

First Report of Polymelia in a DSH Kitten in Tehran, Iran

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Abstract: Congenital malformations are intrinsic structural abnormalities and variations of organs, tissue and/or body systems that can occur during the embryonic development of all animal species, and may be partial or total. Polymelia in humans is a rare condition with little information about its occurrence. There is no categorization of data on its occurrence along with other congenital malformations. There are few reports of this occurring in cows, sheep, amphibians, reptiles, birds, dogs and cats. In Jan 2018, a DSH (Short Hair Domestic) kitten found on a street was referred to a veterinary hospital in Tehran with symptoms of rigid mass and deformity in the pelvic region. With lateral and ventrodorsal positioning, the case was sent to the radiology department and examined under the plain radiograph. Findings included two underdeveloped hindlimbs associated with normal left hindlimb showing the congenital deformity and malformations, deformity and underdevelopment of right hemipelvis, the fusion of first and second lumbar vertebrae and kyphosis due to lumbar vertebrae deformity. Through the radiological examinations, the results show that the rigid mass was actually the third hindlimb and the condition is called polymelia. This is the first reported case of polymelia in a domestic shorthair cat in Tehran, Iran.

Key words: DSH, Polymelia, Tehran.

1. Introduction

Congenital abnormalities can be defined as structural or functional anomalies in a developing fetus which could be multiple or may affect single parts of organs. These abnormalities have been associated with genetic factors, environmental agents (i.e. infections, toxins, teratogens, fertilization techniques, management) or a combination of factors [1, 2]. Some limb anomalies are inherited and the genes responsible for these anomalies have been identified in humans [3, 4]. There have also been reports that indicate chromosomal aberrations are associated with congenital limb malformations [5, 6].

Supernumerary ectopic limb (SEL) is a congenital disorder defined as the presence of accessory limb(s) attached to the various body parts [7, 8]. It is been reported in many researches that these accessory limbs are always smaller than normal limbs, with stiff joints and sparse muscles without innervations [9]. Several

different congenital abnormalities are known to occur in domestic animals [2, 10]. For instance, polymelia, which was coupled with alterations in the organogenesis of most types of tissues in the distal part of the limb, has been observed in Pyrenean mountain dogs, although, this has not been documented in any scientific publication. In cattle, only cases of hemimelia (lack of a portion of a limb) and deformities of hind limbs have recently been reported [11, 12]. Polymelia also known as a congenital defect is characterized by one or more supernumerary legs and can be further categorized into notomelia, cephalomelia, thoracomelia and pygomelia, according to the body region the accessory limb is appearing—the back, the head, the thorax or the pelvis, respectively. This condition is described polymelia as a form of conjoined asymmetric monozygotic twins [13].

2. Case Description

A DSH kitten is probably three-month old, weighting 0.91 kg, found on a street and referred to a veterinary hospital in Tehran, Iran.

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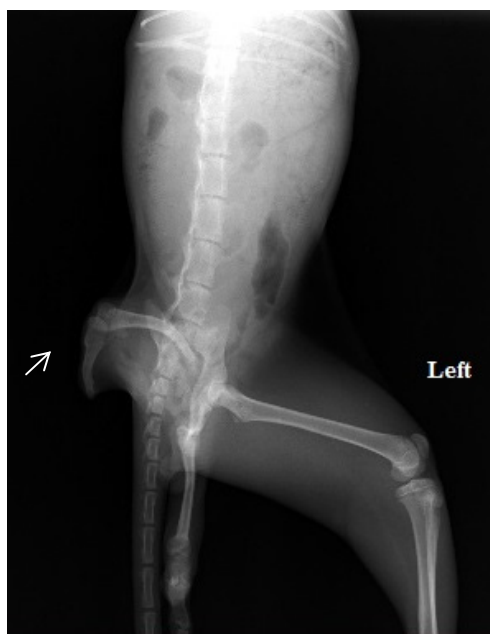


Fig. 1 X-ray radiograph of the polymelia kitten (ventrodorsal position) demonstrates the accessory limb (arrow).

3. Clinical Examination

Physical examination of the kitten revealed left hindlimb was normal, but the right hindlimb was smaller and malformed. With more clinical examinations, a rigid mass was palpated near the right hindlimb and made a suspicion to a tumor or abscess which could be due to age relation and maintenance conditions. About hindlimbs, we were suspected to disuse osteopenia or hindlimb atrophy. the kitten had a difficulty in walking which made it slow in escaping from danger and walked with a lameness which is due to malformed right hindlimb and the massive mass on the mentioned side. There was a posterior curvature of the lumbar spine which could be due to kyphosis. During the abdominal palpitation, there were no signs of distention or pain.

