepatomas are most common in colubrids, particularly king snakes. These tumors can achieve large size, and may be solitary or multicentric. These tumors could be difficult to differentiate from nodular hyperplasia in cirrhotic livers, especially in needle core biopsies. Also, well-differentiated hepatocellular carcinomas can be difficult to distinguish from hepatomas. For these reasons, well differentiated hepatocellular proliferative disease should be interpreted cautiously in cytologic preparations and core biopsies.

Pancreatic Tumors - Acinar cell adenocarcinoma are uncommon in reptiles, and seen most often in snakes. These tumors are aggressive, and readily metastasize. Typically the primary tumors are well differentiated tubuloalveolar adenocarcinomas,

sometimes even retaining some cytoplasmic zymogen granularity, but are less differentiated in metastatic foci.

Acinar cell adenoma is occasionally seen in snakes. The tumors generally are nodular and variably encapsulated, solitary or multicentric, and well differentiated, with cells varying little from adjacent normal acinar epithelial cells. Distinguishing small adenomas from more commonly encountered hyperplasia can be difficult.

Alimentary Tract Tumors - Gastric adenocarcinoma is uncommon in reptiles, and most often seen in snakes. Typically, these tumors are invasive and associated with a marked scirrhous response, and this results in thickening of the gastric wall. The tumors sometimes have mucinous differentiation. Metastasis is apparently rare.

Intestinal Adenocarcinoma is common in snakes, particularly colubrids. These tumors usually are located in the distal small intestine. The tumors generally are similar morphologically to gastric adenocarcinomas, although exophytic and invasive tubulopapillary patterns are occasionally seen. These tumors sometimes metastasize, especially to liver.

Adenocarcinoma are common in Colubrids, particularly corn snakes and king snakes. Morphologic features are similar to those of other enteric adenocarcinomas, and these tumors can metastasize, although rate of metastasis may be slow.

Cloacal Adenocarcinoma are rarely seen in snakes and lizards, and metastatic rate is unknown.

Squamous cell carcinomas (SCC) occurring in the oral cavity are common in snakes occasionally seen in lizards. These tumors generally are well differentiated but invasive and destructive to surrounding tissue, but are very slow to metastasize. Squamous cell carcinoma is also discussed in the section on cutaneous tumors.

Adenomatous polyps are somewhat common in the oral cavity and cloaca of lizards.

Reproductive Tract Tumors - Ovarian Adenocarcinoma has been reported in lizards, and snakes. These tumors are most commonly diagnosed in Lizards, particularly iguanas. In snakes, the tumors are most commonly seen in colubrids and boas. Metastatic behavior is more common in snakes. The author has diagnosed several cases of intracoelomic metastatic carcinoma in snakes and lizards, for which the tissue of origin could not be determined, although ovarian origin was suspected (See unclassified intracoelomic carcinomas).

Adenocarcinomas of the oviduct are uncommon in snakes and lizards, with no apparent species or group predispositions. These tumors apparently have low to no rate of metastasis.

Granulosa cell tumor has been described in snakes. These tumors are more common in snakes than in lizards, and seem to be particularly common in garter snakes. In reptiles, these tumors generally are benign. Seminoma has been seen rarely in snakes and lizards. These tumors typically are well encapsulated and generally are benign.

Teratoma is most often seen in lizards and snakes and is particularly common in iguanas. These tumors meet criteria for teratoma based on the presence of tissues arising from ectoderm, mesoderm and endoderm in the tumor. In the author's experience these tumors are most common in the ovary, and are invasive neoplasms that rarely if ever metastasize.

Few other gonadal tumors such as Leydig cell tumor and luteoma have been seen in reptiles, but are rare and biologic behavior is not well understood.

Endocrine Tumors - Islet cell tumors are rarely reported snakes and lizards. The paraneoplastic potential of the tumors in reptiles is not known. Adrenal tumors are rarely reported from reptiles.

Pheochromocytomas rarely have been described in snakes. Interrenal cell adenoma (cortical adenoma) is rarely seen in snakes and lizards. An interrenal cell carcinoma was diagnosed in a rattlesnake, and this tumor metastasized to multiple visceral organs and mesentery.

Thyroid carcinomas have been described in a terrapin and a lizard. Thyroid adenomas have been reported in Lizards, a snake, and in few chelonians.

Miscellaneous Intracoelomic Epithelial Tumors - Metastatic intracoelomic adenocarcinomas of undetermined tissue origin are often identified in snakes and lizards. Identification of cell of origin can be difficult, especially when the tumors are poorly differentiated and have a high degree of anaplasia, or insufficient tissue is submitted to determine the source of the tumor.

Cutaneous Tumors - Cutaneous squamous cell carcinoma (SCC) is commonly diagnosed in snakes, lizards and turtles. The tumor is particularly common in monitor lizards, especially in the skin of the face. Multicentric cutaneous SCC is rarely seen in chameleons. In snakes, cutaneous SCC was most commonly diagnosed in the cloacal region, originating from scent glands, hemipene or skin of the cloacal region. Cutaneous SCC is occasionally seen in turtles, but is easily confused with papillomas and epithelial regeneration associated with inflammatory and traumatic skin disorders. In all cases these tumors are well differentiated, locally invasive, invoke a scirrhous response, and metastasis is apparently rare.

