

Clinicopathological Features of Ovarian Teratoma Presented as Colic in Mare

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ABSTRACT

Ovarian teratoma is a tumor characterized by presence of well differentiated tissues that are not usual to ovarian stroma. A five year old multiparous Kathiawari mare suffering colic like symptoms (unresponsive to conventional treatment) was ultrasonographically suspected for ovarian neoplasm of the right ovary by trans-rectal palpation and ultrasonographic evidence. Histopathological observations following unilateral laparotomic ovariectomy of the affected ovary confirmed benign ovarian teratoma characterized by presence of hair follicles, sebaceous glands and tooth like calcified structures. Thereafter, mare recovered from abdominal discomfort and was confirmed pregnant four months later.

Keywords: Colic, Equine, Ovary, Teratoma, Tumor

Teratoma is a germ cell tumors, having multiple tissues foreign to the organ in which they arise and generally originated from atleast two or all the three germinal layers i.e. ectoderm, mesoderm and endoderm and rarely contain a mixture of normal and neoplastic tissues (Roberts, 1986; McEntee, 1990). Teratomas in domestic animals are extremely uncommon and mostly benign in domestic animals, with the exception of their malignant counterparts reported sometimes in human beings and mare (McEntee, 1990). Among domestic animals, teratomas are most commonly observed in testes of horses (aged 1 to 5 years), whereas in dogs and cats they generally develop in females (Moulton, 1978; Van Camp *et al.* 1986). However, ovarian tumors are uncommon in mare and consist of about 5% of all the neoplasms with an increased incidence with the advanced age

(McCue, 1998). Granulosa theca cell tumours are the most common, whereas teratoma is second most common ovarian tumour in mares. There are scanty reports of equine ovarian teratomas in the literature, mostly reported in nulliparous Arabian mares (Van Camp *et al.*, 1986; Catone *et al.* 2004; Vanhaesebrouck *et al.* 2010; Da Encarnação *et al.* 2011). The present study describes the clinical, morphological and histopathological features of unilateral benign ovarian teratoma with diverse differentiation of tissue components in a Kathiawari mare manifesting colic like symptoms.

Casedescription

A five year old mare of Kathiawari breed was presented to the university veterinary hospital with a history of mild intermittent abdominal

discomfort from about last one month that may suggest colic, otherwise of good general health. Mare had not responded to the conventional medicinal treatment given earlier for colic and symptoms of pain continued intermittently. Clinical examination recorded a normal rectal temperature (100.3° F), respiratory rate (23 / min) and normal capillary refill time (<2 sec) with slightly higher heart rate (48 beats/min). The auscultation of heart and lungs was normal whereas reduced borborygmi were noticed on right side of abdominal. Results from the complete blood count and routine serum biochemical analyses were normal. The non-pregnant mare had a history of normal cyclicity and two successful foaling. Rectal palpation showed normal observations, except that right ovary was a spherical tumorous mass with somewhat fluctuating consistency, whereas left ovary was comparatively small and had a functional corpus luteum. Trans-rectal ultrasonography did not reveal any remarkable changes with the exception of right ovary which appeared as a spherical structure (13.9 cm in diameter) having several round and elongated highly echogenic components arranged randomly inside its lumen. The observations about right ovary remained consistent on two ultrasonographic examinations at 10 days apart. A presumptive clinical diagnosis of ovarian neoplasia was made and unilateral laparotomic ovariectomy of the right ovary in left lateral recumbancy under general anesthesia was performed. Mare was fasted for 48 hours and administered with tetanus prophylaxis, antibiotic and anti-inflammatory therapy starting 12 hours before surgery. Anaesthesia was induced with xylazine (2.0 mg/kg, IV) and ketamine (4.0 mg/kg, IV) and then maintained with thiopentone (5% solution IV, to effect in repeated doses). The respiration was assisted with oxygen through rebreathing bag in a semi-closed system of Narkovet large animal anaesthesia machine. An enlarged right ovary, hard in consistency with an abnormal irregular surface texture was visualized and excised. No other abnormal structures or visible metastasis

was detected in the visualized abdominal cavity. The mare conceived successfully at a normal spontaneous oestrus exhibited at 67 days post-ovariectomy.

Ovarian gross and histopathology

The excised enlarged ovary was spherical in shape (14.3×12.8 cm), brown coloured with few yellowish zones. Sectioning of the excised ovary revealed it as an ovarian teratoma in the form of a hollow spherical cavity containing many non-gonadal structures inside it (macroscopically); the inner surface of ovary was visibly lined with hair, few small and bony isolated masses, a cystic cavity and fibrous growth (Fig. 1).

