

Generalized apteria and automutilization of members in budgearigar (*Melopsittacus undulatus* SHAW, 1805) presenting circovirosis in the Northeast of Brazil

Apteria generalizada e automutilação de membros em periquito-australiano (*Melopsittacus undulatus* Shaw, 1805) apresentando circovirose no Nordeste do Brasil

Aptérias generalizadas y automutilación de miembros en periquito australiano (*Melopsittacus undulatus* SHAW, 1805) que presentan circovirosis en el Noreste de Brasil

Received: 09/21/2021 | Reviewed: 09/30/2021 | Accept: 10/07/2021 | Published: 10/10/2021

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Abstract

The budgearigar (*Melopsittacus undulatus* Shaw, 1805) is a bird of the order Psittaciformes and family Psittaculidae. This species is considered the third most popular pet in the world and is frequently seen in veterinary clinics. Among the diseases that can affect these animals, the Psittacidae beak and feather disease (PBFD), or circovirosis, is an infectious disease commonly reported in some regions. This paper aims to describe the case of a budgearigar presenting generalized apteria and self-mutilation of limbs due to PBFD and feather-picking disorder in Northeastern Brazil. A budgearigar was admitted to the Veterinary Hospital of the Federal Rural University of the Semi-arid (HOVET-UFERSA) with generalized apteria. Subsequently, feces were collected and a molecular polymerase chain reaction (PCR) analysis for PsCV Circovirus was requested. The result was positive, and upon the animal's return to the clinic, it presented right carpometacarpal and tarsometatarsal self-mutilated. Considering that reports of these disorders for psittacidae are scarce in the Northeast, we report the first occurrence of circovirosis and consequent

feather-pulling disorder with clinical manifestation of generalized apteria and self-mutilation of limbs in a budgearigar in the state of Rio Grande do Norte, which represents a risk for the conservation of wild Psittacidae in this region.

Keywords: Birds; Circovirus; Behavior; Pathology.

Resumo

O periquito-australiano (*Melosittacus undulatus* Shaw, 1805) é uma ave da ordem Psittaciformes e família Psittaculidae. Esta espécie é considerada o terceiro pet mais popular do mundo, sendo frequente o atendimento em clínicas veterinárias. Dentre as enfermidades que podem acometer esses animais, a doença do bico e das penas dos psitacídeos (Pbfd), ou circovirose, é uma doença infecciosa comumente relatada em algumas regiões. O objetivo desse trabalho é descrever o caso de um periquito-australiano apresentando apteria generalizada e automutilação de membros decorrente de Pbfd e transtorno de arrancamento de penas no Nordeste do Brasil. Deu entrada no Hospital Veterinário da Universidade Federal Rural do Semiárido (HOVET-UFERSA) um periquito-australiano apresentando apteria generalizada. Em seguida, fezes foram coletadas e foi solicitada uma análise molecular de reação em cadeia da polimerase (PCR) para Circovírus PsCV. O resultado foi positivo, e no retorno do animal à clínica, o mesmo apresentou carpometacarpo direito e tarsometatarsos automutilados. Considerando que os relatos dessas afecções para psitacídeos são escassos no Nordeste, registra-se a primeira ocorrência de circovirose e consequente transtorno de arrancamento de penas com manifestação clínica de apteria generalizada e automutilação de membros em periquito-australiano para o estado do Rio Grande do Norte, o que representa um risco para conservação de psitacídeos silvestres dessa região.

Palavras-chave: Aves; Circovirus; Comportamento; Patologia.

Resumen

El periquito australiano (*Melosittacus undulatus* Shaw, 1805) es una ave de la orden Psittaciformes y de la familia Psittaculidae. Esta especie es considerada la tercera mascota más popular del mundo, siendo vista con frecuencia en clínicas veterinarias. Entre las enfermedades que pueden afectar a estos animales, la enfermedad del pico y la pluma de aves psitacidas (Pbfd), o circovirus, es una enfermedad infecciosa comúnmente reportada en algunas regiones. El objetivo de este artículo es describir el caso de un periquito australiano que presenta apterías generalizadas y automutilación de las extremidades por Pbfd y trastorno por extraer las plumas con el pico en el noreste de Brasil. Un periquito australiano que presentaba apterías generalizada fue ingresado en el Hospital Veterinario de la Universidad Federal Rural del Semi-Árido (HOVET-UFERSA). Luego se recogieron las heces y se solicitó un análisis molecular de reacción en cadena de la polimerasa (PCR) para Circovirus PsCV. El resultado fue positivo y cuando el animal regresó a la clínica presentó carpometacarpo derecho y tarsometatarsos automutilados. Teniendo en cuenta que los informes de estas condiciones para las aves psitacidas son escasos en el noreste, se produce la primera aparición de circovirus y el consiguiente trastorno de extraer las plumas con manifestación clínica de apteria generalizada y automutilación de las extremidades en un periquito australiano para el estado de Rio Grande do Norte, lo que representa un riesgo para la conservación para las aves psitacidas de esta region.

