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## Pathomorphological study of visceral gout in poultry: A case report

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### Abstract

A case of gout was documented in a 1.5 year-old Chabro layer, which was brought for post-mortem examination at the Department of Veterinary Pathology, College of Veterinary Science, DUVASU Mathura, Uttar Pradesh. Upon conducting a necropsy examination, it was observed that there was a mild congestion in the liver and kidney, along with the presence of a white chalky material on the pericardial sac and kidney surface. There was also clear evidence of kidney enlargement. Tissue samples were collected for histopathological diagnosis, using both absolute alcohol and neutral buffered formalin. Under microscopic examination, kidney sections stained with De Galantha stain showed the presence of black-coloured urate crystals, leading to the confirmatory diagnosis of visceral gout.

**Keywords:** Pathomorphological, visceral gout in poultry

### Introduction

Gout, a metabolic disorder characterized by abnormal accumulation of urates in domestic birds, is a significant concern in poultry farming (Damodaran *et al.*, 1978) [2]. Visceral gout, marked by hyperuricaemia, is commonly diagnosed in caged and aviary birds worldwide and stands as a leading cause of mortality in poultry. Its prevalence underscores the importance of understanding its causes and implications in avian populations.

Renal diseases are prevalent in avian species, with up to 29.6% of all disease conditions in poultry attributed to or associated with renal disorders (Siller, 1981) [7]. Dietary factors play a crucial role in gout development, with higher levels of protein intake linked to increased uric acid production (Xiaomin *et al.*, 1998) [5]. Birds lack of the uricase enzyme exacerbates the accumulation of uric acid, leading to its precipitation and subsequent tissue damage, particularly in the kidneys, heart, lungs, intestines (visceral gout), and joints (articular gout) (Li *et al.*, 1998) [5].

Visceral gout primarily arises from pathological changes in the kidneys, which hinder normal kidney function. Understanding the underlying mechanisms of gout pathogenesis is crucial for effective management and prevention strategies (Bulbule *et al.*, 2013) [1]. In light of the significance of gout as a metabolic disorder in poultry, this pathomorphological case report aims to provide insights into the manifestation and implications of visceral gout specifically in the Chabro breed of birds.

### Materials and Methods

Post mortem examination of poultry was done and pathological samples includes heart, kidney, liver, lungs were collected for histopathological examination. 1×1 cm<sup>3</sup> section of tissues from affected organs were fixed in absolute alcohol for 48 hrs for De Galantha's staining and in 10% neutral buffer formalin for Haematoxylin and Eosin (H&E) staining. For De Galantha's staining tissues were transferred in xylene and paraffin (1:1) for two hours at 58 degree celsius and further in paraffin for 1 hr. Tissues were embedded to make the blocks. Paraffin section were cut by semiautomatic rotary microtome at 8 microns. Special staining of monosodium urate crystals were performed by the use of 20% silver nitrate and a developing solution (Luna, 1968) [4].

## Results and Discussion

On gross examination, liver (Fig.1) and lungs (Fig.2) were found to be congested. There was presence of white chalky material on pericardial sac (Fig.3) and kidney (Fig.4). Kidney was enlarged and mild swelling of ureters was also observed.



