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Short Paper

Congenital and acquired abnormalities of reproductive tract of non-pregnant ewes slaughtered in Fars province, Iran

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Summary

Congenital and acquired abnormalities of the reproductive tract of female sheep resulting in subfertility, infertility or sterility cannot easily be detected by routine clinical examination. Morphopathological abnormalities of the reproductive tract of ewes were studied by examining a total of 739 genital tracts in abattoirs of Fars province, Iran. From these, the 648 non-pregnant genitalia were examined grossly. In gross examination, 12.3% of the tracts were pregnant. Out of non-pregnant tracts, 16.6% exhibited abnormalities. Histopathologic examination of these tracts revealed endometritis 2.93%, metritis 0.3%, pyometra 0.15%, hydrometra 0.15%, papillary hyperplasia of endometrial epithelium 0.15%, endometriosis 0.3%, fatty change of myometrial cells 0.3%, multifocal to diffuse hemosiderosis 1.23%, follicular cysts 1.85%, luteinized-follicular cysts 0.6%, paraovarian cysts 0.9%, oophoritis 0.6% and *Cysticercus tenuicolis* cysts 0.15%. Endometritides were classified as acute or chronic. Acute purulent endometritis and chronic endometritis was diagnosed in 0.75 and 2.18% of the cases, respectively. It was concluded that endometritis and ovarian cysts were the most common abnormalities in the slaughtered ewes.

Key words: Morphopathology, Reproductive tract, Abattoir, Non-pregnant ewes

Introduction

Abnormalities of the reproductive tract of female sheep resulting in subfertility, infertility or sterility cannot easily be detected by routine clinical examination. There is relatively little published information in sheep about the causes of the reproductive failure, other than where direct nutritional or infectious causes have been implicated (Aitken *et al*., 1990; Robinson, 1990). Furthermore, little has been published about the pathological conditions of the ewes reproductive tract which may lead to sterility or reduced fertility. It is reported that in an extensive survey of the causes of ewe infertility in the United Kingdom, 0.6% of breeding ewes failed to conceive due to failure to exhibit oestrus or failure to conceive after multiple matings (Smith, 1991). Abattoir surveys of ewes genitalia in various parts of the world provide useful information on the types and incidence or prevalence of the congenital and acquired abnormalities. Variable levels of abnormalities from 0.72 to 8.7% were recorded from collected reproductive tracts of culled ewes (Emady *et al*., 1975; Long, 1980; Winter and Dobson, 1992; Smith *et al*., 1995; Smith *et al*., 1996; Smith *et al*., 1998). More recently, Palmieri *et al*. (2011) reviewed congenital and acquired pathology of ovary and tubular genital organs in ewes by collecting extensive data from several abattoir surveys. One of the most important sheep raising areas in Iran is Fars province, where the animals are raised under a tribal husbandry system and also small to large farming units. About the reproductive disorders of sheep in this area, there is just

one study of gross changes that was undertaken many years ago (Emady, 1976). Therefore, the present study was carried out to survey the prevalence and characteristics of gross and histopathologic lesions of reproductive tract abnormalities of non-pregnant ewes slaughtered in the Fars province of Iran.

Materials and Methods

A total of 739 genital tracts were collected from ewes slaughtered at Shiraz, Fars abattoir, twice monthly for a one year period. From these, a total of 91 tracts were excluded because they showed evidence of pregnancy. Therefore, the 648 non-pregnant genitalia were examined for morpho-pathological abnormalities. Each tract was opened and examined carefully from cervix to uterine body, uterine horns, uterine tubes and also ovaries. The presence of ovarian follicles, ovarian cysts and any abnormalities of the uterine tubes and ovaries were checked grossly. From these, 108 tracts were grossly with abnormal changes and selected for histopathologic examination. Appropriate tissue samples about 5-10 mm in diameter were taken from affected parts of the genital tracts including uterine body, uterine horns, ovarian tubes and ovaries. All samples were fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned at 5 µm, and stained with haematoxylin and eosin for light microscopic examination.