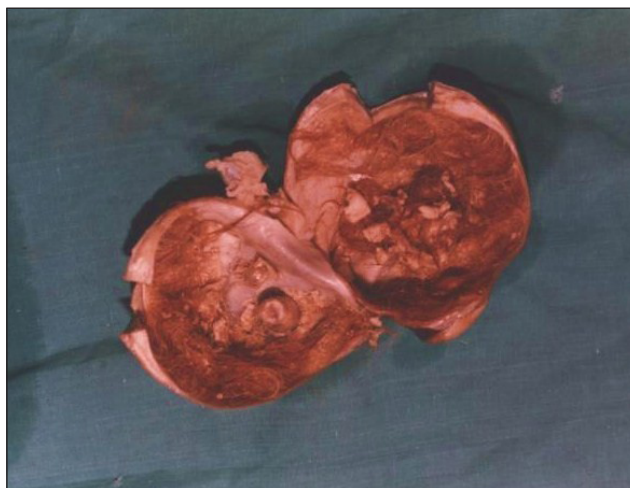


Fig. 1: Teratomatous ovary (gross, sectioned) showing hair, few small bony masses and fibrous growth.

The representative ovarian sections were stained with hematoxylin and eosin, periodic acid-Schiff and Masson's trichrome using standard techniques. Based on its histological appearance, a definitive diagnosis of ovarian teratoma was made. The teratoma had variety of mature tissues viz. hair follicles and some sebaceous glands (Fig. 2); tooth like calcified structures (Fig. 3). The structures were surrounded by clefts being lined by stratified squamous epithelia with fibrous connective tissue at the outermost (Figs. 2 and 3). Although,

a few indistinguishable tissue elements were also present, the ovary did not exhibit any cytological malignant feature.

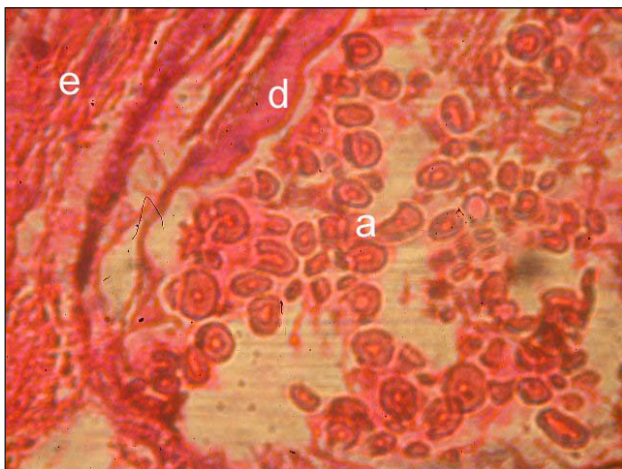


Fig. 2: Oblique section of ovary showing hair follicles (a), stratified squamous epithelium (d) and fibrous tissue (e).

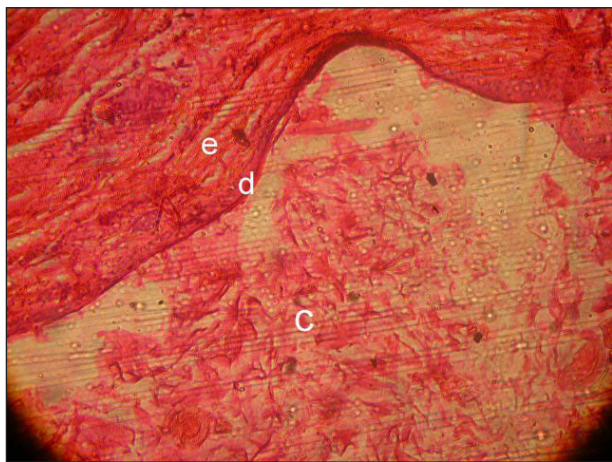


Fig. 3: Oblique section of ovary showing tooth like bony structure (c), stratified squamous epithelium (d) and fibrous tissue (e).

DISCUSSION

The granulosa-theca cell tumor is by far the most commonly (about 97%) occurring ovarian neoplasia in mares and accounts for 2.5% of all equine tumors (Westermann *et al.* 2003). Although uncommon, teratomas are

