Common Causes of Traumatic Ventriculitis in Free range and Intensively Managed Poultry in Zaria, Nigeria

Ibrahim Waziri Musa*, Sa'du Lawal Lawal[1], Kaltungo Bilkisu Yunusa[1], Paul Ayuba Abdu

Ahmadu Bello University, Zaria, Nigeria
1. Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria
* Corresponding author email: drbilki@yahoo.com
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Abstract

The gizzard or *ventriculus* in birds is susceptible to mechanical damage or traumatic injuries referred to as traumatic ventriculitis when subjected to the causative agents. The condition affects both intensively and extensively managed birds. Palm kennel cake is commonly used as a chief source of protein and fat in poultry rations, most poultry that are kept intensively on deep litter system in the study area use wood shavings collected from carpentry workshops as litter material while poultry on extensive system of management have access to refuse dumps where sharp objects are commonly found. Traumatic ventriculitis can hardly be detected and managed clinically. From our clinical records, nails of various sizes, bolts and nuts, sharp objects like pieces of wood, palm kennel shells and wires of various sizes are the major causes of traumatic ventriculitis. Major causes of traumatic ventriculitis or hardware disease in poultry in the study areas are hereby discussed and three cases presented in chickens as case studies. Locally and manually compounded poultry feeds, access to refuse dumps, litter materials to be used in poultry houses and litters in poultry houses were renovation works had occurred should be screened for metallic and hard sharp objects to prevent or reduce risk of ingesting and the occurrence of hardware disease.
Key words: Causes, free range and intensive systems, poultry, traumatic ventriculitis, Zaria, Nigeria.

Introduction

Traumatic ventriculitis or hardware disease is the perforation and or ulcerative erosions of the horny lining 'kaolin lining' of the gizzard caused by foreign bodies. It is a condition that commonly occurs in poultry maintained on deep litter system of management but it is very uncommon in aviary or caged birds (Arnal and Keymer, 1975; Olufemi and Roberts, 1988). The *ventriculus* or gizzard is the muscular stomach of poultry and is functionally considered to replace the teeth in terms of digestion (Barte, 2005; Olufemi and Roberts, 1988). It is made up of large muscle mass with tough horny lining membrane that resists enzymes and acids secreted by the proventriculus (Biester and Schwarte, 1952). Grits in the gizzard is a common finding and usually assists in digestion particularly in seed eating birds by grinding down the feed thereby making gastric juice secreted by the proventriculus more effective (Barte, 2005; Biester and Schwarte, 1952). The gizzard usually contracts powerfully and rhythmically (2-4 times every minute) thereby reducing the contents to a thick paste mass (Barte, 2005; David, 2000).

Metallic or hard sharp foreign bodies may be taken in and reach the gizzard without causing any major problem and may continue to exist normally with grits in the gizzard (Biester and Schwarte, 1952) or the strong acidic condition of the gizzard (pH2-3) may react with the metallic objects resulting into wearing off or chemical damage of its surfaces (Galav *et al*., 2010). Also the gizzard is capable of exerting considerable pressure on the objects taken in for maceration, this makes the gizzard quite susceptible to traumatic injuries with especially sharp hard objects (Biester and Schwarte, 1952; Galav *et al*., 2010). Traumatic ventriculitis due to different types of foreign bodies has been reported in many bird species but appears to be more common in commercial poultry maintained on deep litter system particularly where litter materials were made up wood shavings commonly collected from carpentry workshops (Biester and Schwarte, 1952; Galav*et al*., 2010; Musa *et al*., 2009; Seneviratna, 1969; Rao and Acharjyo, 1990). Chickens with traumatic ventriculitis have been reported to die of either extreme emaciation or from toxaemia (Arnall and Keymer, 1975; Galav*et al*.,

2010; Musa *et al*., 2009). Organ rupture or paralysis due to nerve damage by penetrating sharp hard objects has been observed in some birds (Arnall and Keymer, 1975; Musa *et al*., 2009 Seneviratna, 1969).

