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CASE REPORT

A Cyclopia Case with Otocephaly in a Pirlak Lamb

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ABSTRACT

In this report, a case of cyclopia with otocephaly in a Pirlak lamb was presented which has not been reported previosly in ruminants. A two years old-nulliparous Pirlak ewe was referred to the clinics of Afyon Kocatepe University, Faculty of Veterinary Medicine with the complaint of dystocia. Cesarean section was performed and a dead female lamb was extracted out from the uterus. The number and size of placentomes were reduced at the placental sites. Morphologic and macroscopic examination of the lamb demonstrated that there were some congenital anomalies, especially an eye (cyclopia) and otocephaly, at the head of lamb, however no other anomalies were defined at the other parts of body. On the other hand there were no whole mouth space, maxillar and mandibular bones, teeth (dysgnathia), no nose (arhinia) and tongue (aglossia). Nevertheless, there was a small hole at the bottom of the one eye opening to pharynx, oesophagus and trachea (microstomia). The left and right auricles were adherent together on the both sides of the small hole (synotia). At necropsy, the brain was not normal, rather small and edematous, having any brain lobes and gyrus. Examination of thoracic, abdominal and pelvic spaces revealed no abnormality.

Key Words: Congenital Anomalies, Cyclopia, Otocephaly, Pirlak Lamb

Pırlak Bir Kuzuda Otosefali ile Birlikte Gözlenen Siklopiya Olgusu

ÖZ

Bu raporda Pırlak ırkı bir dişi kuzuda ruminantlarda daha önceden rapor edilmeyen otosefali ile beraber gözlenen siklopi olgusu sunuldu. İki yaşında olan nullipar Pırlak ırkı bir koyun güç doğum sebebiyle Afyon Kocatepe Üniversitesi, Veteriner Fakültesi kliniklerine getirildi. Koyuna sezaryen operasyonu uygulandı ve ölü bir dişi kuzu uterustan çıkartıldı. Plasental bölgelerde plasentomlar sayıca az ve çapları küçük olarak belirlendi. Kuzuya yapılan morfolojik ve makroskobik muayenelerde hayvanın baş bölgesinde özellikle siklopi ve otosefali olmak üzere bazı anomalilerin olduğu belirlenirken, diğer vücut bölümlerinde herhangi bir anomaliye rastlanılmadı. Bunu yanı sıra tam bir ağız boşluğunun olmadığı, maksillar ve mandibular kemiklerin, dişlerin (dysgnathia), burunun (arhinia) ve dilin oluşmadığı (aglossia) gözlendi. Ayrıca, farinkse, özofagusa ve trakeyaya (microstomia) açılan ve tek göz açıklığının alt kısmında küçük bir delik belirlendi. Bu küçük deliğin her iki tarafında sağ ve sol kulak kepçelerinin birbirine yapışık olduğu gözlendi (synotia). Nekropside beynin anormal yapıda, çok küçük ve ödematöz olduğu, beyin loblarının ve giruslarının bulunmadığı tespit edildi. Torasik, abdominal ve pelvik boşlukların muayenesinde bir anormalliğe rastlanmadı.

Anahtar Kelimeler: Konjenital Anomaliler, Siklopi, Otosefali, Pırlak Kuzu

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INTRODUCTION

In mammals, inherited gene disorders, toxic plants, infectious diseases, ischemia during pregnancy, exposing to extreme heat and radiation are the main causes of congenital anomalies (Tonk et al. 2010, Eftekhari et al. 2013). Cyclopia is an abnormal development of nervous system in embryonic period. It is usually characterized by the presence of one eye in the front, middle line of the head. An abnormal chromosome related with head part is reported to be cause of cyclopia (Gondré-Lewis et al. 2015). In ruminants, cyclopia is observed as one eye or two eyes side by side in an eyehole or with the malformations of mouth, nose, upper and low mandibular bones (Ozcan et al. 2006, Hamali and Chador 2010, Karan et al. 2011, Sutaria et al. 2012).Otocephaly is one of these congenital anomalies and it is observed with the malformations of maxillary and mandibular bones, the lack of tongue and nasal bone. Additionally, the auricle is placed at the medium, basal part of the head. In otocephaly cases of human-beings, one or multiple malformations can be observed together in mouth, tongue, eyes, nose and brain (Faye-Petersen et al. 2006, Gekas et al. 2010). However, it is rarely seen in animals (Pourlis 2006, Brachthäuser et al. 2012). It is thought that the first and the second arch defects causes to otocephaly. In addition to this, chromosomal degradation, genetic mutations and environmental factors can cause teratogenic otocephaly (Gekas et al. 2010).It is reported that otocephaly and cyclopy are observed together in a very low incidence (Faye-Petersen et al. 2006, Gekas et al. 2010, Gondré-Lewis et al. 2015). In this study, a rarely seen case of cyclopia together with otocephaly in a Pirlak female lamb is presented.

