

The Histopathology of Recent Cases of Viral Arthritis in Broiler Chickens

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Introduction

Viral arthritis is caused by an avian reovirus and is characterized by lameness in broiler chickens due to acute tenosynovitis and arthritis. At necropsy, affected tendons, especially in the lower leg, are swollen and discolored yellow. The histopathology is characterized by thickening of the synovium of the tendon and paratenon, and in the joints, thickening of joint capsule and articular surface synovium due to lymphohistiocytic and lymphofollicular inflammation, synovial hyperplasia, and lesser involvement by heterophils. Similar lesions occur in the heart, involving the epicardium, and to a lesser degree the endocardium. The histopathology of recent cases of viral arthritis is presented, in conjunction with other reports of newly emerged and virulent strain(s) of reovirus causing viral arthritis in broiler production.

Methods

The reports of broiler and broiler breeder cases submitted to a poultry histopathology service (Veterinary Diagnostic Pathology, LLC; Auburn, Alabama USA) were searched for results pertaining to tendon lesions from January 1, 2010 through June 1, 2013. Study cases were included if lesions were identified in tendons, which were then assigned to three general categories.

- **Tendonosis (tendonopathy).** A chronic ongoing degenerative condition in the broiler tendon occurring as vascular thrombosis, tendon ischemia, connective tissue dysplasia, synovial membrane adhesions, granulation tissue deposition, and tendon rupture.
- **Heterophilic tenosynovitis.** Acute to subacute heterophilic and fibrinous tenosynovitis, consistent with bacterial tenosynovitis, with many cases having intralesional bacterial cocci or rods.
- **Lymphocytic tenosynovitis.** Subacute to ongoing lymphohistiocytic tenosynovitis, with many cases showing lymphoid follicle development (lymphofollicular tenosynovitis).

Results

Cases with tendon lesions were identified for broilers (128 total) and broiler breeders (52 total). For broilers and breeders, all three lesion patterns were identified in cases submitted during the 42-month period. A marked increase in broiler cases with tendon lesions occurred in 2012 and continues into 2013 (Fig. 1). The increase was attributable to lymphocytic tenosynovitis (Fig. 2), mean age 32 days at presentation (range 5-65 days). The increased incidence was not observed for broiler breeders. Although all three lesion types were observed in broiler breeders, lymphocytic tenosynovitis, consistent with viral arthritis, occurred in only a few cases in comparison to broilers (Fig. 3), mean age 17 weeks (range 10-28 weeks). In some cases, lymphocytic epicarditis and arthritis were also identified (Fig. 4). The occurrence of lymphocytic epicarditis follows a similar pattern in 2012 and 2013 as lymphocytic tenosynovitis. The histopathology of lymphocytic tenosynovitis and epicarditis are shown in broilers of various ages in Figures 5 -16.

Discussion

The differential diagnoses for lymphocytic tenosynovitis include viral arthritis (reoviral tenosynovitis) and mycoplasmosis (*M. synoviae*, possibly others). A definitive diagnosis requires demonstration of the etiologic agent by isolation or molecular detection, or serological confirmation of infection. Lesions in the heart occur in viral arthritis and can help to focus the diagnostic investigation. For this reason, heart should be included when collecting tendons for histopathology. The sudden large increase in cases with lymphocytic tenosynovitis and epicarditis is consistent with viral arthritis being a re-emerging disease. The reader is referred to other presentations at this conference on the isolation and characterization of reovirus associated with cases showing this lesion pattern.

Conclusions

Lymphocytic tenosynovitis and epicarditis are histologic lesions consistent with viral arthritis in broiler chickens. A definitive diagnosis requires isolation or detection of the etiologic agent, or demonstration of infection by serology. The sudden re-emergence of viral arthritis in 2012 and 2013 occurred predominately in broilers rather than broiler breeders.

