

STAPHYLOCOCCAL SEPTICAEMIA IN DUCKLINGS (*ANAS PLATYRHYNCHOS DOMESTICA*) I. EPIDEMIOLOGY ISOLATION AND CLINICO-PATHOLOGICAL STUDIES

N. C. Nayak and M. K. Bhowmik

Department of Veterinary Pathology,
Bidhan Chandra Krishi Viswavidyalaya,
Mohanpur, Nadia, West Bengal, 741 252

(Received: August 14, 1987)

Staphylococcal infection is relatively common in many avian species causing subacute to chronic lesions of joints, conjunctiva and endocardium (Biester and Schwarte, 1965). Bhowmik (1983) also isolated *S. aureus* from localised lesions of endocardium and joints of grower ducks showing considerable mortality. In ducklings, coliform septicaemia caused by *Escherichia coli* was described by Biester and Schwarte (1965) and Bhowmik (1983). In the present communication, a new septicaemic disease caused by *S. aureus* is recorded in ducklings on the basis of epidemiology, isolation of the organism and clinico-pathological changes.

Materials and Methods

An acute disease of ducklings characterised by profuse diarrhoea containing blood and congestion of visible mucous membranes with high mortality was investigated in the year 1986. During the investigation, it was revealed that the ducklings were brought two weeks earlier from the Central Institute for Poultry training and Research, Hissarghata, Bangalore.

The epidemiological data and clinical signs of the ailing birds were recorded. Samples of blood from the wing vein or heart of 15 sick birds and from equal number of clinically healthy normal birds of the same age and breed were collected using heparin (1000 iu/ml of blood) for haematological studies like total erythrocyte and leucocyte counts (Natt and Harrick, 1952), differential leucocyte count by the modified method of Sato and Seika (Reddy *et al.* 1976), haemoglobin (Shali's haemoglobinometer) and packed cell volume (Microhaematocrit technique). Statistical analysis was also carried out (Snedecor and Cochran, 1967).

Post-mortem examination of 15 ducklings was conducted and gross pathological changes were recorded. Direct smears were prepared from aseptically collected heart blood of all birds and stained with Gram's, methylene blue and Leishman stain for the demonstration of organisms. Heart blood was also cultured aerobically and anaerobically for the isolation of bacterial agents (Buxton and Fraser, 1977).

Tissue pieces of liver, intestine, spleen, lungs, kidney, heart, brain and bursa of Fabricius were collected in 10% neutral formal-saline,

processed for paraffin sectioning at 4-5 μ thickness and stained with Mayer's haematoxylin and eosin. Duplicate sections were also stained by Gram's McCallum Goodpasture. Methylene blue and Ziehl - Neelsen's methods for bacteria, Giemsa and Shors triple stain for inclusion bodies and periodic acid schiff's for fungus in sections.

Results

Epidemiology:

The outbreak was observed in the winter month and involved newly introduced Khaki Campbell ducklings of 3 weeks old. The birds were weak and debilitated. The affected flocks were under stress during long transport by railway truck. There were also wide geoclimatic variations between two zones in respect of temperature, humidity and climate. The mortality rate was 80% that occurred within 24-48 hours after the onset of clinical signs. Thus, the disease was acute and septicaemic in nature causing high mortality within a short period of time.

Isolation:

Examination of stained smears revealed the presence of gram positive cocci, arranged in clusters morphologically indistinguishable from *Staphylococcus*. Culture examination of heart blood in blood agar and nutrient salt agar showed the presence of moderately large, circular, cream-coloured colonies producing golden pigment characteristic of *Staphylococcus*. The isolate produced haemolysis in blood agar media and was found to be coagulase positive. The observations from cultural characters, pigment formation, bio-chemical reaction and coagulase test confirmed the isolate as *S. aureus*. No other organism could be isolated in anaerobic culture.

Clinical signs:

Typical clinical signs of septicaemia such as severe congestion of visible mucous membranes, profuse diarrhoea containing occult blood, anorexia, increased thirst, nasal and ocular discharge, depression, reluctance to move and sudden death were observed.

Blood picture:

The affected ducklings showed significant decrease ($P < 0.01$) of erythrocyte, haemoglobin values and packed cell volume (Table--1). Further, there were significant ($P < 0.01$) leucocytosis, heterophilia and lymphocytopenia (Table--1) in the affected ducklings.

