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Case Report

Microtia in a Large White Yorkshire Piglet - A Case Report

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Abstract

Microtia condition was observed in a Large White Yorkshire (LWY) piglet in an organized piggery farm at Kattupakkam, Chengalpattu district of Tamil Nadu, India. Although this condition is well documented in human beings. To the best of our knowledge, this is a unique case report on the incidence of congenital microtia with aural atresia in a LWY piglet.

Keywords: Aural atresia, Congenital anomaly, Large White Yorkshire, Microtia, Piglet

Introduction

Congenital anomalies of the ear are common in farm animals unlike humans. Microtia meaning "small ears" refers to a deformity of the ear characterised by hypoplasia or under developed auricle or pinna (Tekes *et al*., 2013). Its severity ranges from partial to complete aplasia of the external auditory canal associated with middle ear abnormalities (Wang *et al*., 2019). Microtia can be either unilateral or bilateral and it can occur independently or as part of a clinical syndrome associated with other congenital malformations (Wang *et al*., 2001); it is more common in males affecting mostly the right ear (Sanchez *et al*., 1997). This condition is known to have a genetic predisposition with the involvement of an autosomal dominant or recessive gene, most of which are homeobox genes that contribute during early embryonic development (Alasti and Van Camp, 2009).

History and Observation

On routine observation of piglets after farrowing, an adult (LWY) sow aged three years gave birth to eight piglets in its first farrowing, out of which one piglet was observed with a rudimentary right pinna. The piglet weighed 1.1kg at the time of birth and on further examination, its left ear was structurally normal while the remnant right ear canal showed atresia (Fig. 1a & b).

a **b**

Figure 1 a & b: Unilateral microtia with aural atresia in LWY piglet

Case

This case report briefs on the incidence of congenital microtia with aural atresia in a pig. During embryonic development, complex tissue reactions occur to form the external, middle and inner ear. Any risk factor that affects the development of external ear leads to microtia during embryonic development (Wang *et al*., 2019). Congenital deformities of the ear are rare in animals; however, the incidence rates are underrated due to lack of proper otoscopic examination and their exact etiology also remains unknown. Rezaei *et al*. (2015) described the first report of microtia in a 2-month-old male German shepherd dog which showed hypoplasia of the right pinna with external aural atresia. Similarly, in the present case too, microtia with aural atresia was observed in the right pinna of a male pig; this is in accordance with previous human studies that have reported microtia unilaterally in the right ear (Luquetti *et al*., 2012; Kalam and Ahmed, 2013).

Several epidemiological studies on microtia have revealed that various factors such as infections, poisoning, anaemia, or pathogenic genes could determine the occurrence of this condition in humans (Suutarla *et al*., 2007). There are several grading systems for classifying microtia. According to Marx (1926) and Altman classification (Luquetti *et al*., 2012) grade I presents all the features of an incompletely developed auricle with smaller external ear canal, in grade II the anatomical structures are partially identifiable with a stenosed external ear canal, grade III being the most common form (the peanut-shell type) shows only a vestigial soft tissue with absence of external ear canal while in grade IV which is the extreme case known as anotia the external ear and auditory canal are completely absent. The present case could be considered as grade III since only a rudimentary soft tissue of the pinna was observed with absence of ear canal.

Although the etiology and wide variability of microtia remains unknown, its studies on animal models and human genetics have revealed several genes associated with syndromic and non-syndromic microtia (Gendron *et al*., 2016).

Qiao *et al*. (2015) validated that a truncating mutation in the *HOXA1* gene causes monogenic disorder of microtia in Chinese Shaziling pigs; additionally, a protein-altering mutation in one of the candidate genes *EVC2* was also identified which is liable for a potential microtia-associated syndrome characterized by ear and rib anomalies in humans. Wang *et al*. (2019) determined potentially pathogenic genes such as *PLEC, USH2A, FREM2, DCHS1, GLI3, POMT1* and *GBA* that cause microtia in human beings; among them the *DCH1* was identified as the most deleterious and was significantly associated with severe microtia-atresia. The *TWIST2* gene is also found to be responsible for human microtia (Marchegiani *et al*., 2015).

Conclusion

It can be concluded that of congenital microtia with aural atresia in LWY piglet could be due to genetic abnormalities of specific or combined gene effects. Though it is an organized scientific farm the changes of inbreeding are less. The sire, dam and piglets (normal and microtia condition) are to be analysed for genomic studies and more specific with *HOXA1* gene responsible for microtia in pigs. Majorly, congenital abnormalities are heritable hence the responsible sire and dam line may be culled and excluded from breeding program. The microtia piglet may grow normally but can't be used for scientific breeding purposes. This study highly emphasis that congenital ear abnormality, microtia condition in piglet has to be carefully evaluated in the breeding program and also with physical and otoscopic examination at the time of farrowing.

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Conflict of Interests

There is no conflict of interest.

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