Post-Mortem Findings in Captive Wildlife in Two Private Zoological Gardens in Nigeria

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Abstract
The significance of pathoanatomical studies concerning diseases that impact wild animals cannot be overstated, as they serve as a fundamental pillar in facilitating the implementation of effective measures for the prevention and control of these afflictions. The challenges of cases of mortality in wildlife may be isolated cases from government-owned facilities and educational centers but it is important to put together some of these cases of wildlife mortality especially as it concerns private zoos. This case report aimed at presenting the post-mortem findings of four cases of mortality in two (2) private zoological gardens in Nigeria. The post-mortem findings showed evidence of sand colic in zebra, helminthosis in a hippopotamus, electric shock in a chimpanzee, and acute mortality syndrome in a giraffe. These findings underscore the need for holistic intervention and veterinary care in the management of zoological gardens especially in low-resource settings.

Keywords: Sand colic, Zebra, Helminths, Hippopotamus, Shock, Chimpanzee, Zoo

1. Introduction

There are over 15 zoological gardens in Nigeria with majority of the zoos being privately driven or privately owned. Major cities in Nigeria are home to some of these private zoos with some of them having amusement parks, and waterparks. They have proven to be top tourist destinations. However, management issues have become paramount in zoological gardens in the country [1] and there are further investments to expand zoo operations. This move has some public health concerns [2].

Data on diseases of wildlife and zoo animals are very scarce in Nigeria probably due to emphasis on the livestock industry which is needed to provide meat for her population [3]. There is a need to focus on the collections of wildlife to ensure their proper management and conservation. Zoos have the challenge of maintaining the health and welfare of living animal collections [4]. Naturalistic enclosures with soil and vegetation are appealing to the public and are more stimulating for the animals; however, they present challenges for both sanitation and parasite control programs and may complicate restraint procedures. Challenges of mortality may be re-occurring or isolated cases but it is important to put together some of these cases especially as it concerns private zoos.

A post-mortem examination is an essential part of the health monitoring of zoo animals and zoo collections. A complete examination of all dead animals within a collection is an important part of surveillance. Examination of wildlife found dead on zoo grounds also serves to monitor for infectious and other disease trends. Much of the information on zoo animal diseases is from government and educational institutional zoos [1, 3] with scanty reports from privately owned zoos. This report, therefore attempts to put together some of the investigations on wildlife in two private zoological gardens in Nigeria.

2. Materials and Methods

In this report, the identified carcasses of four different wildlife animals namely Zebra, Hippopotamus, Chimpanzee, and Giraffe were subjected to post-mortem examination or necropsy to ascertain the cause of death of these wildlife animals in two private zoological gardens. The carcasses of zebra, hippopotamus, and chimpanzee were identified at a private zoo in Lagos State; which is located in the humid zone of the Western part of Nigeria. The carcass of the giraffe was identified at a private zoo in Delta State; which is also a humid zone in the Southern part of Nigeria. The details of the case reports and findings are as reported here.

Case Reports

Case 1

Plain Zebra, Adult, Female, three in a group with one affected and dead. The zebra was introduced into the resort over a year. The animal was observed to have been weak, off feed, passed loose faeces, and lost weight by the handler for about a week. Some interventions were attempted; however, the zebra was found dead on Friday morning (19/08/2022).

Post-mortem findings showed that the carcass had a few excoriations on the skin of the left abdominal wall. The skin was dry (dehydrated) and there were prominent bones in the pelvis and face. The eyes were sunken while the ocular and oral mucous membranes were pale (anaemia). The perineal area was stained with dried greyish loose faeces. There was excess blood-stained fluid in the thoracic (Hydrothorax), pericardial (hydropericardium), and abdominal spaces (ascites). The lungs were wet, shiny, dark red, and non-collapsed with rib imprints. There were also a few patchy areas of consolidation on the right caudal and left cranial lobes. There was serous atrophy of pericardial and abdominal fat (emaciation). There was so much sand in the stomach and intestine extending to the colon and pelvic flexure. A few flukes were in the gastric and intestinal content. There were both petechial and ecchymotic haemorrhages on the serosal and mucosal surfaces of the small and large intestines (right ventral colon) (Plates 1A-D). Post-mortem diagnosis was Foreign Body Enteritis (Sand Colic) and Trematodiasis. The Zebra may have suffered from impaction and possibly endotoxaemia.