Gross pathology:

The changes consisted of massive petechial haemorrhages and congestion in all the visceral organs. Greyish-white necrotic foci were only observed in liver, lungs, intestine and kidneys. Lungs were enlarged dark red in colour and intestine contained massive haemorrhagic exudation.

Histopathology:

Massive haemorrhages and congestion were conspicuous in all visceral organs. There was degeneration and necrosis of cells of the parenchyma in these organs. Massive heterophilic infiltration was noticed.

Discussion

Many pathogenic microorganisms are widespread in nature and are frequent inhabitants in the skin and feathers of birds. It was believed that the injuries served as portal of entry of haemolytic and coagulase positive *S. aureus* in the body and the stress factors due to transport or the geo-climatic variations further facilitated the infection to multiply in the blood liberating its toxins thus producing septicaemia in the ducklings. Jones and Hunt (1983) also stated that *Staphylococci* represent a serious threat to weak and debilitated animals and birds.

The haematological observations confirmed the resulting anemia of the infected birds. It was fact that the organism or its toxins damaged the vascular endothelium resulting in acute haemorrhagic anaemia. It was also possible that the elaborated toxins of the organism suppressed the haemopoietic system causing anaemia in the affected

Table 1
Haematological values of 3—week old ducklings naturally affected with Staphylococcal septicaemia (Mean values of 15 estimations with SE)

Parameters	Infected	Control
RBC (X 10 ⁶ X mm ³)	2.46* ±0.18	3.58 ±0.16
Haemoglobin (g/100ml)	8.4* ±0.11	12.6 ±0.14
PCV (%)	30.4* ±0.37	33.0 ±0.33
WBC (X 10/mm ³)	34.65* ±0.59	30.48 ±0.46
Percentage of distribution of WBC		
Heterophil	58.00* ±1.46	29.00 ±1.05
Eosinophil	2.00 ±0.36	3.00 ±0.36
Basophil	—	1.00 ±0.23
Lymphocyte	35.00* ±1.72	59.00 ±1.12
Monocyte	5.00 ±0.35	8.00 ±0.36

*P < 0.01 (Between infected and control of the same age)

ducklings. The observations of marked leucocytosis and heterophilia clearly suggested the acute nature of the bacterial disease.

The haemorrhagic and necrotic lesions observed in pathologic studies were characteristic in all septicaemic diseases and resulted from toxic injury to the capillary endothelium by the organism or its toxins (Jones and Hunt, 1983).

Based on epidemiology isolation and clinico-pathological studies, it was concluded that haemolytic and coagulase positive *S. aureus* was responsible for septicaemia in ducklings.

Summary

Staphylococcal septicaemia in 3-week old Khaki Campbell ducklings was reported on the basis of epidemiology, isolation of haemolytic and coagulase positive *S. aureus* and clinico-pathological changes. The cause of the disease was acute showing 80% mortality within 48 hours. Clinico-pathologically, the disease was characterised by profuse haemorrhagic diarrhoea, depression significant erythrocytopenia, hypohaemoglobinemia, lymphocytopenia, low packed cell volume, heterophilia, leucocytosis massive congestion and petechial haemorrhages in all visceral organs, degenerative and acute inflammatory changes in liver, lungs, kidneys and intestine.

Acknowledgements

Thanks are due to Head, Department of Clinics for his help and the Vice-Chancellor of this University for the financial support.

References

- Bhowmik, M. K. (1983) A study on the mortality pattern in ducks (*Anas platyrhynchos domesticus*). *Avian Res.* **67**: 91.
- Biester, H. E. and Schwarte, L. H. (1965) *Diseases of Poultry*. 5th ed. Oxford and IBH Publishing Co., Calcutta. pp. 475.
- Buxton, A. and Fraser, G. (1977) *Animal Microbiology*. Vol.1. Blackwell Scientific Publications, London. pp. 347-355.
- Jones, T. C. and Hunt, R. D. (1983) *Veterinary Pathology*. 5th ed. Lea and Febiger, Philadelphia. pp. 159.
- Natt, M. P. and Herrick, C. A. (1952) A new blood diluent for counting erythrocytes and leucocytes of the chicken. *Poult. Sci.* **31**: 735.
- Reddy, M. V., Ramakrishna, K. and Mahendar, M. (1976) *Manual of Veterinary Clinical Pathology*. 1st ed. The Kothari Book Depot, Bombay. pp. 39.
- Snedecor, G. W. and Cochran, W. G. (1967) *Statistical Methods*. 6th ed. Oxford and IBH Publishing Co., Calcutta.