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Case Report

Foot-and-mouth disease virus serotype O, East African topotype 3 (EA-3) in a pastoral herd in Kaduna state, Nigeria

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ABSTRACT

A case of foot and mouth disease involving an uncommon serotype of the Foot and Mouth disease virus (FMDV) is reported in a 6-year-old Bunaji bull from a pastoralist herd in Tohu, Sabon Gari Local Government Area of Kaduna State, Nigeria. Clinical examination revealed erosions in the inter-digital spaces, dorsum and ventrum of the tongue and raised hair coat. The epithelial lining of the lesions on the foot and mouth were gently peeled off and used as samples for diagnosis. A confirmatory diagnosis of FMDV serotype O strain was done by virus isolation using Bovine thyroid gland primary cell line, antigen ELISA for FMD virus, while a phylogenetic analyses of VP1 nucleotide sequences revealed East African topotype 3 (EA-3). Presenting lesions in the interdigital space were cleaned with cotton wool soaked in a solution of 5% chlorhexidine and then sprayed with Oxyspray® after which Tetranor® long acting antibiotic was administered through deep intramuscular route at 20mg/kg body weight. The diagnosis of relatively alien topotype of FMDV in Nigeria calls for a holistic epidemiological survey of all the serotypes and topotypes present in the country in order to plan for effective control measures.

Keywords: Bunaji bull, FMD, Nigeria, Serotype O, Topotype EA-3.

INTRODUCTION

Foot and mouth disease (FMD) is a highly contagious vesicular disease of cloven-hooved livestock and wildlife animals. The causative agent is an Aphthovirus belonging to the family Piconaviridae which exists as 7 major serotypes: O, A, C, South African Territories, SAT-1, SAT-2, SAT-3 and Asia 1 (Jamal *et al*., 2013). The disease is characterized by high morbidity rate but low case fatality especially in adult animals due to previous exposure. However, in the young and naïve populations, the disease may present with high morbidity and mortality (Lazarus *et al*., 2012; OIE, 2014). The disease is of high economic importance due to its ability to cause weight loss and substantial reduction in milk yield (Lazarus *et al.,* 2012; OIE, 2014). Foot and mouth disease is considered to be the single most important limitation to world trade in live animals and their products (Knowles *et al.,* 2005). The seeming lack of livestock movement control in sub-Saharan Africa facilitates the spread of the disease across the region. Also, new strains of the virus can be introduced to areas where they did not exist previously. The susceptible population of animals in Nigeria may therefore be at risk of infection with endemic strains and perhaps, with other strains from the neighbouring countries (Lazarus *et al*., 2012).

Foot and mouth disease is usually diagnosed based on evident clinical signs which include pyrexia, excessive salivation, stomatitis and formation of vesicles/ulcers on the oral mucosa, the nose, inter-digital spaces and the coronary bands of the feet (Radostits *et al*., 2003). Unfortunately, some of these signs may be confused with other diseases that cause stomatitis like malignant catarrhal fever and bovine viral diarrhoea. Thus, laboratory-based diagnosis is necessary and this should be prompt, sensitive and specific, aimed at identification of the serotype/topotype of the viruses involved in disease outbreaks, especially in view of

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the economic losses due to this disease. Besides, there is no cross-protection among the serotypes (Grubman & Bax, 2004; Subramaniam *et al.*, 2015). Therefore, determination of the serotype(s) involved in field outbreaks needs to be established to enhance update on vaccine strains as it is reported that there is a broad intra- and inter-serotype antigenic diversity in the existing serotypes of the FMD virus (Kitching *et al*., 2005). There is a dearth of information regarding the epidemiology of FMD in Nigeria with special consideration for a wide number of topotypes existing in the country. In this case report, the management of FMD and molecular characterization of FMD virus from a pastoral herd are described.

CASE PRESENTATION

A 6-year-old Bunaji bull weighing 234 kg from a pastoralist herd in Tohu, Sabon Gari Local Government Area of Kaduna State was presented with complaints of excessive salivation, inappetence which were noticed a day prior to presentation. Some other animals in the herd (cattle and sheep) were said to have come down with the same condition and recovered prior to the visit. However, a few animals in the herd were sampled and examined to ascertain their health status. The herd comprised 25 cattle, 15 sheep and 23 goats. The herd was managed on an extensive system and had no medical history. Further history revealed that the same condition occurred in five neighbouring herds affecting a large number of cattle and sheep.

CLINICAL EXAMINATION AND DIAGNOSIS

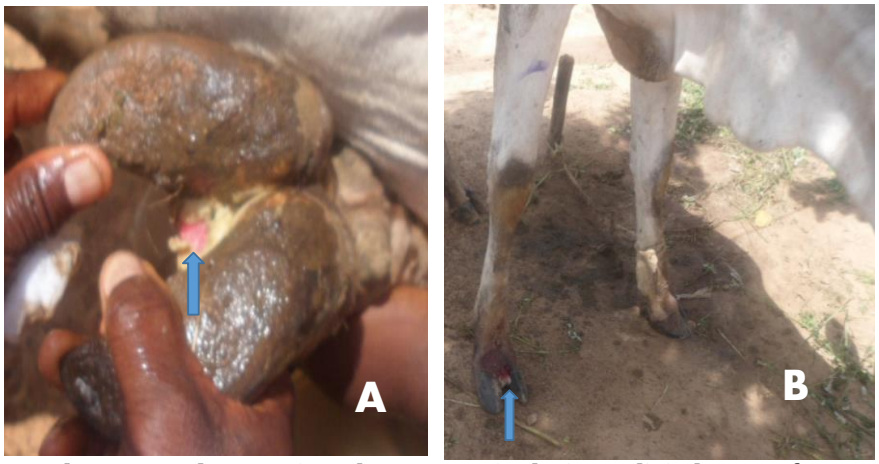
On further examination, the vital parameters were taken. Rectal temperature was 40.5^{o}C, while the pulse rate and respiratory rate were 95 beats/min, and 34 cycles/min respectively. Other clinical signs observed were erosions in the interdigital spaces (Plate 1A and B), erosions on the dorsum and ventrum of the tongue (Plate II) and raised hair coat. Based on these signs, a tentative diagnosis of FMD was made.

