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INTRODUCTION

The subfertile broodmare is a potential cause of significant economic loss to the owner and barren mare investigations, usually performed at the end of the breeding season, are an important means of increasing a mare's chance of successfully conceiving and carrying a foal to full term in subsequent seasons. Normally this will involve visual appraisal of vulval conformation, vaginoscopic inspection of the vagina and cervix, rectal palpation and ultrasonographic examination, and endometrial cytology, bacteriology and biopsy.

Videohysteroscopy is indicated in a number of situations where further investigation of palpable or ultrasonographically identified lesions particular those of a more focal nature are required. When adhesions or foreign bodies are suspected and where direct visualisation of the endometrial surface is required in mares which have persistent unexplained infections and finally in mares where no other cause of the infertility has been diagnosed videohysteroscopy is potentially very rewarding (Wilson 1983, Wilson 1984).

Videohysteroscopy is also useful to facilitate removal of endometrial cysts (Rambags et al 2005; Bartmann et al 2008) and treat adhesions when found (Bartmann et al 2000; Shiemann et al 2003).

The procedure appears quite safe with the only disadvantages being the possible introduction of infection and the minor traumatic inflammation of the endometrium that may occur following abrasion with the endoscope (Shiemann et al 2001).

EQUIPMENT

Most modern, flexible videoendoscopes can be used. The most suitable endoscopes are up to about 150 cm in length and up to about 12 mm wide. Thinner scopes tend to be more flexible and difficult to drive as they readily retroflex.

MARE PREPARATION

The mare is best placed in stocks, her tail bandaged and perineum cleansed so the examination can be performed in an aseptic manner. Just prior to examination the mare is sedated (eg. 0.3 ml detomidine combined with 0.6ml butorphanol). The endoscope should be sterile (ideally gas sterilised or chemically sterilised by soaking followed by rinsing with sterile saline) and handled in an aseptic manner prior to being introduced in to the uterus. Ideally, the mare should be in dioestrus so that the cervix is tight and therefore the uterus can be more easily distended with filtered air (saline has been used instead but is rarely preferred) to allow visualisation of the lumen. Analgesia is needed to combat the discomfort produced as the uterus is distended. Suction can be helpful to remove air during the procedure if the uterus becomes too distended and to remove all the air at the end.

ROUTINE HYSTEROSCOPIC EXAMINATION

The procedure requires two operators one passing the endoscope into the mare the oth-
er driving the controls of the endoscope. A third operator can be helpful to handle biopsy instruments and catheters. The operator wearing a rectal sleeve and sterile gloves inserts the endoscope, aided by sterile lubricant, through the cervix as air is insufflated (Bartmann et al 2003) to allow visualisation of the uterine body and then as the uterus expands the bifurcation is noted cranially and the endoscope can then be passed down each of the horns in turn.

The vagina and external os of the cervix are examined as part of the examination for any abnormality that may not have been detected by previous speculum examination. The uterus is T or Y shaped and the uterine horns are initially more dependant before becoming more dorsal as the ovaries are approached. Once inside the uterus the 10 or more endometrial folds can be recognised and they gradually become less apparent as the uterus expands with air. They tend to be most prominent in oestrus. The endometrium is a pale pink colour but tends to become more hyperaemic as the examination proceeds, so, initial assessment for gross inflammation is important. It is important to maintain orientation and not allow the endoscope to rotate upside down inadvertently as this will make it confusing which horn is being entered. After examining the body of the uterus the endoscope is advanced to the bifurcation and each horn is examined completely including the oviductal papillae at the end of each horn. Sometimes the horns do not dilate easily and it may take some time to make a full evaluation only adhesions are likely to block the lumen completely and prevent the tip of the endoscope reaching the oviductal papilla.

It helps not to overuse the controls that steer the tip as it is relatively easy to retroflex the scope and then not be able to pass down the horns easily. Therefore allowing the endoscope to slide gently along the walls is generally more successful. After returning to the body the endoscope is then retroflexed to observe the internal cervical os for abnormality. Air is then suctioned from the uterus through the biopsy channel until the walls of the horns and body have collapsed back to their normal position before the endoscope is removed from the uterus. It may be necessary to massage the uterus with rectal palpation to remove all the air present. Following the examination the mare is injected with prostaglandin to ensure luteolysis and cause oestrus to be induced. The uterus can then be flushed with large volumes of sterile saline and irrigated with antibiotics to control infection as is deemed necessary. Endoscopic examination allows direct visualisation of any focal lesion, which can then be biopsied specifically to aid diagnosis. Standard long endometrial biopsy forceps are usually preferable despite their large size and rigid nature, which makes sampling less easy but produces a much more suitable specimen for histopathological examination (Hecker et al 2006). It is best to biopsy at the end of the examination as bleeding from the biopsy site will obscure the view (Wilson 1983, 1984, Threlfall & Carleton 1997; Steiner 2004).

