REVIEW OF PBFD VIRUS: IN REFERENCE TO TWO CLINICAL CASES

Faculty of Veterinary Medicine,
Final Degree Project

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INTRODUCTION AND OBJECTIVE

Psittacine beak and feather disease (PBFD) is a viral disease affecting more than 60 species of psittacines around the world that threats the conservation of species in risk of extinction and represents also an increasing concern to aviculturist. It is caused by a non-enveloped, icosahedral, 14-16nm, single stranded DNA virus that belongs to the *Circovirus* genus.

The objective of this study is to do a review of the information about the PBFD virus and to apply this information to two clinical cases corresponding to the two main clinical presentation of this disease.

EPIDEMIOLOGY

PBFD affects generally younger than 2 years old parrots, but parrots of all ages can suffer the disease. Psittacines from all the world should be considered susceptible but Australian, New Zeeland and African parrots are the most susceptible to the disease.

PATHOPHYSIOLOGY

The incubation period is about 21-25 days commonly. But it depends on the age, the dose of the virus, the stage of development of the feather and the immunity of the bird. Adults take from months to years to get infected and develop the clinical disease.

PBFD is an epitheliotropic virus, and affects not only the skin and feathers of the bird but also the gastrointestinal tract epithelium and the extragastrointestinal epithelium, as the bursa of Fabricius and the liver. The necrosis and damage that causes in the bursa, timus and lymphoid system are the responsible for the immunosuppression suffered by the birds.

Table 1:
Characteristics and differences between the acute and the chronic course of PBFD

	ACUTE PBFD	CHRONIC PBFD
Commonly affected bird species	African Grey parrot (*Psittacus erithacus*)	Cockatoo (*Cacatua spp.),* Eclectus (*Eclectus Roratus*), Budgerigar (*Melopsittacus undulatus)* and lories and lorikeets
Age range	Juvenile birds (1 to 6 months)	Adult birds (8-10 months)
Clinical signs	Greenish diarrhoea Depression Lethargy Anorexy Vomiting Feather abnormalities?	Elongated necrotic beak Feather loss Retained feather sheaths Haemorrhage in the feather rachis Pinched appearance of rachis Loss of powder down Dirty plumage
Moment of death	24-36 hours after onset of clinical signs	6-12 months after onset of clinical signs
Frequency	Uncommon	Common

TRANSMISSION

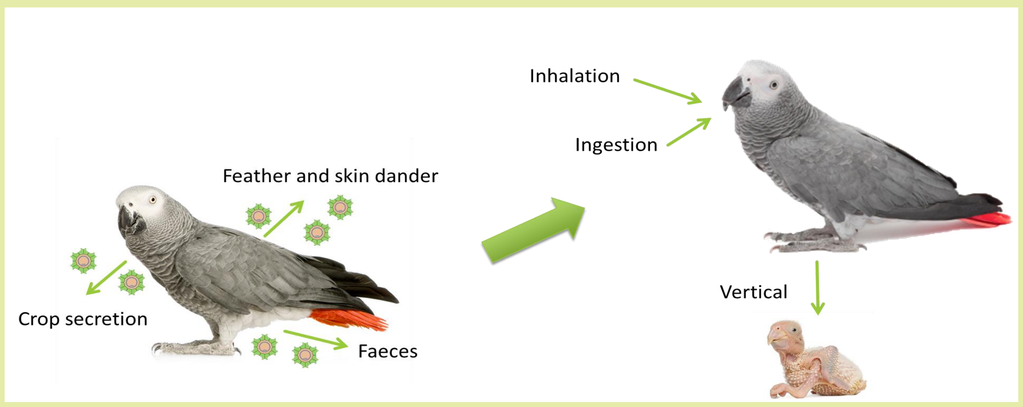


Figure 1. Beak and feather disease virus transmission diagram.

CLINICAL SIGNS

There are two principal possible courses of this disease; the acute and chronic one. Normally the development of the disease depends on the age of the bird when it gets infected.

DIAGNOSIS

The polymerase chain reaction (PCR) from blood of feather samples is the most specific and sensitive method to diagnose PBFD. Haemaglutination (HA) and haemaglutination inhibition (IH) tests can add useful information together with the results from the PCR. When the animal presents the chronic form of the disease a biopsy of the feather follicle is also diagnostic.