Palabras clave: Aves; Circovirus; Comportamiento; Patología.

1. Introduction

The budgearigar (*Melosittacus undulatus* SHWA, 1805) is a bird of the order Psittaciformes and family Psittaculidae often raised in captivity due to its beauty and docility. Weighing from 30 to 50 grams, these animals are granivores and have a life expectancy of 5 to 10 years of age in captivity. It is currently the third most popular pet in the world, behind only the dog and the cat. Due to this popularity, these birds are often seen at the wild animal clinic (Pranty, 2015).

The spread of pathogens among bird species represents an increasing threat to biodiversity and has been associated with the collapse of wild populations and extinction of several species. Among the illnesses that can affect psittacidae, and specifically *M. undulatus*, psittacidae beak and feather disease (Pbfd) caused by beak and feather disease virus (BFDV) is an infectious disease commonly reported in birds under human care (Cunningham et al., 2017; Fogell et al., 2018; Martens et al., 2019, 2020; Morinha et al., 2020^b).

The legal and illegal international trade of captive birds has induced a rapid spread of BFDV on all continents. Both old and new world Psittaciformes are susceptible to this infection characterized by feather abnormalities, dystrophy, and severe deformities of the nails and beak, and it may also lead to behavioral changes, such as feather picking disorder. Due to apteria and/or dystrophy, the animals suffer from the difficulty or even impossibility of flying and are more susceptible to hunting and

predation, besides interfering with reproductive and food-seeking behavior, also impairing thermal insulation. The immunosuppressive nature of BFDV increases the host's susceptibility to secondary infections, and thus other diseases can affect the host, further aggravating the condition (Ledwon et al., 2011; Sarker et al., 2014; Eastwood et al., 2015; Telles et al., 2015; Fogell et al., 2018; Raidal et al., 2020).

Infection in captive Psittaciformes has been reported in at least 33 countries and increasing reports of this disease have led to concerns in terms of the implications for conservation. In addition to ecological implications, circovirocrosis can also result in large economic losses, for example in South Africa, where it has been estimated that poultry farmers lose up to 20% of their flock to the disease each year (Kundu et al., 2012; Regnard et al., 2014; Jackson et al., 2015a; Fogell et al., 2016, 2018; Morinha et al., 2020; Raidal et al., 2020).

Therefore, this paper aims to describe the case of a budgearigar presenting generalized aptheria and self-mutilation of limbs due to beak and feather disease and consequent feather picking disorder in Mossoró, Rio Grande do Norte, Brazil.

