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Gout in a flock of ostriches fed high calcium and protein diets.

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ABSTRACT

Azizi S, Ghalebi SR, Kheirandish R, Nejad FM, Mohajeri FA., Gout in a flock of ostriches fed high calcium and protein diets, Onl J Vet Res., 21(6):288-292, 2017. Gout is associated with abnormal deposition of urates in different tissues of human, reptiles and birds and occurs as visceral and/or articular gout. In poultry, gout is an important cause of mortality. We describe gout in a flock of ostriches fed a diet with 2.9% calcium, 0.9% phosphor and 19% protein. Upon gross examination, white chalky materials were evident in joints and serosal surfaces of kidneys, intestines, pericardium and air sacs. Microscopy revealed parenchymatous interstitial nephritis with deposition of feather-like urate crystals. Findings suggest that high dietary calcium and crude protein concentrations may cause visceral and articular gout in growing ostriches.

KEYWORDS: Gout / ostrich / human / bird

INTRODUCTION

Gout is a common metabolic disorder that results in abnormal deposition of urates in tissues of human, reptiles and birds. The end metabolite of purine metabolism is uric acid (UA) from diet or body tissue breakdown. Gout is caused by an increase of UA in blood, overproduction or renal failure in excretion of urate [Rose 2001]. In the visceral form, there is deposition of sodium urates on the pericardial sac, peritoneum, liver capsule, kidneys and other soft tissues. In the articular form, uric acid deposits in the joints, and periarticular tissues including tendon sheaths, ligaments and periosteum [Zachary 2017]. In humans, gout affects joints in men aged 40 years and older [Harris 1999]. In men, there is an increased serum urate concentration, recurrent attacks of acute arthritis and deposition of urate crystals in synovial membrane around joints (tophi) and in kidney as uric acid nephrolithiasis [Anthony 1991]. In women, gout

is rare but prevalence rises during menopause due to estrogen but the exact mechanism is unclear [Rosen 1994]. In poultry, gout is an important cause of mortality and has been reported in various caged and aviary birds as visceral and articular forms [Riddell 1987]. This metabolic disease has multifactorial origin including severe renal failure, infectious bronchitis virus (IBV), avian nephritis virus (ANV), poor management and nutritional factors [Bayry 2005]. The present study describes occurrence of gout in an ostrich flock.

CASE HISTORY

A flock of 2.5-3 month old ostriches exhibited weight loss and prostration with 30% mortality. Dead birds were necropsied and gross findings included white chalky depositions on serosal surfaces of digestive tract (Fig. 1), pericardium, air sac, in the trachea (Fig. 2), kidneys (Fig. 3) and around joints (Fig. 4).

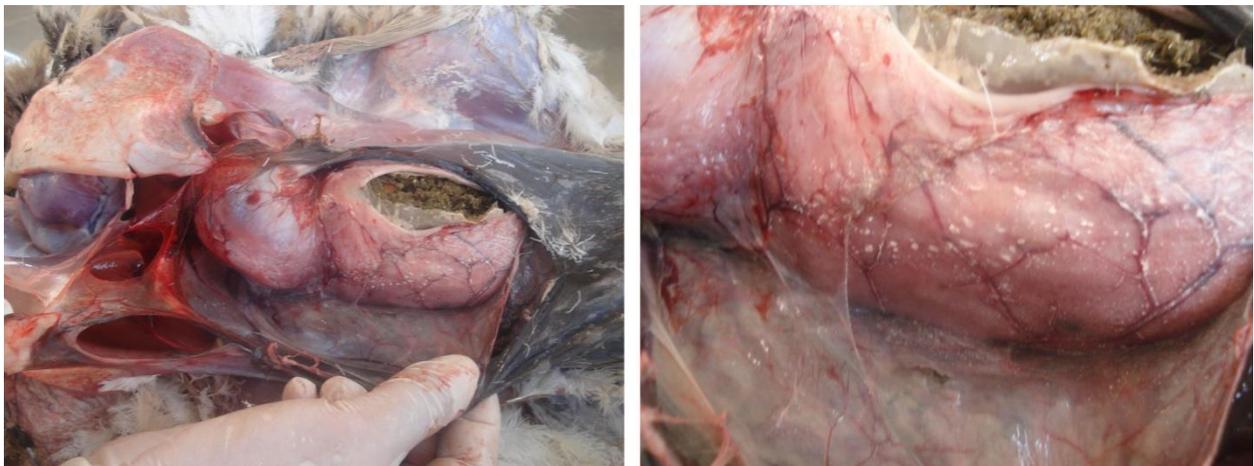


Fig. 1: Visceral gout. White chalky urate crystals deposited on serosal surfaces of crop.



Fig. 2: Visceral gout. Deposition of white chalky urates on trachea.



Figure 3: Visceral gout. White chalky urate crystals deposited on the serosal surfaces of kidney.