Results

Of the 739 female sheep examined, 91(12.3%) were pregnant. The stages of pregnancy were not recorded. In gross examination, out of 648 non-pregnant ewes, 108 reproductive tracts (16.6%) were observed suspected to have some abnormal changes. Histopathologic examination of the suspected tracts revealed endometritis in 19 uteri (2.93%), metritis in 2 cases (0.3%), pyometra in 1 case (0.15%), hydrometra (0.15%), papillary hyperplasia of endometrial epithelium (0.15%), endometriosis in 2 cases (0.3%), fatty change of endometrial and myometrial cells in 2 cases (0.3%), multifocal to diffuse hemosiderosis in 8 uteri (1.23%), follicular cysts in 12 cases (1.85%), luteinized-follicular cysts in 4 cases (0.6%), paraovarian cysts in 6 cases (0.9%), oophoritis in 4 cases (0.6%) and *Cysticercus tenuicolis* cysts in one tract (0.15%).

On the basis of type of infiltrating inflammatory cells, existence of periglandular fibrosis, endometritides were classified as acute or chronic. Acute purulent endometritis was diagnosed in 5 cases (0.75%). Grossly, the affected uteri were hyperemic, edematous and contained variable amounts of white to brown color exudates. Microscopically, degeneration and necrosis of mucosa associated with infiltration of many neutrophils into the mucosa and lumen of endometrial glands were seen. Chronic endometritis was diagnosed in 14 cases (2.15%). Histopathologically, variable degrees of periglandular fibrosis associated with infiltration of mononuclear inflammatory cells, particularly lymphocytes and macrophages (Fig. 1) and also cystic dilatation of endometrial glands were seen. Two cases (0.3%) were diagnosed as having metritis. The affected uteri had flaccid consistency. Microscopically, infiltration of many inflammatory cells including neutrophils, lymphocytes, plasma cells, macrophages and few eosinophils were seen in the endometrium, myometrium and perimetrium. Pyometra with characteristic gross appearance including large uterus full of mucopurulent exudates and retained corpus luteum was seen in one ewe (0.15%). Microscopically, large amounts of neutrophils and fibrin were observed on the endometrial epithelium. Hydrometra was diagnosed grossly in one uterus. Two horns of the affected uterus were distended and had more than 300 ml clear fluid (Fig. 2). The wall of uterus was flaccid and very thin. Histopathologically, atrophy and edema of the endometrium associated with severe atrophy of endometrial glands were seen. Two cases (0.3%) were found with adenomyosis which was diagnosed only microscopically associated with remarkable endometrial hyperplasia. Nests of endometrium including endometrial glands and stroma were present within myometrium. Hyperpigmentation due to

melanin deposits was seen commonly in the caruncles and intercaruncular endometrium. Microscopically, variable amounts of melanosomes granules containing melanin were seen within melanoblasts and macrophages without any histopathologic lesion.

Follicular cysts were seen on ovaries as a large, single cyst larger than 2 cm in diameter without the presence of corpus luteum. These cysts were mainly on the right ovaries (8/12 cases) and were associated with endometritis in 4 of these cases. Luteal cysts were observed as a smooth yellowish thick-walled mass with a fluid-filled cavity in the ovaries (Fig. 3). Microscopically, a relatively large central fluid filled cyst was surrounded by a thick wall of luteal cells and fibrous connective tissue. Paraovarian cysts with thin wall containing clear fluid were present alongside the uterine tubes close to the right (4 cases) and left (2 cases) ovaries (Fig. 4). *Cysticercus tenuicolis* cyst contained clear fluid associated with one whitish scolex was attached to the serosal surface of the right uterine tube. Eosinophilic and lymphocytic oophoritis were seen as focal to multifocal areas of infiltration of these cells in the ovaries.