CASE HISTORY

A two years old-nulliparous Pirlak ewe was referred to the clinics of Afyon Kocatepe University, Faculty of Veterinary Medicine with the complaint of dystocia. Vaginal examination showed that cervix uteri was not relaxed. Transrectal and abdominal ultrasonography revealed that a fluid filled anechoic structure was evident cranial to urinary bladder (Figure 1 A). It was decided to perform radiography at ventro-lateral and latero-lateral positions and the presence of a lamb was determined (Figure 1 B). Moreover, no structure related to fetus was observed except placentomes, but it was not easy to visualize placentomes because of their reduced numbers and size (Figure 1C). Then, cesarean section was performed under general anesthesia and a dead female lamb (Figure 1 D) was extracted out from the uterus. Morphologic and macroscopic examination of the lamb demonstrated that there were some congenital anomalies at the head of lamb, however no other anomalies were defined at the other parts of body. A big eye (cyclopia) was diagnosed in front side of the head, on the other hand there were no whole mouth space, maxillar and mandibular bones, teeth (dysgnathia), no nose (arhinia) and tongue (aglossia). Nevertheless, there was a small hole at the bottom of the one eye opening to pharynx, oesophagus and trachea (microstomia). In addition, the left and right auricles were adherent together on the both sides of the small hole (synotia, Figure 1 E). At necropsy, it was determined that the brain was not normal. It was rather small and edematous. There were not any brain lobes and gyrus (Figure 1 F). Examination of thoracic, abdominal and pelvic spaces revealed no abnormality. Based on the anamnesis, in the sheep herd which the case was observed, it was learnt that there were 120 nulliparous and multiparous sheep and the same rams was used for breeding for many years and there were not any malformation case occurred in this herd. However, during lambing season, it was learnt that a lamb without a head, only having ears had been born and neither the same nor the other anomalies were seen at the other sheep herds at the same region.

DISCUSSION

In many cases, cyclopia was reported in sheep, goats, cows and buffaloes, however in many of observed cases, only cylopia or cyclopia with mandibular bones malformations were reported (Ozcan et al. 2006, Hamali and Chador 2010, Karan et al. 2011, Sutaria et al. 2012, Eftekhari et al. 2013). The cases of arhinia, cyclopia without nasal spaces or structures, are rarely seen (Sutaria et al. 2012). However, the cases, cyclopia with nose and tongue, are merely reported. In this case, cyclopia with otocephaly, microcephaly in a lamb without maxillary and mandibular bones, nose and tongue was presented (Figure 1 D, E, F). In literature, there was no previous report in the ruminants regarding a complex presentation of cyclopia.The reason of congenital disorders can not be determined exactly due to the complex structure of causes. Genetic and environmental factors are among the many causes of congenital anomalies. Mineral and vitamin deficiencies contributing to the formation of brain structure may give rise to brain defects (Sankar et al. 2014). Schiffer et al. (2002) reported that either sonic hedgehog gens or homeobox gens had important roles in the development of cranio facial cells. In recent years, it is revealed that OTX and PRRX gene mutations in humans cause otocephaly (Faye-Petersen et al. 2006, Gekas et al. 2010). However, no relationship between OTX2 gene and otocephaly was found in ewes (Brachthäuser et al. 2012).In ruminants, there are some viral factors affecting the brain and nervous system of the fetus such as Akabane, Aino, Bluetongue, Border disease, Cache Valley, Schmallenberg virus during pregnancy.

