

Clinical and pathological presentation of squamous metaplasia of the *rete ovarii* in a Zebu cow

[Apresentação clínica e patológica de um caso de metaplasia escamosa da *rete ovariana* em vaca Zebu]

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ABSTRACT

Squamous metaplasia of *rete ovarii* is characterized by replacement of the normal cuboidal epithelium of *rete ovarii* by a keratinized stratified squamous epithelium, leading to accumulation of keratinized material within the tubules and cystic dilatation of *rete ovarii*. The present study describes a case of squamous metaplasia of *rete ovarii* in a 10 year old Zebu cow, including clinical, surgical, ultrasonographic, histopathological and hormonal findings. At first ultrasound examination the cow had lightly asymmetric ovaries with follicles presenting echogenicity similar to luteinized follicular cysts. After transvaginal follicular aspiration creamy yellowish sanguineous-purulent content was recovered. After unilateral ovariectomy the ovary was sectioned and brownish viscous material drained from cystic cavity. Histopathology confirmed the diagnosis of squamous metaplasia of the *rete ovarii*. Progesterone concentrations assessed by chemiluminescent enzyme immunoassay within different time periods after ovariectomy showed that pathology did not compromise normal luteal ovarian activity in a contralateral remnant ovary.

Keywords: bovine, epidermoid cyst, ovary, *rete ovarii*, teratoma

RESUMO

A metaplasia escamosa de *rete ovarii* é caracterizada pela substituição do epitélio cúbico normal da *rete ovarii* por um epitélio escamoso estratificado queratinizado, levando ao acúmulo de material queratinizado dentro dos túbulos e à dilatação cística da *rete ovarii*. O presente estudo descreve um caso de metaplasia escamosa de *rete ovarii* em uma vaca Zebu de aproximadamente 10 anos, incluindo aspectos clínico, cirúrgico, ultrassonográfico, histopatológico e dos achados hormonais. Ao primeiro exame ultrassonográfico, a vaca tinha ovários levemente assimétricos e com folículos apresentando ecogenicidade semelhante à dos cistos foliculares luteinizados. Após a aspiração folicular por via transvaginal, foi recuperado conteúdo sanguinopurulento amarelado e de aspecto cremoso. Após a ovariectomia unilateral, o ovário foi seccionado, permitindo a drenagem de material de aspecto viscoso amarronzado da cavidade cística. A histopatologia confirmou o diagnóstico de metaplasia escamosa da *rete ovarii*. As concentrações de progesterona avaliadas por quimioluminescência, em diferentes períodos de tempo após a ovariectomia unilateral, mostrou que a patologia não comprometeu a atividade ovariana normal do ovário contralateral remanescente.

Palavras-chave: bovino, cisto epidermoide, ovário, *rete ovarii*, teratoma

INTRODUCTION

Although metaplastic changes are relatively common in various organs of the female genital

system in ruminants (Santos and Nascimento, 1996; Nascimento and Santos, 2011), only recently a squamous metaplastic lesion of the bovine *rete ovarii* has been recognized (Santos *et al.*, 2012). The lesion is characterized by

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replacement of the cuboidal epithelium that is normally observed in the *rete ovarii* by a stratified squamous keratinizing epithelium. As a result of the metaplastic change, there is accumulation of keratinized material within the tubules of the *rete ovarii* leading to the development of multiple ovarian cysts lined by squamous epithelium and filled with keratinized material (Santos *et al.*, 2012). Apparently these histological changes have been historically misdiagnosed as benign teratomas of the ovary since the terminology “ovarian epidermoid cyst” has even been utilized as synonymous of benign teratoma in the ovary of cows (McEntee, 1990), and more recently a diagnosis of epidermoid cyst of the ovary has been proposed (Edwards, 2002). Considering the lack of information regarding clinical changes associated with squamous metaplasia of the *rete ovarii* in cows, here we describe a case in which clinical parameters have been thoroughly recorded, including clinical, surgical, ultrasonographic, histopathologic, and endocrinologic findings.