Three cases of traumatic ventriculitis as accidental findings during post mortem in adult chickens are hereby reported.

Materials and Methods

Poultry disease case records of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria and Area Veterinary Clinic Gombe were used for the study. Cases of TV and non-TV were extracted from the unit record books and considered together as a group. A case was defined as any farm that reported or submitted birds for diagnosis and diagnosed based on clinical signs and postmortem findings. The birds were categorized based on species affected, that is, chicken, turkey, ducks and others. Breeds, that is local and improved (Halle *et al*., 1999), while production types were considered to be free range/extensive or intensive systems.

Case one

Two dead indigenous cocks from a flock of 20 were presented to the Poultry Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria with the chief complaint of death. The clinical signs observed by the farmer were gradual loss of weight and incoordination noticed over one month ago. The birds were kept on free range and given complimentary feeding with self-compounded feed.

Postmortem examination

The gross lesions observed were: severely emaciated carcasses, enlarged gizzard and protruding piece of wood from the dorsal aspect of the gizzard with some necrotic tissues (Figure I and II). Severe haemorrhagic band at the junction of proventriculus and gizzard was also seen.

Case two

One dead 28-week old commercial layer from a flock of 1200 birds was presented to the State Veterinary Clinic Gombe with a chief complaint of gradual loss of weight before death. The birds were fed commercially compounded feed and were managed on deep litter system made up wood shavings. The postmortem gross lesions seen were: emaciated carcass and protruding 2 inch nail on the dorsolateral aspect of the gizzard.

Case three

This case involved two dead birds from a flock of 2,000, 32-week old commercial layers that were maintained on deep litter system. The birds were presented to the same unit as in case one. Gross lesions seen were consistent with Newcastle disease. However, screws, bolts large sized palm kernel shells and whole maize grains were recovered from the gizzards. The gizzard showed evidence of massive necrosis on its wall, sloughing of its mucosal lining and bile stained contents.

Diagnosis

The tentative diagnosis of traumatic ventriculitis and Newcastle disease was made in cases 1 and 3 while traumatic ventriculitis was made with respect to case 2.

Results and Discussion

Traumatic ventriculitis or hardware disease has been reported to be uncommon condition in cage and

Figure-I: Shows perforated ventriculus by a hard narrow stick (arrow).

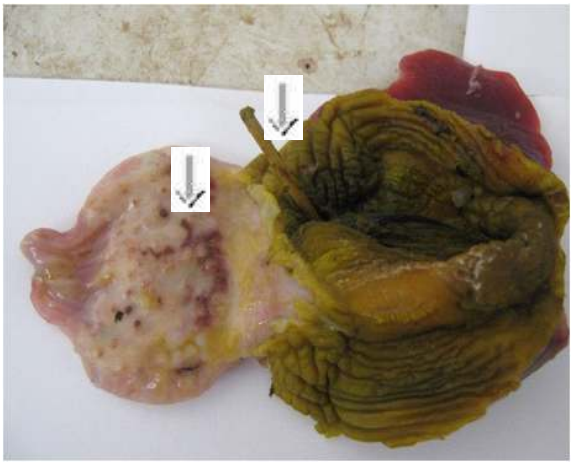

Figure-II: Cross section of the gizzard and proventriculus showing a protruding piece of wood and haemorrhages at the proventricular-gizzard junction.