TREATMENT

There is no effective treatment. Supportive care and antimicrobials should be given to treat secondary infections. Once clinical signs appear the course of the disease is generally fatal. Experimentally two immunomodulatory treatments have been successfully tried: avian gamma interpheron and β-(1,3/1,6)-D-Glucan, but further studies are needed. Some experimental vaccines are in development with recombinant baculoviruses.

CLINICAL CASES

Case 1: Acute form in an African Grey Parrot

Presenting complains: A 3 months old female African Grey Parrot (*Psittacus erithacus)* is presented with apathy, anorexia and nasal secretion.

History: The bird presented the symptoms for 4 days. It lives indoor and is a hand-reared bird currently starting to eat on its own.

Physical examination findings:
- Physical condition: 2,5/5
- Dehydration: <5%
- Taquipnea

Figure 2. Three juvenile African Grey Parrots.

Medical procedures:
- Cell Blood Count
  - Non regenerative anaemia (haematocrit 24%)
  - Severe leukopenia with heteropenia and lymphopenia
- Biochemistry

Table 2:
Parameters, results and reference ranges of the biochemistry profile

PARAMETERS	RESULT	REFERNENCE RANGE
Uric acid	28.55 mg/dl	4.5 – 9.5 mg/dl
Urea	7.9 mg/dl	3 – 5.4 mg/dl
Triglycerides	38.7 mg/dl	45 – 145 mg/dl
Total protein	1.49 g/dl	3 – 4.6 g/dl
AST	587 UI/L	100 – 365 UI/L
GGT	2 UI/L	0 – 0 UI/L
CK-NAC	4696.5 UI/L	165 – 342 UI/L
Phosphor	7.89 mg/dl	3.2 – 5.4 mg/dl
Bile acids PRE	10.1 µmol/L	13 – 90 µmol/L

- Plasma Protein Electrophoresis

Table 3:
Parameters and results of the plasma protein

PARAMETER	%	g/dL
PREALBUMIN (P)	**17.40%** (0 – 13)	**0.26** (0 – 13)
ALBUMIN (A)	**6.70%** (50 – 69)	**0.1** (1.48 – 3.19)
ALFA-GLOBULINS	**16.20%** (2 – 7)	**0.24** (0.03 – 0.21)
BETA-GLOBULINS	**44.50%** (15 – 25)	**0.66** (0.35 – 0.64)
GAMMA-GLOBULINS	**15.2%** (4 – 13)	**0.23** (0.12 – 0.68)
P + A/G	**0.32** (1.3 – 2.7)	

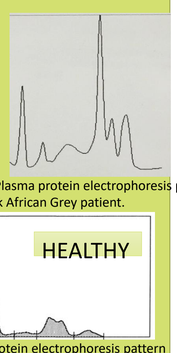
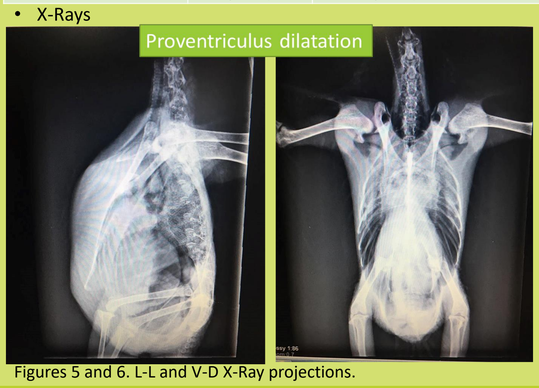


Figure 3.Plasma protein electrophoresis pattern of the sick African Grey patient.

Figure 4. Plasma protein electrophoresis pattern of a healthy parrot.

- X-Rays



Figures 5 and 6. L-L and V-D X-Ray projections.