SAMPLE COLLECTION AND SUBMISSION

Upon adequate physical restraint by an assistant, the epithelial lining of the lesions on the foot and mouth were gently peeled off and scrapped with a scalpel blade into a transport medium containing in-house 5X-PSGA (penicillin, streptomycin, gentamycin and amphotericin-B) diluted 1:1 with glycerol. Specimens collected before treatment were transported on ice to the FMD National Reference Laboratory at the National Veterinary Research Institute (NVRI), Vom, Nigeria and stored at -80°C until processed for onward shipment to the Food and Agriculture Organization World Reference Laboratory for FMD (WRLFMD; IAH Pirbright, Woking, Surrey, UK).

LABORATORY DIAGNOSIS

The epithelial tissues were washed in PBS (pH 7.2-7.4) before removing 1 g for sample processing and incubated in tissue culture flasks containing foetal goat cells (ZZ-R 127) according to protocols described by Ularamu *et al.* (2016). The specimen was further serotyped with an antigen detection ELISA kit for FMDV serotypes O, A, SAT 1 and SAT 2 (IZSLER Biotech Laboratory, Brescia, Italy). Phylogenetic analyses of VP1 nucleotide sequences were carried out at the WRLFMD; IAH Pirbright, Woking, UK to detect the topotype of the serotype present. The specimen was confirmed to be positive for FMD virus serotype O and the strain/topotype detected was East African topotype 3 (EA-3).



Plates 1A and 1B erosions due to FMD in the inter-digital space of a Bunaji bull (Arrows)

Plate II. Ventral aspect of the tongue with erosion in the affected Bunaji bull

TREATMENT

The lesions in the interdigital space were cleaned with cotton wool soaked in a solution of 5% chlorhexidine and then sprayed with Oxyspray® (oxytetracycline + Gentian violet) after which 20% Oxytetracycline LA (Tetranor®) was administered by deep intramuscular route at 20mg/kg body weight. The herdsman was advised to wash the presenting lesions adequately with normal saline and 2% alum solution daily and then after spray with Oxyspray®. He should also feed affected animals with soft feed like fresh grass and maize bran until the lesions are completely healed

DISCUSSION

The clinical signs and lesions observed in this case are diagnostic of FMD according to clinical manifestations of FMD provided by OIE (2014). This case has demonstrated that cattle and possibly sheep in the herd as well as other animals in the neighbourhood had contracted the disease. The history revealed that some other animals that came down with the disease in the past recovered without any medical intervention. This indicates a long time presence of the virus strain affecting livestock in the area that might have prompted acquisition of some level of immunity against the virus. This line of thought agrees with earlier report of Abubakar *et al.* (2013) confirming the recovery of cows and buffaloes suffering from FMD in endemic areas without serious mortality. However, due to lack of cross-protection between the virus serotypes and limited cross-protection among some topotypes, repeated outbreaks as reported by herdsmen in this area indicate there are possibly several FMD virus serotypes/topotypes circulating among livestock in the area.

To the best of our knowledge, this is the first case report of FMD involving FMDV serotype O, East African topotype 3 (EA-3) in a herd in Zaria, North West Nigeria despite that FMD is considered to be endemic in the country. Ehizibolo *et al.* (2017) reported the same topotype in cattle in Kachia Grazing Reserve (KGR) along with SAT2 (lineage VII) to suggest that this particular topotype of FMDV is becoming endemic in Nigeria. The East Africa strain of the FMD virus (O/EA-3) could have found its way into Nigeria via nomadic pastoralism through the porous Eastern borders (Ularamu *et al.,* 2016). Also, increased regional conflicts could be said to account for the increasing livestock movement and the subsequent spread of livestock diseases.

CONCLUSION

The report of FMD virus serotype O, EA-3 in Tohu village in Sabon Gari LGA, Kaduna State, Nigeria, calls for a holistic epidemiological survey of all the serotypes and topotypes of the FMD virus in Nigeria, particularly in Kaduna State in order to understand the complexity of FMD epidemiology in sub-Saharan Africa. Such an endeavour is essential for development of a vaccine that can protect the livestock population in Nigeria from all existing strains of FMD virus. Disease is one of the major limitations to livestock production in Sub-Sahara Africa and development of effective vaccine against predominant strain (s) in Nigeria has the potential of limiting FMD and facilitates the profitability of livestock industry by averting weight loss, and milk reduction in affected animals. Perhaps, a livestock free of FMD sequel to adequate and effective FMD vaccine coverage is necessary for promotion of cattle trade in West Africa region.

COMPETING INTEREST

The authors declare no competing interest.

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