CASE REPORT

An approximately 10-year-old Zebu cow that was kept in a *Brachiaria* pasture was first

examined during a routine gynecological evaluation. At the first examination, the cow had a body condition score of 4.5 (in a scale of 1 to 5) and body weight of 450 Kg, with no clinical or behavioral change that could indicate any reproductive disease. The gynecological examination was performed by transrectal palpation and ultrasonography with a Mindray DPS-2200Vet and a 7.5 MHz linear transducer. There ovaries were asymmetric. The left ovary was spherical and fluctuant with 4.5 cm in length by 3.0 in width, leading to a primary differential of follicular cyst. Ultrasonographically there were multiple small and medium size follicles (i.e. 3 to 6 mm). There were also two cystic structures with 10 and 12 mm in diameter filled with a content that had echogenicity similar to luteal tissues (Fig.1A). The right ovary was similar in size to the left (affected) ovary, and there was only one detectable follicle with 14 mm in diameter (Fig. 1B). Transvaginal ovarian aspiration was performed recovering content similar to a purulent and hemorrhagic exudate, which did not support the diagnostic hypothesis of follicular cyst, but rather an ovarian abscess was suspected. Blood samples were obtained and stored at -20°C until further processing for assessment of progesterone serum concentration.

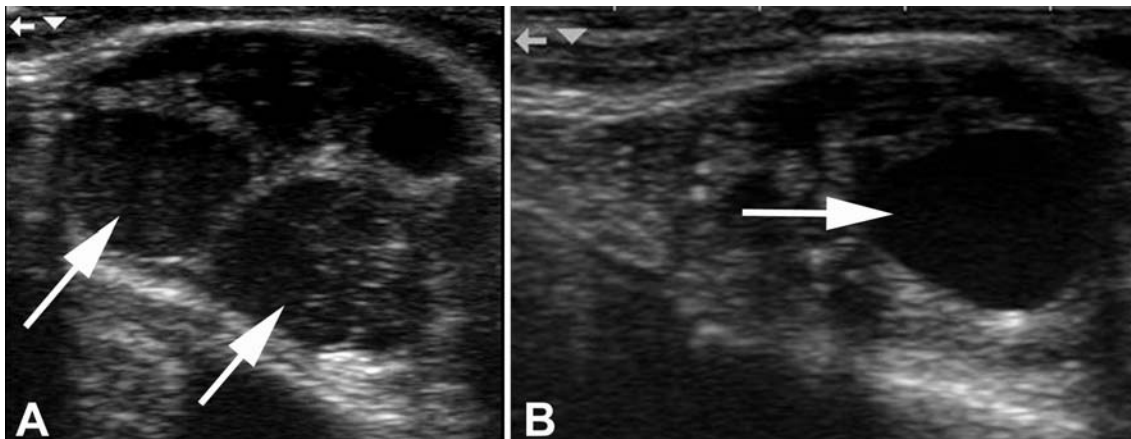


Figure 1. Ultrasound features of the left (A) and right (B) ovary in a Zebu cow with squamous metaplasia of the *rete ovarii*. Left ovary have two cystic structures (white arrows) with 10 and 12 mm in diameter can be observed at bottom of figure. Cystic structures have echogenicity similar to luteal tissues and they are seen to lie embedded in the hyperechoic ovarian parenchyma. At the top of figure there are small follicles represented by anechoic vesicles surrounded by moderately echoic walls, which are a few millimeters thick. Right ovary has one 14 mm ovarian follicle (white arrow) and anechoic small follicles (3 to 4 mm) at top of figure.

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Left ovariectomy was performed approximately 6 months after the first examination. The ovary was 4.5 cm in length by 4.0 in width, and through a longitudinal section of the ovary

drained a brownish creamy content (Fig. 2). Fragments of the ovary were fixed by immersion in 10% buffered formalin, and processed for histopathology examination.