**Fig 1:** Liver showing congested areas (arrow).



**Fig 2:** Lungs: presence of congested areas with white chalky urate deposits

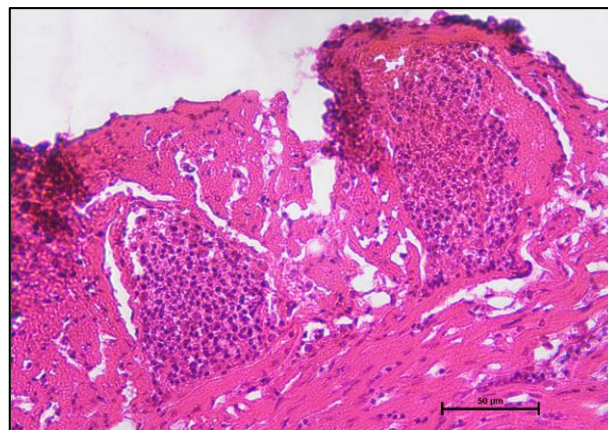


**Figure 3:** Diffuse chalky white deposits on pericardium.

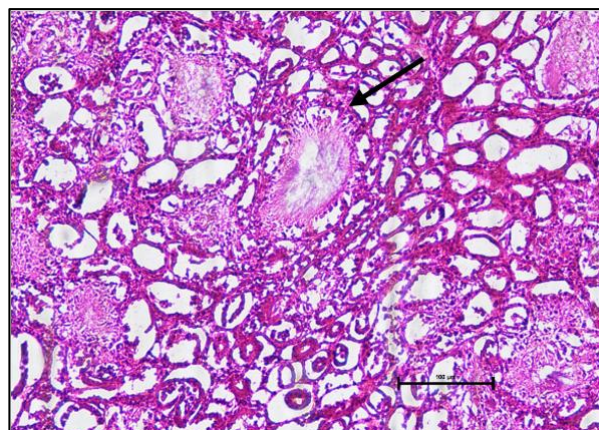


**Fig 4:** Diffuse chalky white deposits on Kidney

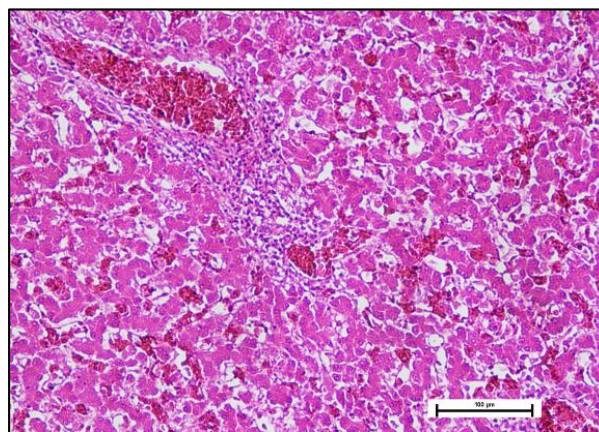
Histopathological examination revealed the varying degree of degenerative changes and inflammatory reaction in the pericardium, lungs, liver and kidneys. There was presence of mononuclear cells infiltration in the pericardium and epicardium. The renal parenchyma revealed degenerative and necrotic in glomeruli as well as in cortical and medullary tubules. The tubules showed degeneration. Large deposits of radiating fine needle shaped crystals (tophi) replacing parenchyma was evident (Fig.6). These urate crystals appeared black against yellow background in special staining (De Galantha staining) (Fig.9).



**Fig 5:** Histopathological section of heart showing the presence of the inflammatory cells in the epicardium and in some regions of endocardium. H & E, 400X.

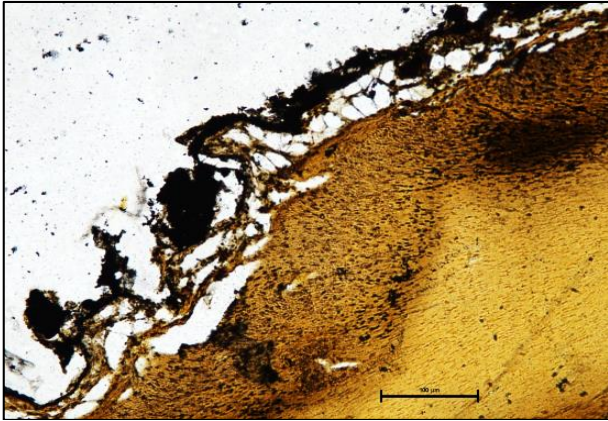


**Fig 6:** Histopathological section of kidney showing the presence of the tophi (arrow) H & E, 200X.

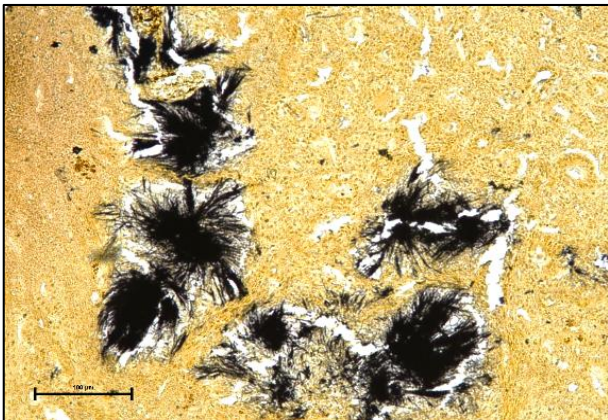


**Fig 7:** Histopathological section of liver showing the presence of the congestion and haemorrhages, degenerated hepatocytes and infiltration of the mononuclear cells. H & E, 400X.





**Fig 8:** Histopathological section of heart showing the presence of the fine needle shaped black urate deposits in the epicardium. De Galantha, 400X.



**Fig 9:** Histopathological section of kidney showing the presence of the fine needle shaped black urate deposits in the renal parenchyma. De Galantha, 400X.

Gout poses a great challenge within the broiler industry, given its significant contribution to morbidity and mortality rates among broiler birds (Yadav *et al.*, 2020) <sup>[9]</sup>. Visceral Gout is characterized by the deposition of uric acid or urates in tissues, manifests through distinct gross and histopathological features. Gross lesions revealed chalky white deposits on various visceral organs including lungs, heart and kidneys that is consistent with the previous studies (Rexhepi *et al.*, 2015) <sup>[6]</sup>. Histopathological analysis of liver showed congestion and haemorrhage. Kidney revealed tubular degeneration and the presence of large deposits of radiating fine needle-shaped crystals that were visible as black colour in De Galantha stain. All these findings are in accordance with earlier studies.

### Conclusion

This case report sheds light on the significant impact of visceral gout as a metabolic disorder in poultry and its manifestation through distinct gross and histopathological features. Gross examination revealed chalky white deposits on various visceral organs, while histopathological analysis confirmed severe degenerative changes and the presence of large urate crystal deposits. These findings underscore the importance of understanding and managing gout in poultry populations to mitigate morbidity and mortality rates effectively.

### Acknowledgement

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### Conflict of interest

Authors have no conflict of interest in this study.

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