Melanomas (chromatophoromas) are common in some reptiles, particularly snakes, and some of these tumors have been further classified based on type of pigment production. These tumors are common in colubrids, particularly San Francisco garter snakes. These tumors are occasionally seen in lizards. The tumors occur most commonly on the trunk. These tumors are invasive and difficult to completely excise, and have moderate potential for metastasis to viscera. Morphology can be highly variable; in the author's opinion, all cutaneous melanomas in reptiles should be considered malignant with potential for metastasis.

Cutaneous or oral fibrosarcomas are common in snakes and lizards and occasionally seen in chelonians. These tumors are most common on the body wall and within the oral cavity. The tumors are especially prevalent in colubrids and boids; oral tumors are more common in boids and cutaneous tumors are more common in colubrids. These tumors are invasive and have moderate potential for metastasis, especially those occurring on the body wall. Anaplastic soft tissue sarcoma: As in mammals and birds, anaplastic mesenchymal neoplasms can be difficult to differentiate in reptiles. These tumors likely represented a spectrum that includes fibrosarcoma, neurofibrosarcoma or nerve sheath tumor, myxosarcoma, leiomyosarcoma, rhabdomyosarcoma, and amelanotic melanoma. The lack of standardized, readily available, reliable and inexpensive ancillary diagnostic tests such as immunohistochemistry for reptile neoplasms adds more difficulty to establishing a definitive diagnosis for these tumors. Soft tissue sarcomas are most common in snakes and lizards, and are particularly common in colubrids, crotalids, agamids and geckos. Most of these tumors are diagnosed in the skin and soft tissues of the body wall or legs, although visceral tumors are also occasionally seen. Soft tissue sarcomas are generally high grade undifferentiated malignancies, with considerable potential for metastasis.

Cutaneous papilloma is occasionally seen in lizards, crocodylians and turtles. The author has not seen these tumors in snakes. Morphologic features of these tumors included papilliform proliferation of epidermis, supported by variably inflamed dermis, but without a mesenchymal component to the tumor. Hyperkeratosis is often present and sometimes these tumors had secondary bacterial or fungal colonization of the keratin layers. No inclusions are seen in these tumors, but some may have a viral etiology.

Fibropapilloma (fibropapillomatosis) is a well recognized and documented condition of marine turtles and a herpesvirus is the putative causal agent. These tumors typically are solitary or multicentric within the skin in various locations. The tumors have the same type of papilliform epidermal hyperplasia seen in conventional papillomas but also have a prominent fibroblast stromal component. Some of these turtles have concurrent and often multicentric visceral fibromas or fibrosarcomas, and these tumors are considered a component of fibropapillomatosis.

Lipomas are uncommonly reported in reptiles. Subcutaneous lipoma may be overrepresented in corn snakes. As in mammals, lipomas can be difficult to completely excise, especially infiltrative variants.

Musculoskeletal Tumors - Leiomyoma and leiomyosarcoma are occasionally seen in the reproductive or alimentary tract of snakes, lizards and turtles.

Rhabdomyosarcoma is rarely seen in reptiles but may be overrepresented in geckos. The gecko tumors are anterior intracoelomic neoplasms of undetermined tissue origin that spread by local tissue invasion into the body wall and viscera.

Osteosarcomas are rarely seen in snakes and lizards and usually develop in the vertebrae.

Chondrosarcomas are somewhat common in snakes, and are particularly common in Colubrids especially corn snakes. These tumors arise from vertebral articulations, are locally invasive and sometimes associated with pathologic vertebral fracture and paralysis. These tumors generally are well differentiated with cells often occurring within lacunae in a chondromatous matrix. No metastatic lesions have been reported. Chondrosarcoma is rarely diagnosed in lizards, primarily arising in the cartilage of the legs.

Hematopoietic and Lymphoid Tumors - Lymphoid malignancies with or without leukemia are perhaps the most commonly reported neoplasms of reptiles. These tumors are most commonly reported in snakes and lizards, and also rarely are seen in chelonians and crocodylians. In the study population, these were the second most prevalent tumors in snakes and lizards, exceeded only by soft tissue sarcomas. In snakes, the tumors seem most common in vipers, particularly cobras and urutus. For lizards, the tumor seems most common in monitors, particularly Savanna monitors. These tumors are also common in Chuckwallas, bearded dragons and Egyptian spiny tailed lizards.

Lymphoid tumors in reptiles are typically multicentric and most often have blast morphology. Occasionally tumors have plasmacytoid or histiocytic morphology. The oral manifestations of lymphoma are often admixed with inflammation making the diagnosis of lymphoma difficult in small biopsy specimens.

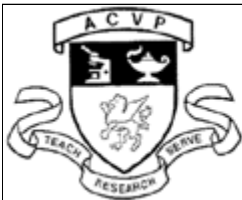
Leukemia without solid tumor formation is uncommon in reptiles. Bearded dragons appear to be overrepresented for development of monocytic leukemia.

Miscellaneous Sarcomas - A variety of soft tissue sarcomas are occasionally seen in snakes and lizards, and rarely in tortoises. These tumors include myxosarcoma, fibroma, various benign and malignant vascular neoplasms, histiocytic sarcoma, round cell tumors of undetermined cell lineage, nerve sheath tumor, and mesothelioma.

References

1. Garner MM, Hernandez-Divers SM, Raymond JT. Reptile neoplasia: A retrospective study of case submissions to a specialty diagnostic service. *Vet Clin N Am: Exotic Anim Pract* 2005 8: in press.

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