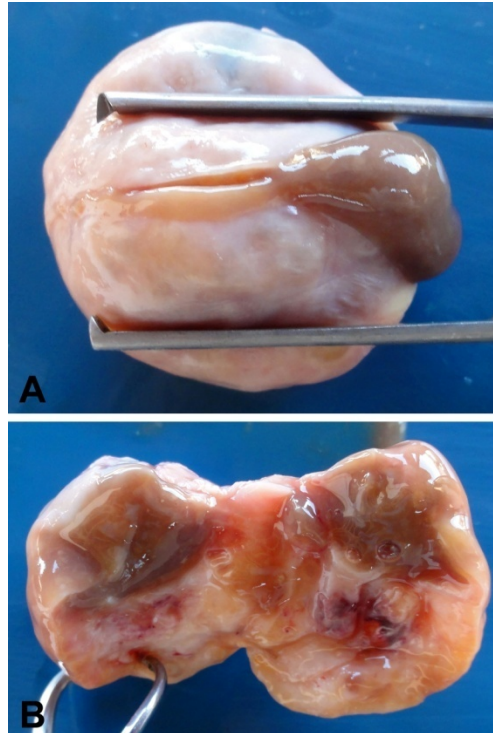


Figure 2. Gross appearance of the left excised ovary with squamous metaplasia of the *rete ovarii* of a Zebu cow. (A) Enlarged left ovary draining a brownish material from a cystic cavity. (B) Cut surface of the left ovary showing one of the cystic cavities with a brownish viscous material.

After the ovariectomy, the cow had been examined by ultrasound at four occasions during the period of 8 months. Developing ovarian follicles and corpora lutea had been observed during these 8 months, indicating that the remaining right ovary had normal ovarian cyclic activity. Three additional blood samples were collected over the course of these eight months post surgery.

Progesterone concentrations were assessed by chemiluminescent enzyme immunoassay (Arndt *et al.*, 2009). There was 1.7ng/mL of serum progesterone prior to ovariectomy, and 0.44, 1.59, and 1.53ng/mL of progesterone at second, third and fourth blood samples, respectively, after 12, 15 and 20 days time period intervals. These results indicate luteal activities at two occasions and a follicular phase once (i.e. progesterone levels lower than 1ng/mL of

serum). These endocrinologic findings further support the notion that the cow sustained ovarian cyclic activity after ovariectomy.

Histologically, there were multiple cystic structures with diameter ranging from 0.4 to 1.5 cm, which were lined by simple cuboidal epithelium (i.e. similar to the normal epithelium of the *rete ovarii*), or by two or more layers of cuboidal cells. Most cysts had multifocal areas with keratinized stratified epithelium (Fig. 3A). There were multifocal areas of erosion of the epithelium with mild necrosis and inflammation in the adjacent connective tissue (Fig. 3B), and a focal intraepithelial lymphocytic aggregate in stratified epithelium. The cysts are filled by keratinized material or hemolyzed blood (Fig. 3C). In the ovarian cortex, there were several follicles at different stages of development indicating that the ovary was functional.

