Common causes of ovarian enlargement in the mare

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Ovarian enlargement is a relatively common finding when performing routine reproductive examinations in the mare. Per-rectum ultrasonography enables visualisation and detection of structures that cannot be palpated and hence is the primary diagnostic tool in these cases. In some cases where pathology is detected on ultrasound examination, further diagnostics including hormonal analysis and histopathology are indicated.

What are the most common causes of ovarian enlargement or asymmetry?

The most common causes include normal physiological cycling (ovarian pre-ovulatory follicles or corpora lutea), haemorrhagic anovulatory follicles (HAFs), granulosa-theca cell tumours (GCTs) and ovarian haematomas.

Pre-ovulatory follicles are fluid-filled structures visible on ultrasound as circular or irregularly-shaped anechoic (black) structures in the otherwise uniformly echogenic (white) ovarian stroma (Figure 1). A ‘wave’ of selected follicles becomes visible on ultrasound approximately 10-12 days prior to the ‘dominant follicle/s’ (the follicle, or follicles in the case of twins, destined to ovulate) ovulating. A dominant follicle grows approximately 3mm per day and depending on the breed, pre-ovulatory follicles can reach up to 55mm in size. When nearing ovulation the follicle becomes soft and may be painful on rectal palpation.

Ovulation is recognisable on ultrasound by the replacement of the original anechoic follicular structure with an ‘ovulation site’ following evacuation of >90% of the follicular fluid.\(^1\) The ovulation site can have a variable appearance with approximately 50% resulting in the immediate formation of an echogenic, tissue dense corpora lutea (CL) (Figure 2). The remaining 50% form a corpora haemorrhagica (CH), visualised as an echogenic structure containing single or multiple non-echogenic structures (Figure 2). Despite their differing ultrasonographic appearance, both structures produce progesterone and have the same physiological function. The CL is functional for approximately 14 days and plasma progesterone concentrations >1ng/mL can confirm the presence of active luteal tissue.

The following table summarises recent literature on the three major pathological aetiologies of ovarian enlargement, including ultrasound and historical findings that aid in achieving the correct diagnosis and recommended treatment for each condition.

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Figures:
- **Figure 1.** Ovarian pre-ovulatory follicle.
- **Figure 2.** Ovarian CL and CH in the same ovary.
**Haemorrhagic Anovulatory Follicle (HAF)**

<table>
<thead>
<tr>
<th>Ultrasound image</th>
<th>What are they?</th>
<th>Common ultrasound findings</th>
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<tbody>
<tr>
<td><img src="image" alt="Ultrasound image" /></td>
<td>A HAF is a follicle that fails to ovulate. Physiological ovulation failure is common during the transitional periods (beginning and end of the breeding season); however, they can also occur spontaneously during the ovulatory breeding season, at which time they are considered abnormal. HAFs more commonly occur in older mares (&gt;11 years) and in mares that have been exposed to multiple injections of PGF2α.</td>
<td>HAFs are usually seen on ultrasound as large (42-75mm³), anechoic structures that gradually begin to develop speckles in their lumen. These speckles are blood clots. As the structure matures, organisation of the contents can reveal the development of fibrinous strands in the lumen. HAFs generally have a thin luteal border (&lt;3mm³) which can help in differentiating them from a CH.</td>
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*Figure 3. Haemorrhagic Anovulatory Follicle.*

**Effect on oestrus cycle**

The occurrence of a HAF is often followed by a prolonged period of behavioural anestrus and a lengthened interovulatory interval. It is important to note that the cycle will not be fertile unless a concurrent normal ovulation has also occurred.1 Spontaneous regression of a HAF commonly occurs within 1-7 weeks.

**Treatment**

HAFs usually regress over the same life-span as a CL, i.e. 12-14 days. Treatment with PGF2α 9-14 days following detection can be effective in causing the regression of a HAF in some, but not all, cases.

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**Granulosa Cell Tumour (GCT), Granulosa Thecal Cell Tumour (GCTC)**

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<td><img src="image" alt="Ultrasound image" /></td>
<td>GCTs are tumours of ovarian sex cord - stromal tissue involving granulosa cells alone or in combination with thecal cells. They display no breed predilection and have been described in maiden, barren, pregnant and postpartum mares.2</td>
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Gonadal tissue involvement influences:

1. **Behaviour**: Changes including aggressiveness, stallion-like behaviour, prolonged anoestrous, or nymphomaniac behaviour can be the primary presenting sign.3

2. **Hormone levels**: Inhibin secreted from granulosa cells and testosterone secreted from thecal cells are usually increased. The negative feedback of these hormones then causes a drop in progesterone. Anti-Müllerian hormone (AMH) has recently been described as a more sensitive biological marker as it is expressed in ovarian granulosa cells. Most labs run a 'GCT panel' and now offer AMH measurements.

*Figure 4. Granulosa Cell Tumour.*

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<td>The ultrasound appearance of a GCT can be very variable. Most commonly, an enlarged, multicystic structure of ‘honeycomb’ appearance is noted.1 The contralateral ovary is reduced in size as a result of negative feedback from inhibin produced by the GCT, with little or no follicular activity noted.4</td>
<td>The two primary presentations are: 1. Persistent oestrus (19-22%) 2. Prolonged anestrus (8-32%)1,5</td>
<td>Surgical removal of the ovary. Multiple surgical approaches have been described including laparoscopic, colpotomy, standing flank and paramedian.6 Surgical approach is determined by the size of the tumour.</td>
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Ovarian haematomas have no effect on endocrinological cycling patterns and affected mares maintain the ability to conceive. Haematomas generally resolve over weeks- months with no negative effects. Occasionally these structures can increase in size to the extent that they cause significant pain and colic and surgical removal is indicated.

References