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Surgical correction of polymelia in ISA-brown Chicken: A case report

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Abstract

Polymelia is a congenital anomaly which is associated with extra limbs in animals and humans. Predisposing factors are associated with genetic, environmental agents, or a combination of factors. A case of polymelia was observed in 5 days old ISA-brown chick during a routine check in commercial poultry farm with about 5000 pullets of ISA-Brown strain. On physical examination, there were two extra limbs located caudally, initially touching ground but as the bird grows, the extra limbs were off the ground, rigid, shrunken, smaller, and non-functional yet responded to stimulus. Radiographic evaluation with plain X-ray revealed that the extra limb originated from the left acetabulum, having one short femur pointing caudally, one short tibiotarsus bones bifurcated into two and giving rise to two tarsometatarsus bones, each having four curled digits. Surgical amputation of the extra limb was carried out when the chicken was 10 weeks old under xylazine and ketamine anaesthesia. Full recovery was attained in 14days and the chicken was walking normally without any deformity in the gait.

Keywords: Polymelia, amputation, ISA-brown, tibiotarsus, tarsometatarsus, extra limbs

Introduction

Polymelia is a rare congenital defect involving limbs, in which the affected animal has more than the usual number of limbs (Bharati, 2017) [4]. Polymelia is a foetal developmental anomaly usually linked to genetic factors (trans-genes, chromosomes mutation), and environmental agents (infections, toxins, indiscriminate use of drugs, teratogens, exposure to ionizing radiation, fertilization techniques, hatching of eggs with double yolk etc.) or a combination of factors (Keeler *et al.*, 1981; Newman *et al.*, 1999; Hirschberg *et al.*, 2012; Bharati 2017; Onmus *et al.*, 2017) [8, 10, 7, 4, 12]. It often occur with some other congenital abnormalities affecting the limbs in domestic animals such as: polydactyly, hemimelia and duplication of some organs like colon, caecum and cloaca or rudimentary wing as reported by; Noh *et al.*, (2003) [11], Zhao *et al.*, (2006) [17], Azeez and Oyagbemi, (2013) [2], Bharati, (2017) [4]; Neupane, *et al.*, (2017) [9]; Newman *et al.*, Daneze and Brasil, (2018) [5].

Case History and Clinical Examination

A chick was identified with extra limbs and isolated at five (5) days old during a routine vaccination and checks in a commercial poultry farm with about five thousand (5000) pullets of ISA-Brown strain in Abeokuta and brought to Maiduguri, Borno State, Nigeria. The chick was kept and fed until it reached 10 weeks of age and attained a live weight of 0.65kg before clinical evaluation and surgical correction was carried out at the Small Animal Surgery Theatre, Department of Veterinary Surgery and Radiology, University of Maiduguri, Borno State, Nigeria.

Clinical evaluation

Physical examination revealed two extra limbs located caudally, it was short, rigid and immovable and also off the ground but responded to stimulus with needle prick (Figure 1). Plain x-ray also revealed that extra limb originated from the left acetabulum, it had short femur, tibiotarsus bifurcates into two giving rise to two distinct tarsometatarsal bones and each having four curled digits (Figure 2).



Fig 1: Arrow showing 2 extra limbs with curled digits located caudally

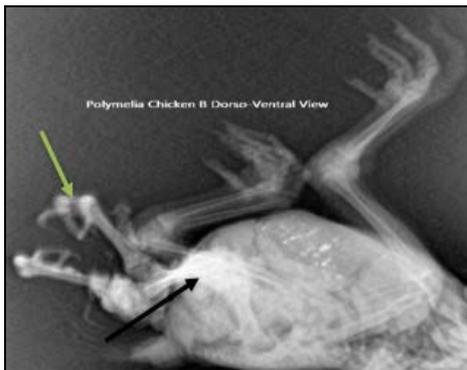


Fig 2: X-ray showing extra limb originated

from left side, with short femur (black arrow), tibiotarsal bones bifurcates into two, leading to two tarsometatarsal bones and two curled digits (green arrow).

Surgical Amputation

The chicken was prepared for surgery by carefully removing the feathers around the proposed incision site under sedation and aseptically scrubbed with 0.3% w/v chlorhexidine. Anaesthesia was achieved with Xylazine (2mg/kg) and Ketamine (20mg/kg) combination administered at the pectoralis muscles. The bird was placed on lateral recumbency and properly draped. A 3cm skin incision was made, while the muscles and connective tissues over the point of articulation of the extra limb were reflected (Figure 3). The femur of the accessory limb was disarticulated from the joint, using scalpel blade, scissors and forceps (Figures 4 & 5). The surgical wound closure was carried out using simple interrupted suture pattern with polyglycolic acid (PGA) suture material (Figure 6). The chicken recovered uneventfully from the anaesthesia, took water and feeds few hours after the surgery.



Fig 3: Incision to disarticulate the extra limb



Fig 4: Arrow showing amputation of the limb



Fig 5: arrow showing amputated extra limb



Fig 6: Arrow showing surgical wound closure

Post-Operative Care and Recovery

Post-surgical analgesia was achieved with Meloxicam 5 mg/kg x 3/7, Ceftriaxone (Rocephin®) 75mg/kg x 5/7 and Oxytetracycline spray 5/7. Full recovery was achieved following the post-surgical treatments with evidence of walking without any deformity and sutures removed on day 14 following surgery. (Figures 7 & 8)



Fig 7: Shows chicken recovering



Fig 8: shows chicken fully recovered

Discussion

Polymelia is believed to arise from organogenesis phase of embryonic development usually linked to genetic factors and environmental agents. The specific cause of this condition in this present case could not be ascertained. Polymelia has been recorded in humans and most animals' species such as ovine, bovine, caprine and poultry but very rare in swine (Hiraga & Demis, 1993; Ramadan *et al.*, 1998; Talamillo *et al.*, 2005) [6, 14-16]. Polymelia usually manifest as extra limbs, with five or more limbs in four legged animals and three or more in birds, the extra limbs are usually abnormal in shape and size, and often non-functional with stiff joints and sparse muscles with innervations (Pohlmeyer, 1974; Amatya, 2014; Bharati 2017) [13, 3, 4]. The clinical signs observed in this case were short extra limbs, stiff joints, and spares muscles with innervation similar to report of Pohlmeyer (1974) [13]. Radiographical evaluation carried out to determine the position and origin of the extra limbs and surgical amputation in this case is similar to report of Abu-Seida (2014) [1] who reported surgical amputation of polymelia in a layer chicken in Egypt. Cases of avian polymelia in Nigeria are rarely reported and corrected as reported by Azzez and Oyagbemi 2008) who reported Nera black chicken (*Gallus domesticus*) with polymelia and rudimentary wing from Nigeria.

The survival of the chicken in this case report and the progressive growth to the point of laying eggs varies with Azzez & Oyagbemi, (2013) [2] who reported that affected birds often have shortened life span and died within few days to 8 weeks after hatching. This may be attributed to localised polymelia without duplication of any of the internal organs which could lead to shortened life span as reported by Noh *et al.*, (2003) [11], Zhao *et al.*, (2006) [17], Bharati, (2017) [4]; Neupane, *et al.*, (2017) [9]; Daneze and Brasil, (2018) [5].

Conclusion

Surgical amputation of an extra limb in avian species is one of the ways to managing the condition and giving the affected birds (especially exotic birds) a chance to live a normal life without deformity. Furthermore, other ways of managing the deformity can be explored and documented.

Conflict of Interests

The authors have no conflict of interest to declare.

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