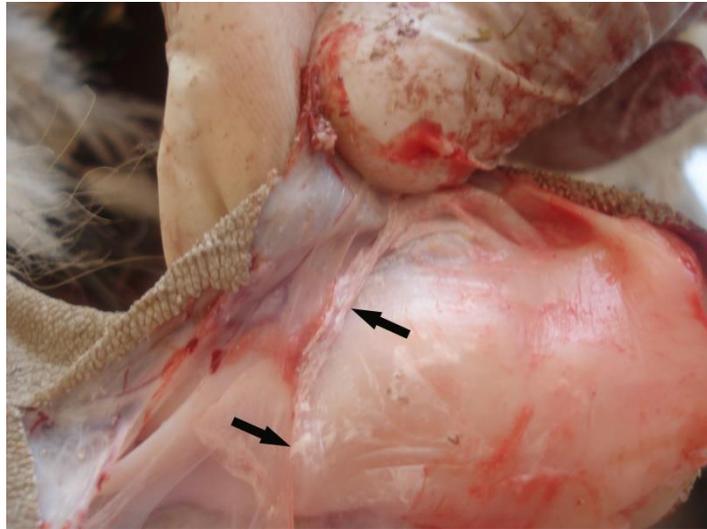


Figure 4: White chalky urate crystals deposited around a joint.

Tissue samples of 1 cm³ thickness were fixed in 10% neutral buffered formalin for histopathological examination. Samples were dehydrated in graded ethanol and embedded in paraffin. Sections with 5 μm thickness were stained with hematoxylin-eosin and examined by an ordinary light microscope. Feather or spindle shape urate crystals were visible in renal tubules. Epithelial tissues of tubules were damaged surrounded by numerous heterophils and lymphocytes as shown in Figure 5 below.

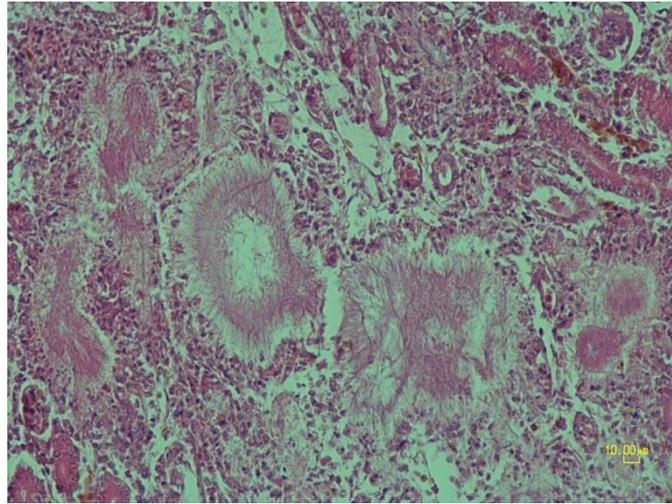


Figure 5: Visceral gout in ostrich. Feather-like urate crystals in renal tubules surrounded by lymphocytes (HE, Bar= 10 μm).

Ostriches had been fed a diet with 2.9% calcium, 0.9% phosphor and 19% protein. The normal level for calcium in a growing ostrich diet should have been ~1.4%, so the level was then reduced to 1.2% calcium with 16% protein, 0.6% phosphorus and 24000 kcal energy. Ammonium chloride and soluble vitamins were added to diet.

DISCUSSION

Ostriches are the largest flightless bird reaching 2.75 m in height and 150 kg. The bird is reared for meat, leather and feathers. Exposure of birds to nephrotrophic strains of infectious bronchitis virus, influenza virus, cryptosporidium, poor management and nutritional factors such as rich nitrogenous diet, high crude protein in diets, vitamin A deficiency, water deprivation or metabolic alkalosis induced by increasing sodium in diet as well as potassium over chloride ratios have been described to be associated with visceral gout [Bayry 2005, Trampel 2000, Mubarak 1999].

Birds affected with visceral gout but not treated, may survive for several months. In fact, no pathognomonic clinical signs are present in the visceral form but nephritis is thought to be involved in pathogenesis [Brown 1996, Riddell 1987]. Results suggest that high level of calcium and protein in diet were responsible for gout found in this flock exhibiting both visceral and articular forms. Histopathological examination revealed interstitial nephritis with deposition of feather-like urate crystals in kidney and other tissues. The findings confirm those of Guo et al. (2005) who induced experimental visceral gout in growing birds with high dietary calcium and protein and concluded that growing layer birds should not be fed layer rations. Growers fed on the high calcium diets had severe kidney damages but combined effects of high calcium and high protein diets had caused severe kidney damage and typical visceral gout (Guo et al., 2005). Guo et al. (2005) believed that high dietary calcium was a primary cause of deposition of urate and high protein a secondary cause for its visceral deposition. Mumane and Garner (1987) reported visceral gout in a rough legged hawk (*Buteo lagopus*). Urate crystals were observed on the pericardium, thoracic and abdominal air sacs, ventral surface of the liver and spleen. There was no indication of articular or renal involvement.

Gout can be controlled by treating an acute attack, preventing joint damage and reducing urate concentrations with allopurinol [Schlesinger 2004]. Allopurinol inhibits xanthine oxidase and soluble precursors of purine metabolism, xanthine and hypoxanthine [Becker 2005]. Tophi size decrease gradually but may take years. Our findings suggest high dietary calcium and crude protein concentrations may cause visceral and articular gout in growing ostriches.

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