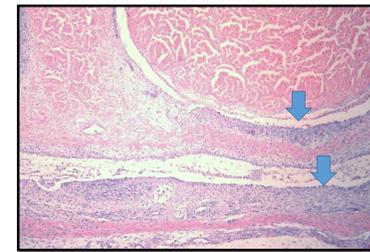
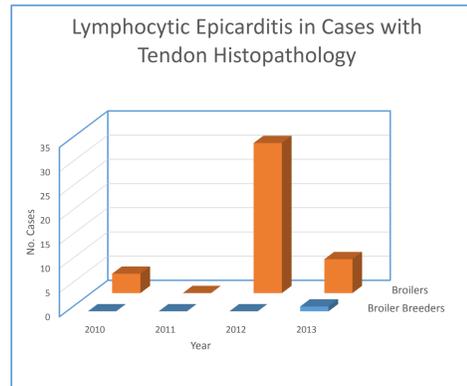
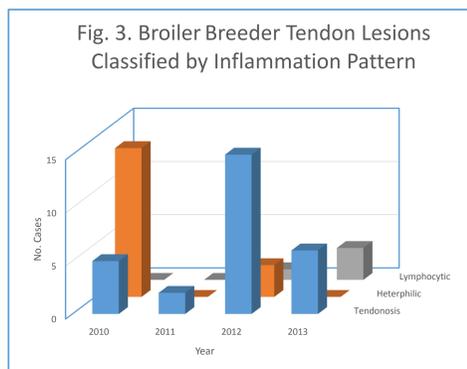
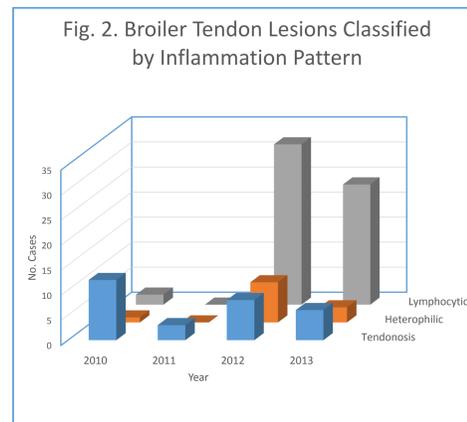
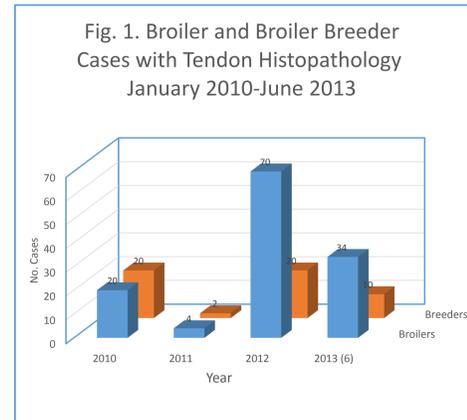


Fig. 5. Broiler, 5 days of age. Tendons from the hock region. The tendon synovium and synovial sheath have thickening of the synovial membranes due to edema and lymphocytic inflammation (arrows).

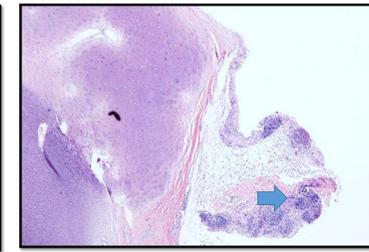


Fig. 6. Broiler, 5 days of age, same case as Fig. 13. Joint capsule from a long bone. The joint capsule has lymphocytic synovitis with lymphoid follicle formation (arrow). The differential diagnosis for this lesion includes reovirus and *M. synoviae*.

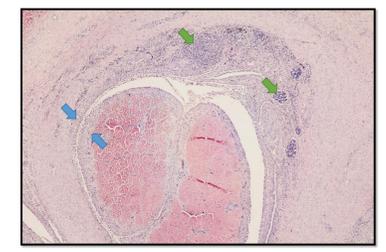


Fig. 7. Broiler, 17 days of age. Two tendons with lymphocytic tenosynovitis. The synovial membranes of tendon and paratenon are both thickened by edema, fibroplasia, and lymphocytes (blue arrows) and there are lymphoid follicles present (green arrows).

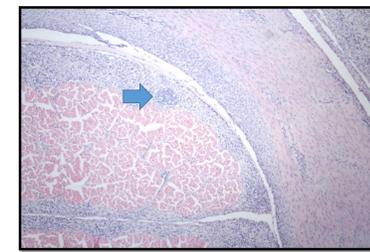


Fig. 8. Broiler, 27 days of age. Tendon and tendon sheath. The synovial membranes due to edema, lymphohistiocytic inflammation, and lymphoid follicle formation (arrow).