2. Methodology

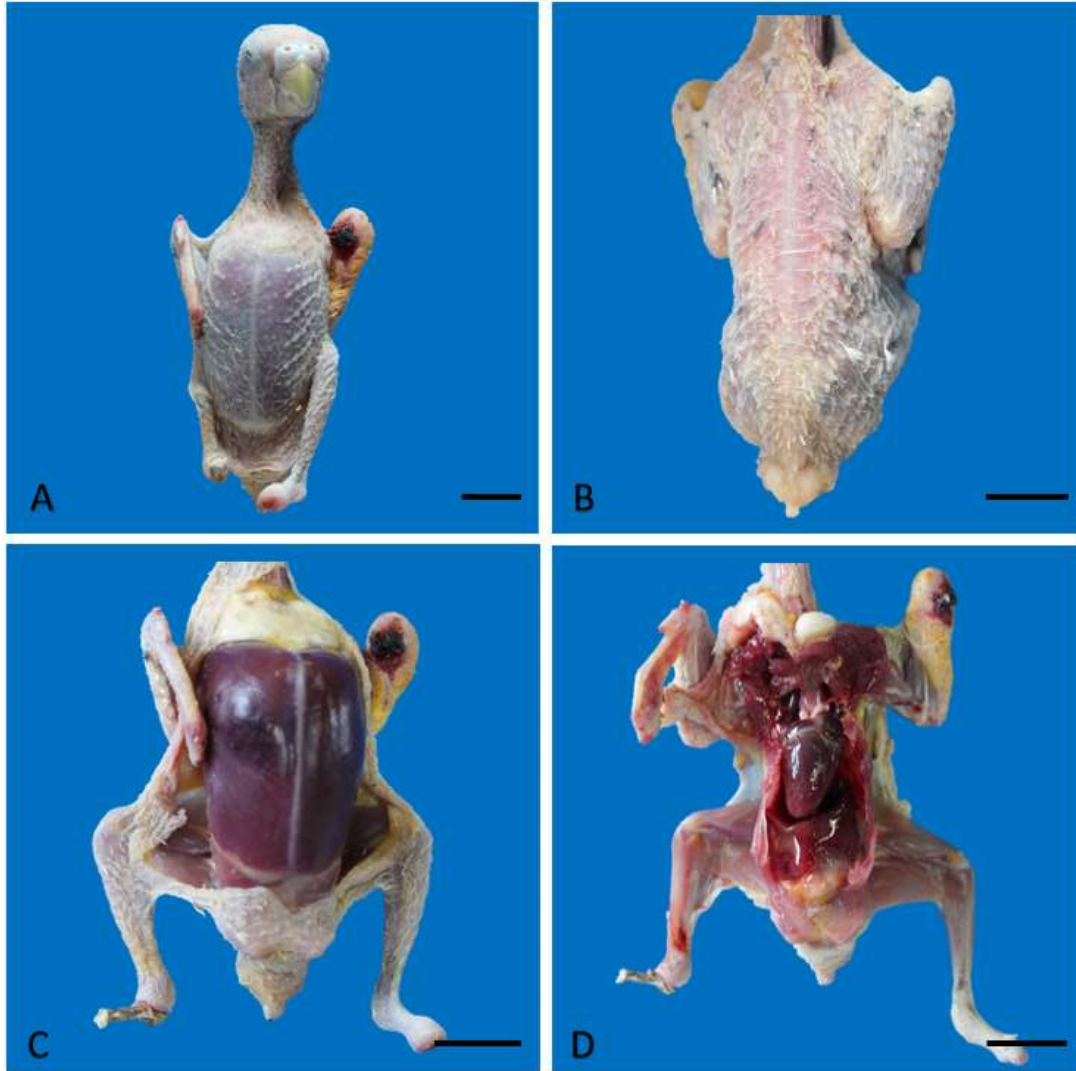
Case description

On March 28, 2019, an approximately 7-month-old, female, budgearigar with body score 3 (on the scale where 1 refers to cachexia, and 5 to obesity) was admitted to the Veterinary Hospital of the Federal Rural University of the Semiarid (HOVET-UFERSA), Mossoró-RN, Brazil. The animal's diet consisted of mixed seeds, apple, spinach, cabbage, bread, rice, and couscous. There was a generalized complaint of aptheria, and it was reported that the parents appeared to be healthy and that among the siblings of the same litter there were animals with and without feather alterations. In addition to these birds, the guardian reported that she raised another pair of asymptomatic budgearigars, of which usually the last-born chick lost its feathers, and a pair of cactus parakeets (*Eupsittula cactorum* Kuhl 1820), both also without symptoms.

In order to evaluate the possible causes of the alterations found, a plumogram and a skin scraping were performed to search for ectoparasites, as well as a coproparasitological evaluation by direct examination (Hoffman, 1987) and flotation (Willis, 1921) techniques to search for endoparasites, all of which were negative. At the same time, the BFDV viral genome was amplified from feces and performed Polymerase Chain Reaction (PCR) to detect of the BFDV using a pair of primers and following reaction conditions described by Ypelaar et al. (1999). A 717 bp tract of the BFDV ORF1 was amplified with primer sense 2 (5'-AAC CCT ACA GAC GGC GAG-3') and primer antisense 4 (5'-GTC ACA GTC CTC CTT GTA CC-3') according to Ypelaar et al. (1999). To detect of ORF1 coding for the VP1 protein of Polyomavirus (the cause of the fledgling disease) was use a pair of primers sense A (5'-CTT ATG TGG GAG GCT GCA GTGTT- 3') and primer antisense B (5'-TAC TGA AAT AGCGTG GTA GGC CTC-3') following reaction conditions described by Phalen et al. (1991). The result was positive only for BFDV, confirming the involvement of the animal by PBFD. When the specimen returned to the clinic, it had right and left carpometacarpal and tarsometatarsal bones exposed by the animal itself (Figure 1-A, B).

Due to the bird's condition, the impossibility of cure and considering the welfare of the individual, it was decided to perform euthanasia, with the consent of the person responsible. After this procedure, the bird was necropsied using the ventral midline access with a subsequent costal incision to remove the sternum and pectoral muscles (Figure 1-C, D). The only macroscopic alteration observed in the cellular cavity was cardiomegaly (Figure 1-D).

Figure 1 – *Melopsittacus undulatus* affected by circovirus and consequent feather picking disorder, showing generalized apteria and self-mutilation of the direct carpometacarpal and tarsometatarsal bones. Scale bar: 1cm. A - Dorsal decubitus; B - Sternal decubitus; C - Skin removal from the chest region; D - Sternum removal and visualization of the celomatic cavity where there is cardiomegaly.