Discussion

In the present study, endometritis was the most common finding of uterine aibnormality indicating that this condition plays a more important role in infertility. Endometritis in ewes, as in cattle, is most common in luteal phase or postpartum and induces embryonic loss as a result of uterine tissue disruption or direct embryo cytolysis (Ramadan *et al*., 1997; Khodakaram-Tafti and Darashiri, 2000; Dawood, 2010). In addition, the absorption of bacterial components can prevent the growth of Graffian follicles and ovulation (Sheldon and Dobson, 2004).

Chronic endometritis is characterized by

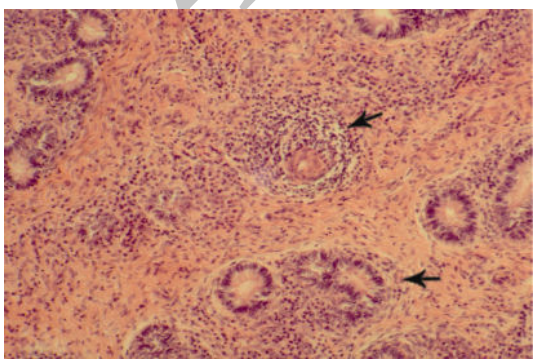

Fig. 1: Chronic endometritis, Uterus, Ewe. Periglandular fibrosis (arrows) associated with infiltration of mononuclear inflammatory cells are seen in the endometrium (H&E, ×250)

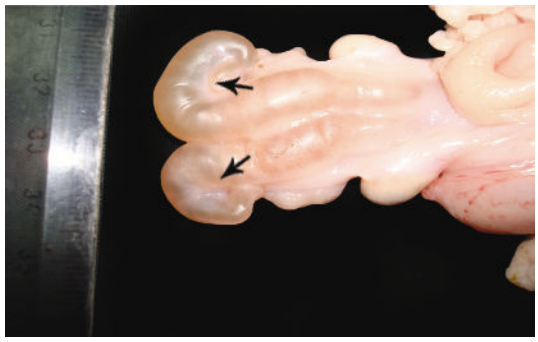

Fig. 2: Hydrometra, Uterus, Ewe. Two horns of the affected uterus are distended due to more than 300 ml clear fluid (arrows)

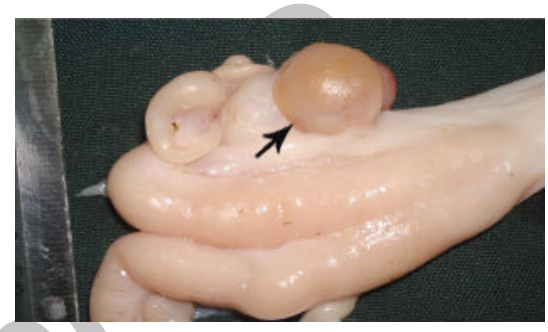

Fig. 3: Ovary, Ewe. A Luteal cyst is observed as a smooth yellowish thick-walled mass (arrow) with a fluid-filled cavity in the affected ovary

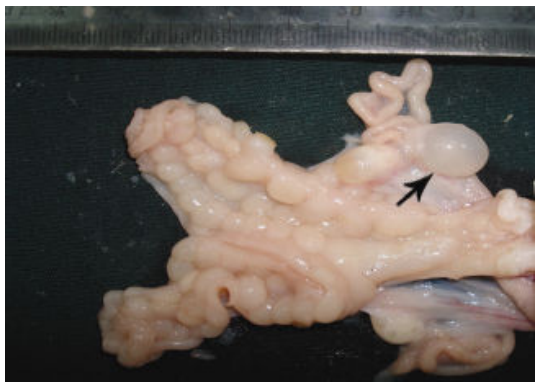

Fig. 4: Uterine tube, Ewe. A paraovarian cyst (arrow) is seen alongside the uterine tube close to right ovary

