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DISORDERS OF SEX DEVELOPMENT IN CATS – TWO CASE STUDIES

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Abstract: *Disorders of sex development (DSD) include any congenital or developmental abnormality of any part of the female or male reproductive tract, definition that is used also in veterinary medicine and science, not only in humans. In feline's DSD, abnormalities of chromosomal sex, gonadal sex or phenotypic sex are reported. In this article we want to short review the embryogenesis of the reproductive tract, to describe the possible causes that can generate such abnormalities of sexual development and to provide two examples – one case with bilateral ovarian agenesia and another one with unilateral ovarian agenesia and complete unilateral aplasia of the uterine horn, abormalities identified during routine elective ovariohisterectomy. The aim of this paper is to contribute to a better understanding of DSD feline's case studies seen in practice.*

Keywords: sexual development, reproductive abnormalies, aplasia of Mullerian ducts, ovarian agenesia

• Introduction

Developmental abnormalities of the ovaries and of the utero-vaginal segments in animals can be accompanied by clinical signs or, more often, can be encountered during elective ovariohysterectomies. For an understanding of the etiopathogenesis of these developmental disorders, the main embryonic stages through which the genital tract is formed in mammals are important to know. Normal embryonic sexual development takes place in three stages: chromosomal, gonadal and phenotypic or somatic stage (Fig.1). Different mechanisms such as differentiation, migration, fusion and canalization manage to complete this dynamic process, and perturbation of this process can induce different types of uterine-vaginal abnormalities (Table 1).

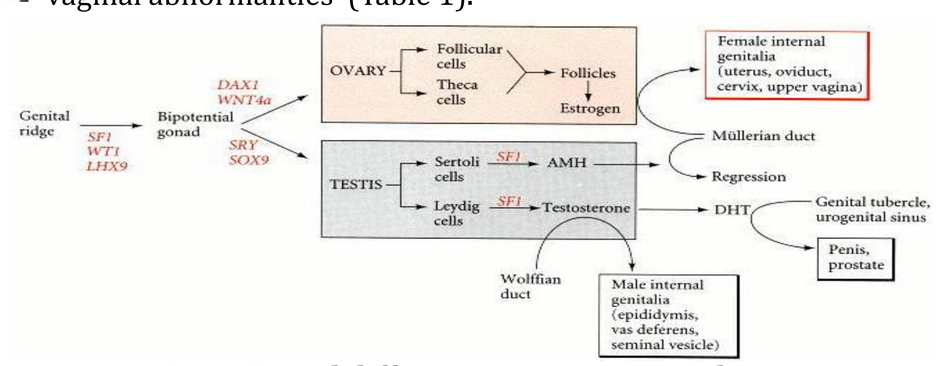

Fig 1. Sexual differentiation in mammals

Table 1. Possible types of uterine-vaginal abnormalities in mammals

Type of uterine-vaginal abnormality	Cause
Agenesis of the uterine horns	Failure of Mullerian ducts to develop
Uterus unicornis/ Unilateral segmental aplasia of the uterus	
Bilateral segmental aplasia of the uterus	
Segmental aplasia of the uterine body	Failure of the caudal parts of the two Mullerian ducts to fuse appropriately and to form a single lumen
Segmental aplasia of the cervix	
Logitudinal septation of the uterine body/ Uterus didelphus	
The cranial vaginal septation	
Segmental stenosis of the vagina/ Aplasia of the vagina/ Vestibulo-vaginal constriction	Failure of the caudal parts of the Mullerian ducts to fuse with invaginated urogenital sinus to establish anatomical continuity
Longitudinal septum in the cranial vagina	
Imperforate hymen	

• Material and method

- The first case, was an 2 years old female domestic cat that was presented to the Small Animal Reproduction Clinic from Faculty of Veterinary Medicine, Timisoara in december 2022 for routine ovariohisteroctomy. The cat didn't had cycled regularly and no other significant reproductive history. On presentation the patient was in good condition. After the anesthesia protocol was carried out with Xylazine 1-1.5 mg/kg IM, Ketamine 10-15 mg/kg IM and Propofol 1-2 mg/kg IV the surgical procedure was done. During surgical intervantion bilateral ovarian agenesia was identified with the present of the uterine horns.
- The second case, was an average 2 years old female domestic cat that was presented to a veterinary clinic (SC.SANROVET-DUO.SRL) in Sânmihaiu Român in march 2023 for routine ovariohisteroctomy. No reproductive history was known in this case due to unknown origin of the cat. During surgical intervantion unilateral ovarian agenesia and complete unilateral aplasia of the uterine hornwas observed.