Treatment and clinical progress:
- PCR confirmed PBFD diagnosis

DAY 1
- **Marbocyl** 2% 5 mg/kg IM SID
- **Metacam** 1 mg/kg IM BID
- **Duphafral** 2 ml/kg SC, single dose
- **Nebulitzation** F10 (1 drop in 10 ml NSS) BID
- **Fluid therapy**: 20 ml SC → ¾ (Isofundin + 5% Glucose) + ¼ G5

DAY 2
- **Marbocyl** 2% 5 mg/kg IV SID
- **Metacam** 1 mg/kg IV BID
- **Ranitidine** 2 mg/kg IV BID
- **Ceftazidine** 100 mg/kg IV BID
- **Nebulization** F10 (1 drop in 10 ml NSS) BID
- **Fluid therapy**: 2/3 (Isofundin + 5% Glucosa) + 1/3 Isohes
  - *First 8h: 60 ml/kg/day*
  - *Maintenance: 2.5 ml/kg/h*
- 15 ml feed every 6 hours

DAY 3
- **= Day 2**
- **Fluid therapy**: 2/3 (Isofundin + 5% Glucose) + 1/3 Isohes
  - *Maintenance: 2.5 ml/kg/h*
- **Blood transfusion** (4 ml + 1 ml NSS)

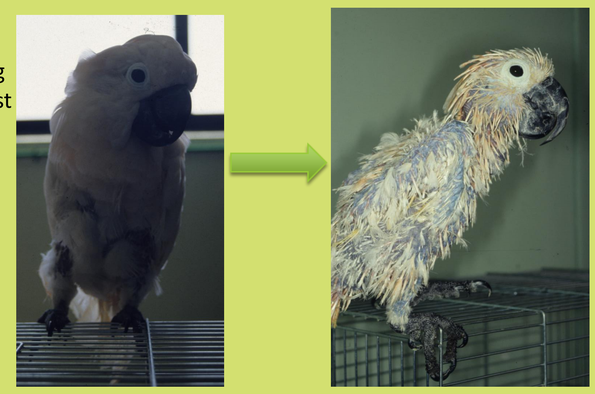
• Death at 44 hours of admission

Case 2: Chronic form in a Sulphur Crested Cockatoo

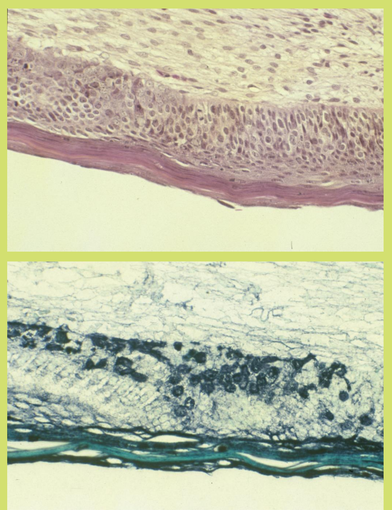
Presenting complains: A Sulphur Crested Cockatoo (*Cacatua sulphurea*) is presented with feather loss and feather dystrophia.

History: The bird was relinquished for presenting feather abnormalities. During its stay the bird lost almost all the feathers and developed beak necrosis and fractures.

Physical examination findings: Good condition except for the feather abnormalities.



Figures 7 and 8. The Sulphur Crested Cockatoo at the first stages of the clinical disease, and after almost 3 years completely destitute of feathers and with beak elongation.



Figures 9 and 10. Histological slides of the follicular epithelium of the feather. Haematoxylin-eosin stain and in situ hybridization technique.

Medical procedures:
- Cell Blood Count
- Biochemistry
- Biopsy → intracytoplasmic inclusion bodies → confirmed PBFD diagnosis

Treatment and clinical progress
- Supportive care
- Isolation
- Died almost three years after its arrival

CONCLUSIONS

- PBFD is a worldwide spread disease and represents a threat for both captive and wild psittacines.
- The most common presentation of PBFD involves feather loss and feather dystrophia but PBFD also has to be included in the differential of depressed, anorexic, juvenile psittacines, specially African Grey Parrots.
- PCR is the election diagnostic technic for PBFD acute presentation.
- PCR and feather biopsy are both diagnostic for chronic PBFD.
- There is currently no treatment and no vaccine available.
- Prevention by PCR testing and aggressive disinfection together with isolation or euthanasia of the affected birds are the only way to keep an aviary free of PBFD.
- Recombinant vaccines may be a good tool to prevent PBFD clinical disease in a near future.
- Further studies are necessary to find an effective treatment.