Furthermore, some authors reported that these viruses could cause arthrogryposis, hydranencephaly, microcephaly and cerebellar hypoplasia defects (Givens and Marley 2008, Brachthäuser et al. 2012, Pawaiya and Gupta 2013). Based on anamnesis at the same grazing region, there was no malformation case seen either in the herd that the case was observed or in the other closer herds. It may be mentioned that viral agents has no effect on malformation in this lamb.Many cyclopia cases occurring in high incidence (25%) have been reported in the sheep herds grazing in the field containing Veratrum californicum plant which has a teratogenic effect in sheep (Welch et al. 2009). It is reported that especially the alkaloid, cyclopamine, has toxic effects on the fetus at the day 14 of pregnancy. Thus, it causes craniofacial defects and embryonic death that can be seen later (Welch et al. 2009, Welch et al. 2012). The teratogenic Veratrum alkaloid cyclopamine inhibits sonic hedgehog signal transduction pathway directing the embriyonic cell development and differentiation at the phase of embryonic period (Incardona et al. 1998). In addition, it effects maxillary and eye structure development leading to cyclopia cases (Welch et al. 2009, Welch et al. 2012). However, according to our knowledge there is no Veratrum californicum plant in the fields in Afyonkarahisar region. Then, it is suggested that in this case, Veratrum californicum plant has no effect on cyclopia. It was reported that cyclopia had 3% incidence rate in the anomalies which caused dystocia in ewes (Basher 2006). Fetal cortisol induces parturition in ewes. Close to parturition, the hypothalamus of fetal brain triggers fetal adeno hypophysis to release adrenocorticotropic hormone (ACTH) and ACTH effects adrenal cortex to release fetal cortisol (Challis et al. 2001). In this case, the ewe was brought to clinic due to dystocia. Macroscopically and at necropsy, it was revealed that the lamb's brain was not normal. It was rather small and edematous. There were not any brain lobes and gyrus (Figure 1 F). Therefore, it is suggested that the brain has no functional hypophysis which would release ACTH for effecting adrenal cortex to release fetal cortisol. Cyclopia with otocephaly may be the main cause of dystocia occurred in this ewe due to deficient of fetal cortisol release. Generally, the lamb with cyclopia is undeveloped and hairless (Welch et al. 2009, Welch et al. 2012). In twin births, there may be two lambs with cyclopia or without cyclopia (Hamali et al. 2010). One of twins with cyclopia may be smaller, feeble and hairless as premature. Cyclopia can prolong the gestation period (Welch et al. 2009). In this case, the gestation period was normal and there was only one lamb in the uterus. The lamb had a normal hair development in nature (Figure 1 D). In healthy pregnant ewes' uterus, there are 80 or more placentoms, however the number of placentomes may decrease in cyclopia cases (Welch et al. 2012). This is the reason why abnormal placental formation can inhibit the fetal development due to deficient blood flow and hormones. Furthermore, in a reported research, the decrease in the number and weight of placentomes were determined due to pregnancy in the ewe with cyclopia at the day 153 of pregnancy, however the diameter of plasentomes were reported normal (Welch et al. 2012). In this case, it was hard to visualize the placentomes except the enlarged fluid filled anechoic structure (Figure 1 A). However, caesarian section revealed that the fully haired lamb was in normal size but the placentomes were very small and less than normal (Figure 1 C). In conclusion, the clinical aspect of a rarely seen case, cyclopia was reported in this case report. However, the reason of cyclopia and otocephaly was not fully understood in this case. Because of another abnormality (a lamb without a head, only having ears) observed in this herd, it is suggested that using the same rams for mating for many years may be the reason of abnormality and this can cause an inherited gene disorder.

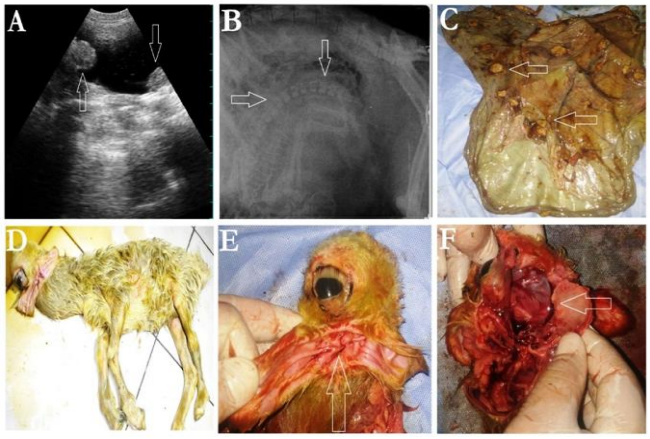

Figure 1 (A-E). Representative image of clinical process of cyclopia and otocephaly case in Pirlak lamb. A; Ultrasonography of placentomes (arrows), B; Latero-lateral radiography of ewe and image of hyperechoic structures related to fetus (arrows), C; Image of placenta following caesarian section and reduced number of placentomes (arrows), D; Image of entire fetus following caesarian section, E; Adherent left and right auricles and a small hole in the middle of auricles (arrow), F; Necropsy of cranium.

Şekil 1 (A-E). Siklopi ve otosefali bulunan Pırlak kuzunun klinik süreçlerinin görüntüleri. A; Placentomların ultrasonografisi (oklar), B; Koyunun Latero-lateral radyografi ve fötusa ait hiperekoik yapıların görüntüsü (oklar) C; Sezaryen operasyonu sonrası plasentanın ve yetersiz sayıda olan plasentomların görünümü (oklar) D; Sezaryen operasyonu sonrası fötusun görünümü E; Birleşik sağ ile sol kulakların yerleşim yeri ve ortalarında küçük bir boşluk (ok), F; Kafatasının nekropsisi.

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