next common type of equine ovarian tumors, occurring most commonly in mares aged 3 to 18 years. Presence of the cutaneous elements is the commonest reported finding in ovarian teratomas (Catone *et al.* 2004) and the presently observed pathological alterations were consistent with previously described cases of benign ovarian teratoma. The cell(s) leading to the development of a teratoma are directed towards developing gonad at an extremely early stage of foetal or embryonic development as a consequence of abnormal migration of germ cells during embryogenesis (McEntee 1990; Vanhaesebrouck *et al.* 2010). Unlike most of other tumors, ovarian teratomas have well-differentiated mature tissue components indicating that these tumors arise from pluripotential germ cells that have undergone somatic differentiation (Schlafer *et al.* 2010). Among the several theories suggested for histogenesis of teratomas, the most widely accepted is that benign cystic ovarian teratomas are parthenogenetic tumours developing from a single germ cell which has completed only first meiotic division but not the second (Hughes *et al.* 1980). Ovarian teratomas have also been classified as either mature (exhibiting well-differentiated tissues of ectodermal, mesodermal and endodermal origin), immature (poorly differentiated embryonic elements from the germ layers) or monodermal (predominance of one embryonic cell type within the tumor) on the basis of histopathological findings (Outwater *et al.* 2001).

A case of mature ovarian teratoma in an equine fetus was reported (Gamba *et al.* 2014). Similar to the present observations, reported equine ovarian teratomas were ovoid or irregular in shape. Likewise, reported teratomas had foreign tissues like hair, follicle, teeth or bony structure, cartilage, stratified squamous epithelium, majority with solid areas and cysts, (Moulton 1987; Da Encarnação *et al.* 2011). Some less common structures like respiratory epithelia, sebaceous and sweat glands, muscle fibers, fat, nervous tissues exceptionally along

with functional remnant of ovary (small follicles and a diestral corpus luteum) were recorded in equine teratomatous ovaries (Catone *et al.* 2004; Vanhaesebrouck *et al.* 2010). In mares, apart from ovarian teratomas alone (Bosu *et al.* 1982), teratoma within an equine antral follicle (González *et al.* 2015), ovarian cystadenoma associated with teratoma (Fujimoto and Sakai, 1955), ovarian adenocarcinoma associated with teratomatous elements (Van Camp *et al.* 1986) and teratocarcinoma i.e. metastatic carcinoma (Bartman *et al.* 2001) has also been recorded in the literature.

As evident in the present case, mare with unresponsive colic like symptoms also needs to be ascertained for abnormalities of organs including ovaries. Differential diagnoses for enlarged equine ovaries should include neoplastic (GTCT, teratoma, dysgerminoma, and lymphosarcoma) and non-neoplastic conditions (anovulatory follicle, ovarian hematoma, ovarian abscess). Teratomas are generally unilateral, benign and referable clinical signs are usually lacking (Hughes *et al.* 1980; Jubb *et al.* 1993). These grow very slowly in most of the cases, resulting in a long pre-symptomatic period. Ovarian teratomas in mares are usually diagnosed by the change in ovarian size and/ consistency revealed during the transrectal palpation. Clinical and particularly ultrasonographic features of affected ovary indicated the possibility of ovarian neoplasm in the present study and thus aids in differentiating ovarian tumours and other non-tumoral structures or ovarian disorders (Montavon, 1994). However, histopathology of excised ovaries is crucial for the final diagnosis.

Ovarian teratomas are non-functional with regard to steroid hormone secretion and generally do not affect the health status and fertility, of the mare (Montavon, 1994). Hence, regular oestrus cyclicity observed in the present mare was not surprising and equine ovarian teratomas have been discovered during gestation or following foaling (Montavon, 1994) and contralateral ovary usually remains functional

and maintains the cyclicity and pregnancy (Mair *et al.* 1998). Nevertheless, abdominal pain as a result of pressure from the expansive growth of tumorous ovary and impaired fertility caused indirectly by adhesions of ovary with surrounding structures can develop (Montavon, 1994). Although ovarian teratomas are benign in nature, surgical excision of the teratoma-affected ovary by laparotomic unilateral ovariectomy remains the primary therapeutic method (Pugh *et al.* 1985). Laparoscopic guided ovariectomy in standing mares is advantageous, with few postoperative complications than the hand assisted laparotomic technique, although the use of laparoscope through the flank approach in excision of very large sized tumorous ovaries has its limitations (Vanhaesebrouck *et al.* 2010). Prognosis of ovarian teratomas as well as postoperative fertility is good. Occurrence of oestrus at an earlier time (45 vs. 67 days post ovariectomy) in a treated endometritic mare with ovarian teratoma compared to the present case has been reported (Lefebvre *et al.* 2005). This is unlike granulosa-theca cell tumors where they cause increased blood testosterone concentrations and behavioral changes or many other reproductive problems.

The anatomical, morphological and histological features of the recorded teratoma indicated that most likely it was a primary tumor originating from the ovary. Further cytogenetic, ultrastructural and immunohistochemical investigations would help to better understand the tumorigenesis of ovarian teratomas.

Conflict of interest: Author declares that they have no conflict of interest.

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