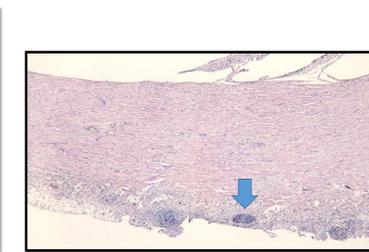


Fig. 9. Broiler 27 days of age. Heart. The surface of the heart (epicardium) was thickened by lymphohistiocytic inflammation with lymphoid follicle formation (arrow), consistent with viral arthritis (reoviral tenosynovitis).

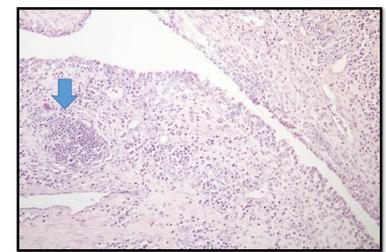


Fig. 10. Broiler, 33 days of age. Tendon synovium. The synovium was thickened by villus hyperplasia with diffuse lymphoplasmacytic inflammation, and lymphoid focus formation (arrow).

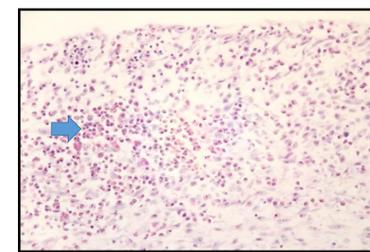


Fig. 11. Broiler, 33 days of age, same case as Fig. 10. Tendon synovium. Heterophils (arrow) were focally numerous within the broader lymphohistiocytic inflammation.



Fig. 12. Broiler, 33 days of age, same case as Fig. 10. Tendon. Blood vessels within the body of the tendon are cuffed by lymphocytes and small mononuclear cells (arrow), consistent with viral arthritis.

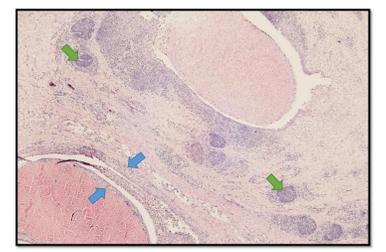


Fig. 13. Broiler, 35 days. Tendons from the hock region. The synovial membranes of tendon and paratenon are thickened by edema, fibroplasia, and lymphocytes (blue arrows), and by synovial hyperplasia. Lymphoid follicles are present (green arrows).

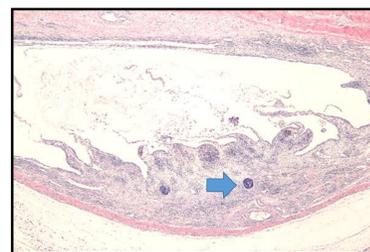


Fig. 14. Broiler, 37 days of age. Tendon sheath. The tendon sheath (paratenon) is thickened by edema and lymphofollicular inflammation. The tendon has been artifactually removed and fronds of hyperplastic and adhesive tendon synovium are in the tendon space.

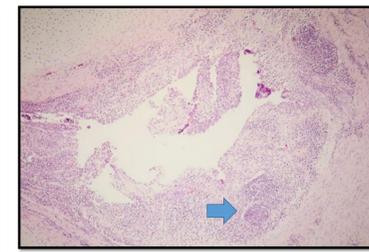


Fig. 15. Broiler, 44 days of age. Tendon synovial membrane is thickened by edema, lymphocytic inflammation with lymphoid nodule formation (arrows), consistent with reoviral tenosynovitis.

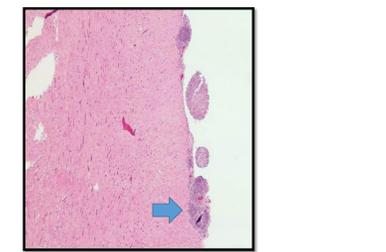


Fig. 16. Broiler, 44 days, same case as Fig. 15. Heart. Lymphocytic inflammation on epicardium (arrow).



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