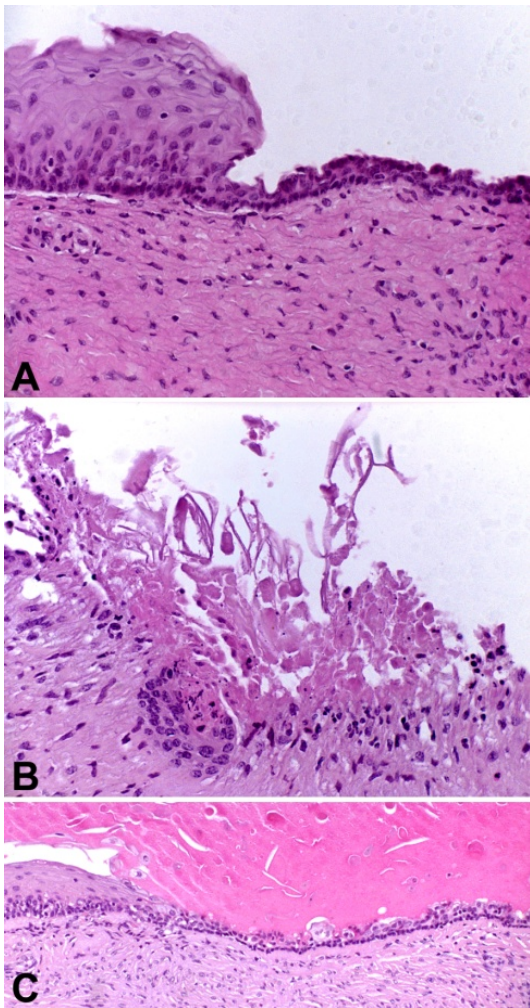


Figure 3. Squamous metaplasia of the *rete ovarii* in a Zebu cow. (A) Cystic wall layered by an epithelium abruptly transitioning from a double layered to keratinized stratified epithelium (to the left). (B) Focal erosion of the epithelium associated with mild necrosis and inflammation (C) Cystic *rete ovarii* with squamous metaplasia, and filled with hemolyzed blood.

DISCUSSION

This is the second reported case of squamous metaplasia of the *rete ovarii* after its recent original report (Santos *et al.*, 2012), and the first in which clinical data was available. Although in the first reported case there was no clinical information available, apparently the cow did not have any detrimental effect on its ovarian cyclic activity since a functional corpus luteum was found in one of the ovaries (Santos *et al.*, 2012). In the present report we were able to confirm that

indeed ovarian cystic changes secondary to squamous metaplasia of the *rete ovarii* did not interfere with the ovarian cyclic activity. In addition, in the present case the lesion appeared to be unilateral as opposed to a bilateral localization in the first reported case (Santos *et al.*, 2012). However, in spite of clinical and ultrasonographic normal findings in the contralateral ovary, the possibility of bilateral metaplasia cannot be completely ruled out in this case. Importantly, after a unilateral ovariectomy for removal of the affected ovary the cow remained up to eight months after the surgery displaying regular estrous cycles.

Squamous metaplasia of the *rete ovarii* has only recently been recognized as an entity (Santos *et al.*, 2012), although it is clear that this change was observed in some previous reports in which it was diagnosed as either benign teratomas (Costa, 1974; McEntee, 1990) or epidermoid cysts (Edwards, 2002). That notion is supported by the fact that cuboidal scarcely ciliated and single layered epithelium coexisted with stratified squamous keratinizing epithelium in some of these previously described lesions (Costa, 1974; Edwards, 2002). As early as in the 1960's, Donaldson and Hansel (1968) have mentioned squamous metaplasia of the *rete ovarii* in a study which aimed to evaluate cystic corpora lutea and follicular cysts in bovine ovaries, but in spite of mentioning it they did not describe or document the lesion (Donaldson and Hansel, 1968). Considering its clinical presentation and its tendency to generate cystic lesions in the ovary, degenerative cystic conditions of the ovary as well as ovarian cystic neoplasms should be included in the differential diagnosis.

In this case, as well as in the first reported case (Santos *et al.*, 2012), the metaplastic change and consequent accumulation of keratinized material resulted in cystic dilation of the *rete ovarii*. Therefore, ovarian cysts in general should be considered in the differential diagnosis. Importantly, cysts of the *rete ovarii* occurs among domestic animal species, particularly in the bitch and queen, but not associated with metaplastic changes in the epithelium. In addition, several other types of pathological cysts can develop in the ovary, including paraovarian cysts, germinal inclusion cysts, cystic corpus luteum, luteinized cyst, follicular cyst, tube or

bursa-ovarian cysts, and the hydatid of Morgagni (Nascimento and Santos, 2011), which makes a clinical differential diagnosis somewhat challenging.

In conclusion, here we describe a case of squamous metaplasia of the *rete ovarii* in a Zebu cow, with gynecological and endocrinological evidences that this lesion does not have deleterious effects on ovarian cyclicity. Additional studies are required to determine the prevalence of this lesion in different breeds of cattle and its long term clinical outcomes.

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