• Results and discussions

- The two cases with abnormalities in the female genital tract were identified during elective ovariohyterectomies. In both cases there were no clinical signs. In the first case presented, bilateral ovarian agenesis was found, with the presence of Mullerian segments (Fig 2.a-Fig2.b), and in the second case, it was observed unilateral ovarian agenesia and complete unilateral aplasia of the uterine horn (Fig2.c).

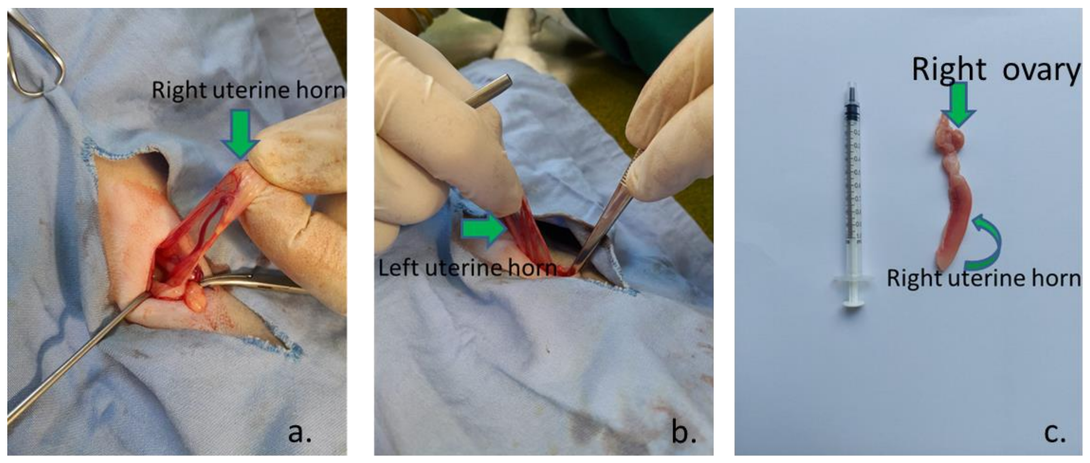

Fig 2. Case no1. Female domestic cat during elective ovariohisterectomy with bilateral ovarian agenesia, both uterine horns are presented (a-b); Case no2. Right uterine horn with right ovary identified during elective ovariohisterectomy (c)

- Developmental abnormalities of the Mullerian ducts have different clinical aspects from severe forms, such as agenesis, rudimentary uterus to less severe forms such as hypoplasia, imperforation of the hymen (table 1).
- The frequency of these disorders in female cats was 0.09% (49/53,258) and 0.05% (15/32,660) in female dogs, data reported by McIntyre et al. in a study conducted in the United States and Canada in 26 veterinary clinics during elective ovariohysterectomy.
- The causes of these congenital abnormalities can be multifactorial, such as genetic, endocrine or environmental factors and hence is difficult to identify (Colaco et al.,2010).
- Congenital anomalies of the reproductive tract in cats are diverse, ovarian agenesis has a low incidence and causes permanent anestrus, ovarian aplasia (present of an undifferentiated ovarian tissue) or ovarian hypoplasia (differentiated ovarian tissue) are other clinical forms that can occur in cats. These pathologies can be associated with the absence of the ipsilateral kidney because they have a common embryonic origin, an aspect that cannot be confirmed in the two cases presented.

• Conclusions

- Sexual development is a complicated, staged process with multiple interactions between different genes, hormones, hormone receptors, etc. DSD deviations can occur at any stage of the sexual development process. Affected animals generally show infertility and/or ambiguous sex, but also other complications such as pyometra, hydrometra, cysts. Definitive diagnosis requires molecular and cytogenetic investigations.