Plate 1: Gross findings from Zebra (A) showing severe acute severe haemorrhagic enteritis (B), trematodiasis (C), and pneumonia (D).

Case 2

Hippopotamus, <1 year, Male,

The hippopotamus was introduced into the resort on June 23, 2022. The animal was found dead Sunday morning (04/09/2022).

Postmortem findings showed the carcass was in fair body condition. The skin was cyanotic. There was palor of the ocular and oral mucous membranes. There was about 250ml of straw coloured fluid in the thorax. The lungs were non collapsed, dark red, with firm cranial lobes and the caudal lobes rubbery. There was about 100ml of similar straw coloured fluid in the pericardial cavity. The left ventricular wall was markedly thickened and there was blood clot on the bicuspid valve.

Similarly, more than 250ml of straw coloured fluid was in the abdominal cavity. The liver and the spleen were moderately congested and enlarged. They were both covered by fibrous capsule/membrane. The gastric mucosal surface was hyperaemic and the content was mucoid with a few green forages. The mesenteric vessels were injected; the small intestinal mucosal surface was hyperaemic, mucoid and haemorrhagic. There were numerous nematode worms in the distal small intestine and large intestine (plate 2A-D). All other organs did not show observable gross lesions.

Post-mortem diagnosis was septicaemia and Helminthiasis. The pneumonic lungs may have contributed to the immediate cause of the hippopotamus death.

Plate 2: Gross findings of hippopotamus (A) showing acute severe pneumonia (B), haemorrhagic enteritis (C), and severe helminthosis (D).

Case 3

Chimpanzee, >20 years, Male. The chimpanzee had spent close to 20 years in captivity. Recently there were some repairs on the housing cage of the animal. The animal was active until a few minutes later when it was observed to be weak and biting his tongue.

The carcass was fresh and in good body condition. There was severe pallor of the ocular mucous membranes. There were cut wounds on the left palm. The lungs were non-collapsed, congested with consolidation of the left caudal lobe. There were ecchymotic haemorrhages on the epicardium, unclotted blood in the chambers of the heart (Plate 3). The liver was markedly enlarged and congested. The spleen was also enlarged and congested. The intestines were hyperaemic and haemorrhagic. The kidneys were also markedly congested. Post-mortem diagnosis was Shock (cardiogenic).

Plate 3: Gross findings of Chimpanzee (A) showing acute severe pneumonia (B), haemorrhages on the epicardium (C), and excoriation of the skin (D).

Case 4

Giraffe, *G. camelopardalis*, <1 year, Male. The giraffe was introduced into the park on 27 January 2023 from Chad. It was active with good appetite until Saturday 04 February, 2023 when it started showing signs of weakness like not being able to stand properly. Attempt at resuscitation was made through the administration of fluid and glucose. The animal was also examined clinically but it died shortly afterward on Saturday 04 February 2023.

The carcass was in good body condition. There were a few bluish spots on the skin (perineum & knee). The ocular mucous membranes were moderately pale. The oral mucous membranes were hyperaemic and brownish foamy fluid was noticed in the mouth, around the lip and on the floor. The tracheal mucosa was hyperaemic, lungs were diffusely congested and with consolidated patches. There was about 150ml of straw-coloured fluid in the pericardial cavity. The liver and the spleen were moderately congested and enlarged. The stomach was distended, gastric serosal had lineal haemorrhages and mucosal surfaces were haemorrhagic (ecchymotic) with content containing green forages. The mesenteric vessels were congested; the small intestinal mucosal surface was hyperaemic, mucoid and haemorrhagic (Plate 4). The kidneys were also congested bilaterally.

Post-mortem diagnosis included Toxicity, Anaphylaxis (shock) and Acute Mortality Syndrome.

Plate 4: Gross findings of Giraffe (A) showing acute severe pneumonia (B), tracheitis (C) and enteritis (D).