Figure-III: Whitish necrotic areas in gizzard. bolts, nuts and maize grains (whole) recovered from a chicken gizzard

Figure-IV: A 2 inch nail (arrow) protruding through the dorsolateral surface of the Gizzard.

aviary birds, but is commonly seen in commercial poultry particularly those kept on deep litter system (Arnall and Keymer, 1975; Musa *et al*., 2009) this agrees with the above case reports. It has also been reported in free range poultry production systems as seen in case one. Caged aviary birds and poultry kept on battery cages may not have access to such foreign bodies and may be free from the condition. The condition is common in the study areas probably due to the fact that wood shavings collected from carpentry workshops that commonly contain nails and sharp objects are used as litter materials in most farms and free ranging birds may accidently pick such objects in refuse dumps as they scavenge. It could also occur where recent construction or renovation works in poultry houses that are kept on deep litter are carried out (Musa *et al.,* 2009). Also, self-compounded poultry feeds that are mixed manually on hard surfaces or raw materials containing foreign bodies when utilized without proper screening for sharp objects or birds on free range that have access to refuse dumps may scavenge and accidentally pick such foreign bodies that are capable of causing hardware disease as is suspected in case 1.

Palm kernel residue after extracting the palm oil is commonly used in poultry rations as a cheap source of fat and protein in the study areas. The residue contains the hard palm kennel shells of various sizes that may not be normally digested by the birds. Other metallic objects like coins, nuts and bolts may accidently be picked up by birds and may lodge in the proventriculus or gizzard and can most often be detected at postmortem. Large sized and excessive palm kernel shells in poultry rations, other hard and metallic foreign bodies may lead to gizzard impaction, severe tissue reaction and or traumatic ventriculitis as observed in case three.

All the cases had consistent history of gradual loss of weight before death. This agrees with the observation that depending on the shape, size and nature of the foreign body swallowed, sharp or hook like objects may bury their ends into the muscular wall of the *ventriculus* during contraction. The affected bird may exhibit signs of pain; loss of appetite and gradual weight loss (Biester and Schwarte, 1952; Musa *et al*., 2009; Galav*et al*., 2010) alternatively, such sharp objects may be forced through the wall of the gizzard in single or multiple directions at once during contraction. This eventually may result into perforations or mechanical damage to its surface and or local to chronic tissue reactions leading to peritonitis unless the penetrating object is walled off (Biester and Schwarte, 1952; Galav*et al*., 2010; Musa *et al*., 2009) as seen in the above cases.

The farmers were advised to pay good attention for the presence of any metal or sharp objects in the litter material at the point of collection. This may be easily achieved by the use of large size magnets. Birds on free range should be prevented from accessing refuse dumps. Newly renovated poultry houses, raw materials for making feed and hard surfaces where poultry feeds are manually mixed should also be screened for metals and sharp objects. Palm kernel cake if used in poultry ration should be at low level and grinded into smaller particles to avoid incidences of gizzard impaction and trauma. The use of battery cage in intensive management systems and feeding birds with commercially compounded feeds may reduce the

risk of ingesting sharp objects or metals by birds. The farmers were only given advice because clinical diagnosis and management of traumatic ventriculitis is difficult or impossible as several attempts made have not been successful (Arnall and Keymer, 1975; Awadhiya and Vegal, 1975). Mild to chronic ventriculitis usually occurs which may not be detected clinically but diagnosed at autopsy (Galav*et al*., 2010; Musa *et al*., 2009). The management of this condition is usually difficult or impossible, because the presenting clinical signs if any are not clear cut (Arnall and Keymer, 1975; Galav*et al*., 2010; Musa *et al*., 2009), the cost of X-ray diagnosis and surgical intervention may be greater than the economic value of the birds (Musa *et al*., 2009) or even unrewarding as presence of grits in the gizzard may mask other foreign bodies (Arnall and Keymer, 1975; Awadhiya and Vegal, 1975). A short of radiograph costs more than one thousand Nigerian naira and surgical management may double that amount (Verbal communication). The gizzard being a highly muscular organ makes the removal of foreign objects and sutures almost impossible (Arnall and Keymer, 1975; Awadhiya and Vegal, 1975; Barte, 2005). Also chances of repair and remedy of traumatized gizzard are poor and several attempts to manage such cases have failed (Biester and Schwarte, 1952).

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