Plain radiography was performed with lateral and ventrodorsal projections of hindlimbs. The radiological findings are two undeveloped hindlimbs associated with normal left hindlimb showing the congenital deformity. The right hemipelvis is also deformed and underdeveloped. The first and second lumbar vertebrae are fused which could be due to old

healed fracture or block vertebrae. Also, kyphosis was present in the lumbar vertebrae. Gathering all information defined actually the rigid mass was an undeveloped hindlimb which was called polymelia with presence of congenital hemipelvis and lumbar vertebrae. The third limb was intact and no lesion was found on it. There were two apparent differences between the normal and accessory limbs which were opacity and conformations (Fig. 1).

4. Discussion

Limb malformations are one of the most common congenital abnormalities of animals. Depending on the cause and conditions, they may be single, multiple, and occur as a syndrome or associated with other abnormalities. Polymelia is the duplication of an entire limb, however, when the extralimb is attached to the pelvic region, it is called pygomelia, which is frequently occurring as a congenital malformation. Depending on its attachment sites to the body, the condition could be classified as cephalomelia (attached to the head), notomelia (attached to the vertebral column), thoracomelia (attached to the thorax) and pygomelia (attached to the pelvis) [14].

These malformations originate from interference in embryogenesis, so the organogenesis is the most affected period. They may be related to the erratic spread of germ cells in the embryo, or to the abnormal duplication of those cells at the beginning of the embryo development [15].

Extra limbs have no function [16]. However, difficulty in walking can cause distress to the animal. In this instance, the location of the insertion of the extra limb did not have an effect on the animal's walking, but the animal was uncomfortable when sitting, which caused distress. Therefore, surgical excision of the extra limb is needed. This surgical intervention is recommended since additional limbs can interfere with the development and conformation of adults [17] and provides comfort.

Many case reports of polymelia were described in other species with other congenital defects. A case report polymelia and duplication of the descending colon in a Poodle dog by Daneze and Brasil described a six-month old female Poodle dog born with a third hind limb and duplication of the descending colon. The extra limb was projected dorsally toward the coccygeal vertebrae and was slightly displaced to the left of the median body axis next to the anus. Although the animal walked without difficulties, it showed signs of discomfort when defecating and sitting [18]. The condition is also reported in an Iranian indigenous young fowl with unhealed navel. According to the report, a young fowl with four legs has the problem of a difficulty in walking. The X-ray examinations revealed two well-developed extra hind limbs consisted of the femur, tibiotarsus, tarsometatarsus, digits and phalanges, which were attached to the coccygeal area of the body. Dissociation from the axial skeleton refused the existence of any functional application for these supernumerary limbs and also prevented us from using the term of "pygomelia" for describing the case [19].

While the limb developments impairments are considered as the main event leading to the polymelia

in Animals, some embryonic events could also do the same in human. In 2012, a baby boy was born with six legs in Sindh-Pakistan whom extra limbs were diagnosed as remnants of a unequal conjoined twin. The considerable point of this event was the baby's father who was an X-ray technician. Anyway, despite the human for whom a unequal conjoined twin case could end up to polymelia, it cannot be a possible cause of polymelia in cats. Generally, in different vertebrate species the susceptibility to a damaging environmental factor varies in the different stages of bone development [20].

5. Conclusions

The malformations described in the present paper are a very rare case of polymelia in cats which are never described in any studies in Iran with additional and undeveloped hind limbs together. Although this is the first published report of DSH cat polymelia in Iran, authors have previously heard of similar cases in some rural areas. In this very rare case of polymelia with the involvement of two hind limbs, it could make a wrong diagnosis because of rigid mass. This was probably caused by various conditions and has not been reported before in Iran. Although an occurrence is very rare, following an individual case of polymelia should be further investigated, using ultrasonography, CT-Scan, MRI and other diagnostic imaging techniques. It will give us more information about other conditions involving the animals and make a better diagnosis. Whatever was the cause of this event, chromosomal abnormalities or other conditions, it is extremely valuable for scientific communities to have suitable statistics of such anomalies. On the other hand, paying attention to anatomical abnormalities will help to understand their etiology.

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