3. Discussion

The circumstances of mortality from the four different wildlife animal species in this report, underpin similarities in the wildlife issues that occur in governmental or public zoos. The findings

show evidence of sand colic in zebra, helminthosis in a hippo, electric shock in a chimp, and acute mortality syndrome in a giraffe. These findings underscore the need for holistic intervention for managemental shortcomings and veterinary care. Most of these mortalities could have been averted should proper measures were put in place to diagnose the causes and or prevent the conditions.

Zoo animal medicine has made remarkable advances over the past century, in part because zoos have evolved from mere collections of exotic animals to centers of research in animal biology and disease diagnosis, treatment, and prevention [5].

Causes of mortality in captive wildlife include but are not limited to infectious pathogens. Adetunji and Adesope [6] reported causes of mortalities were unknown in more than 17% of the cases. Akanbi et al [2] observed non-infectious conditions accounted for 23% of total cases reported including fractures, nutritional deficiencies, toxicity, and dystocia, among others. Infectious diseases including bacterial, parasitic, and viral were the dominant groups of diseases of captive wild animals in the zoos investigated. Emikpe et al [3] reviewed various conditions diagnosed in zoo/wild animals using conventional methods and ancillary techniques.

Post-mortem examination as part of a thorough pathologic examination, including medical, husbandry, and nutritional history of the animal, is valuable in identifying problems requiring immediate action to safeguard the health of the collection and trends over time. Given the limited existing knowledge regarding some species in zoo collections, complete post-mortem examinations can also add to the canon of literature about what is normal and how species vary. The foundation of a medical program for zoo animals is preventive medicine. Preventive medical programs should be dynamic and consider the individual animal and its population. Components of the program include risk-based quarantine, routine diagnostics, and therapeutics, (including vaccinations, adequate nutrition, comprehensive parasite control), and disease monitoring via post-mortem examinations. Animals should be evaluated to ensure their health complies with local, state, and federal health requirements before movement between institutions or release in managed reintroduction programs. Pre transport evaluations can also be used as an opportunity to assess the overall health status of the group in which the animal has been living [5]. Morbidity and mortality from parasites can be increased during times of stress, such as shipment or when comorbidities are present, or in young animals.

To achieve significant reduction in mortalities of captive wild animals, managers of zoological gardens should adopt proper housing and feeding, routine vaccination, deworming, hygiene and sanitation and seek prompt veterinary attention when animals are sick.

Recommendations include review of the managemental conditions especially habitat. Routine deworming should be encouraged for the animals in captivity and holistic veterinary care should also be implemented.

References

[1] Morenikeji OA, *Wildlife and Zoo Management*. Ibadan: University of Ibadan Press, 2016, 1-31pp. ISBN: 978–978–54045–9–3.

[2] Akanbi OB, Jegede HO, Adam M, Oludairo OO, Aiyedun JO, Rimfa AG, Ahmed J, Barde IJ, Hanga AB, Ajadi AA, Atata JA, Taiwo VO, Shoyinka SVO, Disease and mortalities in selected zoological gardens in Nigeria. Comparative Clinical Pathologyhttps://doi.org/10.1007/s00580-021-03273-6.

[3] Emikpe BO, Morenikeji OA, Jarikre TA, Zoo animals' disease pattern in a university zoological garden, Ibadan, Nigeria. *Asian Pac J Trop Dis*, 6(2), 2016, 85-89.

[4] National Research Council (NRC) Committee on a Review of the Smithsonian Institution's National Zoological Park, Washington (DC) Animal Care and Management at the National Zoo: Interim Report: National Academies Press (US); 2004.

[5] Clancy MM, Preventive Medicine for Zoo Animals, San Diego Zoo Safari Park. MSD Veterinary Manual. Last review/revision Oct 2021 | Modified Oct 2022.

[6] Adetunji V, Adesope A, Some Causes of Mortalities in Captive Wild Animals in Ibadan, Nigeria: A Retrospective Study. Nigerian Veterinary Journal, 4 35 (2), 2014, 989-999.