infiltration of lymphocytes and plasma cells associated with gland atrophy, periglandular and perivascular fibrosis, and lymphoid follicle formation. Lymphoplasmacytic endometritis may be associated with persistent infection of *Chlamydophila psittaci*, targeting the endometrial cells of the basal stroma (Papp and Shewen, 1996). In this study, among the observed uterine disorders, metritis was diagnosed in 0.3% of cases. This abnormality was reported as uncommon condition in ewe and ranged from 0.46% (Alosta *et al*., 1998) to 3% (Saberivand and Haghighi, 2006). Also, the incidence of pyometra in the present study is similar to other reports. It is an uncommon condition in ewe caused by *Escherichia coli* infection, in association or not with other bacteria (Cockcroft, 1993; Moghaddam and Gooraninejad, 2007).

The accumulation of thin or viccid fluid in the uterine lumen or hydrometra is a significant factor in infertility and subfertility (Chien *et al*., 2002). Similar to the present study, melanin deposits without pathologic significance were commonly reported in both ewes and nulliparous sheep (Alosta *et al*., 1998; Smith *et al*., 1999). In this study, adenomyosis or presence of endometrial glands and stroma between muscular bundles of myometrium was diagnosed microscopically in 2 cases. This abnormality was reported as a rare lesion in ewes that were commonly associated with endometrial hyperplasia (Adams, 1975; Dawood, 2010; Palmieri *et al*., 2011).

In the present study, follicular (1.85%) and luteinized-follicular (0.6%) cysts were found as relatively common ovarian abnormalities. Although the significance of ovarian cysts in ewes is not completely understood and has not received as much attention as in cattle, it is a common finding in different breeds of sheep (Palmieri *et al*., 2011). In the reports, the incidence of follicular or luteal cysts is highly variable, ranging from 0.19 to 2% and from 0.01 to 2.4%, respectively (Alosta *et al*., 1998; Smith *et al*., 1999; Moghaddam and Gooraninejad, 2007; Dawood, 2010; Palmieri *et al*., 2011). Acquired cystic ovaries arise as a result of anovulation whereby, instead of regression, follicles continue to increase in size and persist (Noakes *et al*., 2001). Follicular and luteinized cysts likely represent different manifestations of the same condition, so that the previously known luteal cysts are now designed as luteinized-follicular cysts (Peter *et al*., 2009). The prevalence of uterine lesions such as endometritis and pyometra is significantly higher in ewes with ovarian cysts than in those with normal ovaries (Regassa *et al*., 2009).

Paraovarian cyst was seen in 0.9% of cases of the present study. Common ovarian congenital lesions observed during abattoir surveys are cystic lesions near ovary and uterine tubes, derived from remnants of paramesonephric or mesonephric structures (Adams, 1975). Paraovarian cysts are commonly found at either cranial or caudal pole of the ovary and arise from either the cranial or caudal segments of the mesonephric tubules. The cysts cause infertility if they compress the uterine tube or block the fimbrial ostium (Smith *et al*., 1998).

Oophoritis was diagnosed histo-pathologically in 0.6% of cases. This lesion is a rare condition in sheep, resulting from either a direct extension or hematogenous spread of uterine or uterine tube infection to the ovary. *Cysticercus tenuicolis* cysts were observed grossly in 0.15% of cases. These cysts are common incidental findings during ovine postmortem examination and may be attached to the uterine tube, ovarian bursa, vaginal fornix, perimetrium, and broad ligament (Smith *et al*., 1999). *Cysticercus tenuicolis* cysts and paraovarian cysts can impair fertility if causing pressure on the oviduct (Smith *et al*., 1999).

The results of the present study showed 12.3% of the ewes examined were pregnant at the time of slaughter. This is higher than the rates reported by Alosta *et al*. (1998) in Ireland (10%) and by Smith *et al*. (1999) in southwest England (8.11%). This rate of slaughter of the pregnant sheep population represents a considerable loss in terms of production and income. The detection of pregnancy before sending ewes to slaughterhouse could avert such losses.

In conclusion, endometritis and ovarian cysts were the most common abnormalities in the slaughtered ewes of this study.

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