

# Caudal duplication (dipygus) in a Rock Pigeon (*Columba livia*)

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## SUMMARY

The first description of caudal duplication (dipygus) in a pigeon (*Columba livia*) is presented. Congenital defect is macroscopically and radiologically described. A surgical exeresis was completed. Possible causes are discussed. Although it is unknown if congenital duplications are caused by genetic or environmental factors, or both, genetic factors can be suspected in this case.

**Key words:** Dipygus – Caudal duplication – Congenital defect – Pigeon – *Columba livia*

## INTRODUCTION

Congenital defects are those abnormalities present at birth that result from errors arising during development (Noden and de la Hunta, 1985). Congenital duplications are interesting among congenital defects because they are composed by two individuals. Multiple births most frequently result from fertilization of separately ovulated female gametes. However, complete or partial separation of cleavage-stage blastomeres and blastocysts, or duplication during gastrulation can also result in the development of multiple organisms (Noden

and de Lahunta, 1985). Thus, they form a graded series from slight duplication to near separation of two individuals (Hiraga and Dennis, 1993). There is a wide range of external variations according to the degree, site, and angle of fusion, and they are classified as free (unattached) or conjoined and symmetrical or asymmetrical (Hiraga and Dennis, 1993). But perhaps conjoined twin cases are described less frequently in the literature.

In humans, the incidence of conjoined twinning has been reported to be between one in every 58.000 deliveries in Caucasian population and one in 6.454 deliveries in some Asian populations (Baldwin, 1991). Conjoined twinning results form the incomplete division of a monozygotic twin 13 days after fertilization but before third week of gestation (Finberg, 1994), and it necessarily occurs only in monochorionic monoamniotic pregnancies.

In animals, congenital duplications are most common in cattle but sometimes are seen in sheep and hogs (Diojode et al., 1992; Roberts, 1986), and rarely in goats (Corbera et al., 2005). Congenital duplications are very rare in birds, and only a few descriptions are available in the literature. Regarding congenital duplications in birds, caudal duplication

has been described only in chickens (Ebako et al., 2002; Ghazi and Dadras, 1994). In 2009 a complete caudal duplication has been described in cats (Seavers, 2009). Thus, this paper describes a case of caudal duplication or dipygus (*monocephalus tetrapus dibrachius*) in a Rock Pigeon (*Columba livia*).

#### CASE REPORT

An 8-month-old male domesticated Rock Pigeon was presented at the Veterinary Teaching Hospital of the University of Las Palmas de Gran Canaria, for clinical evaluation.

The animal showed apparent good health, presenting normal behavior and normal response to stimuli. However, the pigeon showed two extra pelvic limbs located at caudal position. These extra limbs were asymmetric and had arisen midventrocaudally in the caudal region and located ventrally to the cloacal opening. The right limb was longer and more developed than the left limb, and presented 4 rudimentary digits, 2 of which showed 3 phalanges and nails and the other 2 digits only presented the two first phalanges. The left limb appeared more atrophied and only presented 3 digits with 2 phalanges each one (Fig. 1).

X-ray examination showed an extra set of abnormal hips. A midline separated synsacrum were joined caudally to each femoral bone, and connected or fused caudally instead of pelvic bones that would complete where a normal avian hip should be. Therefore the extraset of pelvic limbs, located caudally to the acetabulum, were articulated neither to the synsacrum nor to the pelvic bones of the other normal pelvic limbs (Fig. 2). Also an abnormal left limb was observed on X-ray examinations, with a fused femur and tibia at the level of the patella with radiographic signs of bone destruction probably occurred after an episode of arthritis of the joint. An infection of the limb was suspected to have occurred in the past, due to the location of the limb and the continuing trauma of the paralytic limbs.

Due to the anatomical and radiological description, a surgical repair of the malformation was recommended. The pigeon was anesthetized using isoflurane. After a mask-induced the animal was intubated and prepared for surgery. No complications were found on the surgery procedure. A complete exeresis of

the extra hips was done. Vascular supply was clamped and sutured. No nervous system connection was found, which explains the complete paralysis of the extra limbs. No postsurgical complication was observed.

