Buparvaquone therapy in a rock pigeon infected with *Haemoproteus columbae* showing torticollis

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Abstract A clinical *Haemoproteus columbae* infection in a two months rock pigeon was diagnosed on the basis of outward signs and blood smear examination. The clinical signs suggestive of pigeon malaria were anorexia, depression, inability to fly, circling movements and episodes of torticollis. The characteristic halter shaped gametocytes were seen, in thin blood smear, encircling the nucleus of erythrocytes. Buparvaquone therapy, two intramuscular injections at the rate of 5 mg/kg at 72 h interval, was successful. Supplementation of multivitamin helped in speedy recovery and clinical signs along with uncommon torticollis, completely disappeared in one week.

Keywords Buparvaquone · *Haemoproteus columbae* · Pigeon · Torticollis

Introduction

Pigeons are domesticated and kept as pets in many cultures across the world (Powers 2002). Pigeons and doves comprise 50 % of all the birds kept in captivity for food, hobby, entertainment and display (Harlin and Wade 2009). Parasitic infections are the major health problems in pigeons as they affect growth rate, egg production, weight gain, immune status and in severe cases, may cause death (Dranzoa et al. 1999; Valera et al. 2006; Palinauskas et al.

2009; Cellier-Holzem et al. 2010). *Haemoproteus* ('Haima' means blood and 'Proteus' means powerful sea god with the ability to attain different shapes) is an apicomplexan, intracellular parasite of birds, reptiles and amphibians (Gupta et al. 2011). *Haemoproteus columbae* is a haematozoan that commonly infects pigeons in tropical countries (Bennett and Peirce 1990). The vector responsible for the transmission of *H. columbae* is a haematophagus, Hippoboscid fly, *Pseudolynchia canariensis* (Bennett et al. 1993; Valkiunas 1997). *Haemoproteus* infection is commonly diagnosed based on microscopic examination of a thin blood smear where gametocytes are seen within the erythrocytes. The disease caused by *H. columbae* in pigeon is popularly known as 'pseudomalaria' or 'pigeon malaria' because the parasite resembles *Plasmodium* species (Friend and Franson 1999). It is a fatal infection of young and stressed pigeons, however, in adult birds, it is non-pathogenic. The clinical signs of *H. columbae* infection include anorexia, lethargy, depression, dyspnea, circling movement and diarrhea (Zinkl 1986; Varshney et al. 2014; Maharana and Kumar 2016). The prevalence rate of *H. columbae* infection in pigeons is higher in Indian states, namely Kerala and Gujarat (Ravindran et al. 1999; Raval et al. 2016).

In pigeons, the occurrence and impact of helminth parasites are well documented but only few studies concerning hemoprotozoans have been carried out. To date, no frequent reportings have been done on *H. columbae* infection of rock pigeon from Rohilkhand region of Uttar Pradesh, India (Gupta et al. 2011). The present study records an uncommon clinical infection of *H. columbae* in a rock pigeon from Rohilkhand region of Uttar Pradesh and its successful management.

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History, clinical observations and diagnosis

A two months old rock pigeon was presented to the Referral Veterinary Polyclinic, ICAR-Indian Veterinary Research Institute, Izatnagar, with the history of inappetence, dullness, circling movements, torticollis, weakness, and inability to fly. Earlier, three pigeons between 2 and 4 months age, of the same flock died with similar clinical signs. The sick pigeon and pigeons that died were adequately treated with oral cephalixin along with multi-vitamins and minerals but no improvement observed. All the pigeons of the flock were properly vaccinated for Ranikhet disease. On clinical examination, episodes of torticollis (Fig. 1), frequent circling movements, ruffled feathers, and depressed behavior (Fig. 2) were seen. However, no ectoparasite could be traced over the entire body surface of affected pigeon. Blood sample was collected from the peripheral wing vein, a thin smear was prepared, air dried, stained with 10 % Giemsa stain as per the standard protocol and examined for presence of blood parasite (Soulsby 1982).

Blood smear examination revealed the presence of intra-erythrocytic gametocytes of *H. columbae* (Fig. 3). The specific diagnostic features included elongated, ‘halteridial’ shape, light blue in colour and circumnuclear position. Presence of gametocytes confirmed it to be a case of *H. columbae* infection or an acute pigeon malaria associated with recurrent attacks of torticollis in a rock pigeon.

Treatment

The treatment of infected pigeon with oral cephalixin was immediately discontinued and further treatment with Buparvaquone (Zubion, Intas Pharmaceuticals Ltd.,

Fig. 1 Torticollis in pigeon with *H. columbae* infection

Fig. 2 Depressed behavior of pigeon with *H. columbae* infection

Fig. 3 Macrogametocyte of *H. columbae* inside the RBC

Ahmedabad) was initiated. Two injections of Buparvaquone were administered at the dose rate of 5 mg/kg, intramuscularly, 3 days apart (Raval et al. 2016). Multivitamin liquid (Vimeral, Virbac Animal Health India Pvt. Ltd., Mumbai) at the rate of 0.2 ml per os, twice daily for 2 weeks, in drinking water, was supplemented as it removes stress and enhances immunity (Maharana and Kumar 2016). The vectors for *H. columbae* were controlled by changing the litter regularly, and treating the pigeon shelter with Deltamethrin (Butox, MSD Animal Health, Pune) spray at a dilution rate of 2 ml/l of water (Varshney et al. 2014; Raval et al. 2016). Regular review and monitoring revealed complete recovery of the pigeon in one week and no infection was traced by follow-up blood smear examination.

Discussion

Most *H. columbae* infections in pigeons are asymptomatic and non-pathogenic, however, young and immunocompromised pigeons may suffer from the disease and treatment is done only during fatal outbreak in a flock when parasitemia rate is usually high (Greiner and Ritchie 1994; Nematollahi et al. 2012; Raval et al. 2016). The treatment with Buparvaquone is highly effective for clinical *H. columbae* infection in pigeons as reported by previous researchers (El-Metenawy 1999; Razmi et al. 2011). The outbreak of pigeon malaria is usually encountered when the population of vector species i.e. louse fly, is high. Thus, vector control is sufficient to prevent the disease (Bhatia et al. 2006). The features of gametocyte, the only stage found in peripheral blood, recorded in the current study were in agreement with Islam et al. (2014). The cause of torticollis could not be traced in the literature.

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Authors' contributions This is an uncommon clinical case of *H. columbae* infection in a pigeon, being adjudged and reported by Vivek Joshi. Umesh Dimri guided to build the manuscript. Shahjahan Alam, and A.Gopalakrishnan helped in microscopic examination of *H. columbae* and correction of manuscript.

Compliance with ethical standards

Conflicts of interest None of the authors has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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