### LESIONS AND OTHER FINDINGS

Generalised and localised acute inflammation of the endometrium may be recognised by its very hyperaemic and oedematous appearance however, this is not always obvious and the gold standard remains endometrial biopsy. Atrophy of the endometrial folds and scarring seen as focal or diffuse pale yellow discolouration may be observed. Adhesions may be noted of the cervix and lacerations of the vagina. Intrauterine adhesions are occasionally seen resulting from severe chronic inflammatory episodes often associated with the use of irritating intrauterine treatments. They appear as bands or sheets of tissue extending, often in a haphazard fashion across the lumen or parallel to the walls. Occasionally urine and faecal material may be recognised in the vagina and occasionally uterus. Fluid, in varying quantities, may be found pooling on the floor of the uterus and is a common finding. It may vary from greyish fluid to yellow purulent material as in pyometra. In this case commonly cervical adhesions
or injury will be present. Alternatively clear mucus, urine and rarely mucometra are possibilities. Samples of any fluid seen can be aspirated via a catheter passed down the biopsy channel for cytological and bacteriological examination (Bracher et al 1992).

Generally it is difficult to assess the degree of underlying degenerative endometrial disease from the gross appearance of the endometrium and a reliance on endometrial biopsy is necessary. Although, it has been reported that the videoendoscopic appearance of small arteries under the endometrium is related histologically to the degree of sclerotic change in the intima and adventitia of these vessels. A correlation was found between the appearance of small arteries under the endometrium and age of the mare, and the degree of endometrosis was more severe in mares in which these small arteries were most visible (Inoue et al 2000).

Uterine cysts are often seen in older mares originating from glandular or lymphatic tissue (Kaspar et al 1987). Blockage of lymphatic channels leads to single or multiloculated cysts developing which have a variety of shapes and sizes and can be pedunculated or adherent to the wall. They are most commonly located in the body and at the base of the horns near the bifurcation. The importance of cysts in relation to fertility is debatable with some studies finding no evidence of an effect (Eilts et al 1995) and others finding a reduced pregnancy rate in mares with cysts (Leidl et al 1987, Tannus & Thun 1995). Kollmann et al 2008 reported on improved pregnancy rates following transendoscopic surgical removal of cysts. Some equine gynaecologists believe movement of the early embryo prior to fixation may be affected and fertility reduced if cysts are very large or numerous and that if located at the base of the horns they may affect fixation at the normal location. They may increase the likelihood of early resorption if the vesicle locates directly in contact with a cyst. Also, accurate detection of a pregnancy and distinguishing it from a cyst can be made much more difficult and for this reason alone removal of cysts may be preferable. Two endoscopic techniques have been used one using Nd:YAG laser surgical ablation of the cysts resulting in drainage of fluid and photoablation of the cyst alternatively, (and preferred by the author) the use of a thermocautery loop to snare the cysts and remove them entirely as much as is possible. By either method recurrence of existing cysts and development of new cysts does occur. In the author’s view the latter method results in less recurrence. The laser ablation of cysts has a greater risk of thermal necrosis and injury to the deeper tissues with delayed uterine perforation and extensive scar formation a possibility.

Large foreign bodies such as swab tips and marbles are very occasionally seen. But normally they are very small and may be difficult to identify during transrectal ultrasound. Some are the remnants of cotton wall used to clean the mare’s perineum and contain tiny amounts of cotton lint acting as a nidus for other cellular material to deposit on including bacteria. These bacteria may then allow a persistent endometritis to develop. It may be possible to remove a foreign body with biopsy forceps passed down the biopsy channel or with large volume flushing. The remnants of the endometrial cups can occasionally be seen, in some mares that have relatively recently had a resorption, as yellow plaques on the endometrial surface at the base of the horn. In some cases the may remain much longer than expected and be associated with persistence of eCG secretion. These mares may cycle abnormally and produce anovulatory follicles. Fetal remains from a whole mummified fetus to various partially resorbed remnants have been found on rare occasions.

Uterine haematomas and occasionally fistulas have also been reported associated with foaling trauma and may be investigated. Uterine tumours such as leiomyoma (Berezowski 2002; Hollerrieder et al 2002; Janicek et al 2004) and melanoma have been seen on rare occasions and haemangioma of the cervix has also been reported. Finally, uterine scarring from previous caesarian section surgery may be visualised.
REFERENCES