A thorough epidemiological survey, including visit to the animal's flock, was undertaken. It proved to be a well-controlled and well-managed dovecote located in a rural area. Nutrition was based on soybean and corn. Animals were vaccinated annually against Newcastle Disease (serotype avian paramyxovirus type 1 or APMV-1). Parasitic disease prophylaxis were based on the administration of levamisole (Ripercol® 20 mg/animal) and carnidazole (Spartrix® 10 mg/animal), both administered annually. History also reveals that congenital abnormalities have been observed neither in this flock nor in the neighbor's flocks.



Fig. 1. Pigeon showed two extra pelvic limbs arisen midventrocaudally in the caudal region and located ventrally to the cloacal opening.

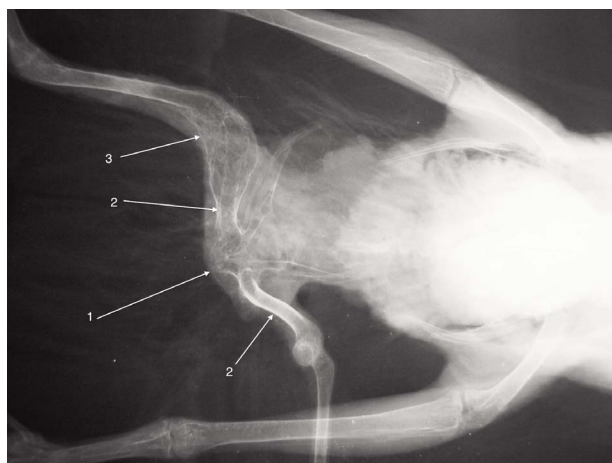


Fig. 2. A midline separated synsacrum (1) were joined caudally to each femoral bone (2), and connected or fused caudally instead of a pelvic bone. Abnormal left limb with a fused femur and tibia at the level of the patella (3).

## DISCUSSION

The presence of an accessory limb, considered a form of incomplete twinning, is referred to as dipygus or pygomeia. The majority of congenital malformations are triggered by genetic or environmental factors. No excessive environmental climatic conditions occurred immediately before or during the incubation, whilst in the care of the breeder.

As far as this case is concerned, this is the first description of any congenital abnormality observed in the farm, and the use of drugs was restricted to levamisole and carnidazole.

Levamisole is indicated for the treatment of *Ascaridia columbae* and *Capillaria obsignata* (Flammer, 1986; Plumb, 2011). In birds (cockatoos, budgerigars, Mynah birds, parrots, etc.), 40 mg/kg have been reported to be a toxic dose when administered SC. IM injections may cause more severe toxicity. Depression, ataxia, leg and wing paralysis, mydriasis, regurgitation, and death may be seen after a toxic dose in birds (Plumb, 2011). However, levamisole for pigeons in Spain is presented in tables for forced oral administration (Ripercol®). In the literature consulted, no evidence of relation between the administration of levamisole and congenital diseases has been found.

A few studies has been published about the use of carnidazole us trichomonacidal drug in pigeons (Munoz et al., 1998; Franssen and Lumeij, 1992), therefore there is no evidence of the possible effect of this drug on congenital diseases. As carnidazole is widely used in pigeons, and due to the lack of congenital disease in pigeons described in the literature, no relationship between this drug and the congenital defect could be proved.

Otherwise, no evidence of chronic effects (adverse, sensitization, carcinogenic, mutagenic, teratogenic, reproductive or others) have been demonstrated secondary to the use of the vaccine employed to the prevention of the Newcastle Disease in pigeons.

In our knowledge, this is the first description of this kind of congenital defect in pigeons. Further studies regarding widely used drugs in pigeons and the presence of congenital defects should be carried out in order to show any possible statistical relationship.

Although it is unknown whether congenital duplications are caused by genetic or environmental factors, or both, genetic factors can be suspected in this case.

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