

ANATOMY AND CLINICAL SIGNIFICANCE OF THE ESOPHAGEAL TONSILS OF BOID SNAKES

Charles Innis^{1*}, VMD, Elliott Jacobson², DVM, PhD, DACZM

¹VCA Westboro Animal Hospital, 155 Turnpike Road, Westboro, MA 01581

²The Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, FL 32610

Abstract: While general descriptions of the lymphoid tissues of snakes have been published (Ottaviani and Tazzi, 1977), detailed evaluations of the locations and functions of these tissues are rare. The reptile lymphatic system is composed of superficial and deep microvascular lymphatic nets that collect lymph from the intercellular space. These nets drain into collecting vessels, which carry lymph to lymphatic sinuses and the principal lymphatic trunks. The lymph sinuses, sometimes called lymph hearts, have inherent contractile activity, and aid in the transport of lymph to the larger lymphatic trunks. In snakes, most lymph returns to the venous system by passing through the precardiac lymph sinus (also called the cardiac plexus or jugular cistern) to the vena cava (Ottaviani and Tazzi, 1977).

In a general description of histology of the reptile esophagus, Luppa (1977) reported that lymphoid tissue often penetrates from the tunica propria of the esophagus into the epithelium, but provided no further description. Jacobson and Collins (1980) reported on the occurrence of tonsil-like lymphoid aggregates in the esophagus of five species of boid snake: African Rock Python (*Python sebae*), Ball Python (*P. regius*), Burmese Python (*P. molurus bivittatus*), Blood Python (*P. curtus*), and Boa constrictor (*Boa constrictor*).

The esophageal tonsils of boids are generally grossly visible as ovoid, tan to red, distinct thickenings of the esophageal mucosa. In adult snakes they are generally 0.3 to 1.5 cm by 0.5 to 1.0 cm. In the species studied to date, there are generally 10 to 35 tonsils, distributed mainly within the middle 75% of the organ (Jacobson and Collins, 1980).

Histologically, the epithelial layer of the tonsils is composed superficially of columnar ciliated epithelial cells and many goblet cells. The deeper epithelium contains simple cuboidal and columnar cells, with fewer goblet cells. Deep to the epithelium, surrounding the lymphoid tissue, is a layer of loose connective tissue made of predominantly collagen. Deep to the connective tissue is an aggregate of lymphocytes and smaller numbers of plasma cells. Many plasma cells contain eosinophilic intracytoplasmic Russell bodies, representing accumulations of rough endoplasmic reticulum, rich in immunoglobulins. The tonsils are very well vascularized relative to adjacent non-tonsillar submucosa (Jacobson and Collins, 1980).

The function of the esophageal tonsil is unknown, but it has been suggested that the distribution within the esophagus of snakes that swallow large prey may provide some

local immunologic benefit to an organ that may be injured by distention, abrasion, etc. (Diani, 1974). Alternatively, the presence of plasma cells containing Russell bodies suggests that the tonsils may be involved in immunoglobulin production (Jacobson and Collins, 1980).

Clinically, the esophageal tonsils have been found to be very useful sites for the detection of histopathological changes associated with Inclusion Body Disease (IBD) a viral disease of boids (Jacobson, *et al*, 1999; Jacobson, *et al*, 2001). The tonsils are readily visible at necropsy and should be collected as a standard part of all boid post-mortem examinations. In addition, the tissues are visible endoscopically and can be biopsied for attempted pre-mortem diagnosis of IBD. This may be a less invasive diagnostic technique than biopsy of other organs such as liver or kidney.

Future investigation of the esophageal tonsils should include determination of other boid and non-boid species that have tonsils, as well as correlation of tonsillar changes with diseases other than inclusion body disease.

Key Words: esophagus, tonsil, snake, lymphoid tissue, boid, inclusion body disease

References

Diani A. 1974. A comparative study of the ophidian digestive tract. Ph D. thesis, Saint Louis University.

Jacobson ER, Collins BR. 1980. Tonsil-like esophageal lymphoid structures of boid snakes. *Devel Comp Immunol*, 4: 703-711.

Jacobson ER, Klingenberg RJ, Homer BL, Mader DR, Nathan R. 1999. Inclusion body disease. *Bull Assoc Rept Amphib Vet*, 9(2): 18-22.

Jacobson ER, Morris PM, Norton TM, Wright K, Nathan R. 2001. Quarantine. *J Herp Med Surg*, 11(4): 31-34.

Luppa H. 1977. Histology of the digestive tract. *In* Gans, C and Parsons, T (eds): *Biology of the Reptilia*, Volume 6, Morphology E. Academic Press, New York: 236.

Ottaviani G, Tazzi A. 1977. The lymphatic system. *In* Gans, C and Parsons, T (eds): *Biology of the Reptilia*, Volume 6, Morphology E. Academic Press, New York: 315-326.