Source: Personal archive.

3. Results and Discussion

Beak and feather disease virus (BFDV) can result in a range of clinical signs, depending on the strain, age, and species of the infected Psittaciformes, as well as the immune response. Some animals may be asymptomatic, but the classic clinical manifestation includes symmetric loss of remiges, retrices, and down, and subsequent replacement by dystrophic and necrotic feathers, inadequate molting, feather color malformations and changes, beak deformities, such as fractures, palate overgrowth, and necrosis, as well as lethargy, depression, diarrhea, immunosuppression, and often death. Generally, young or juvenile birds show an acute and rapidly fatal form of the disease, while adults are more likely to outgrow the infection or develop chronic disease (Jackson et al., 2015; Fogell et al., 2016; Martens et al., 2020; Morinha et al., 2020^{a,b}).

Besides the classic symptoms, Pbfd can cause feather-picking disorder. This disease is marked by the plucking or destruction of feathers and/or self-mutilation of the skin, and in severe, impulsive cases, the animals can cause considerable injury to the skin tissues, causing hemorrhage, secondary infections, and penetration of the muscle and cellular cavity, which

can lead to the animal's death (Telles et al., 2015). In the present case, the animal was young, and the clinical manifestation was characterized by the acute form of the disease, evidenced by the aptheria affecting the entire skin of the individual. In addition, the circovirus probably predisposed to the feather pulling disorder. It is thus suggested that limb amputation resulted from the impulse caused by this disorder, which, despite being described by the act of feather picking, can also lead to mutilation of the skin, muscles, and cellomastic cavity, as previously mentioned, and in this report, there is also mutilation of bone tissue.

BFDV is transmitted horizontally from direct or indirect contact by feather dust, contaminated surfaces or objects, or vertically (Jackson et al., 2015; Fogell et al., 2016; Martens et al., 2020; Morinha et al., 2020^{a,b}). In the case reported here, it is possible that the adult birds that were raised together with the specimen passed the disease to the offspring, among which only the most immunosuppressed animals, which often were not fed correctly, for example, were symptomatic.

For diagnosis, histopathology, immunohistochemistry, serology (immunofluorescence and ELISA), and PCR can be used, the latter being characterized by rapid, reliable, and non-invasive detection. Thus, tissue, feather, blood, and fecal samples can be used (Eastwood et al., 2015), the latter being the collection method of choice for this case because besides the animal not having feathers, we aimed to cause the minimum possible stress. As an option of the person in charge, a histopathological analysis was not possible.

Although some studies use drugs such as acyclovir for the treatment of the disease, there is no effective method for the complete cure of the animals. Thus, supportive care can increase survival, but may not necessarily lead to the resolution of clinical signs or prevent chronicity, and it is often necessary to euthanize the affected birds. BFDV elimination in affected individuals is difficult, and the virus has the ability to remain stable for several years in the environment. For prevention, a quarantine period of at least 6 months is necessary, with tests every 90 days to avoid endangering other animals in the flock, and to prevent infected birds from reproducing due to the possibility of vertical transmission. Additionally, some studies for the production of vaccines are already being carried out, but this is not yet available on the market (Bonne et al., 2009; Jackson et al., 2014).

Due to the high biological risk, the possibility of euthanasia of the contacting animals was considered. Since the birds were pets, the person responsible did not consider this option, because the other individuals were not in such a critical condition as reported. She was then recommended not to breed the animals she had, not to acquire other birds, and not to pass on the contaminated and/or infected birds to other breeders. It was also recommended that the animals should be kept in a controlled environment, where free-living birds should not have access, and that frequent and rigorous hygiene of the environment should be maintained. In order to maximize the quality of life of the affected individuals, the guardian was encouraged to implement environmental enrichment measures and to improve the diet of the patients, and it was suggested to keep them on species-specific extruded feed.

Although there are papers reporting beak and feather disease in psittacidae in Brazil, these studies are scarce mainly in the Northeast region. Moreover, to date, this is the first report to relate this disease to severe feather-picking disorder characterized by limb self-mutilation.

4. Conclusion

The importance of beak and feather disease for clinical and conservation of birds is highlighted. Considering that reports of this condition in psittacidae are scarce in Northeastern Brazil, we report the occurrence of circovirus in the budgegarigar (*Melopsittacus undulatus* SHAW, 1805) and the consequent feather-picking disorder related to generalized aptheria and limb self-mutilation for the state of Rio Grande do Norte. This report represents new data regarding the viral diseases that can affect Psittaciformes in this region. From this work, it will be possible to conduct future research in order to

understand how exotic Psittaciformes populations infected with this and other diseases can interfere with the conservation of wild birds in the Northeast of the country.

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