SOME ASPECTS OF UTERINE MOTILITY IN THE MARE AS MEASURED BY MYOMETRIAL ELECTROMYOGRAPHY

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"Difficult though it may be to record uterine activity in a unicorn the data obtained is no more reliable than similar data derived from the study of one mouse".

Finn and Porter (1975)

ABSTRACT

The purpose of this study was to determine how uterine motility as measured by both electromyographic techniques (emg), and to a lesser extent by intra-uterine pressure changes (IUP), is influenced by steroid hormones, uterine stimulants and relaxants, infused intra-uterine fluids, natural breeding and the first 20 days of pregnancy.

Two intact and two ovariectomised mares had uterine emg activity measured from 3-8 hours/day over a period of 1-5 months. Simultaneous IUP recordings, using an open tipped catheter, were periodically taken. One intact mare during anoestrus and both spayed mares were given exogenous courses of oestradiol and progesterone to simulate oestrous cycle activity. Oxytocin, cloprostenol, propantheline bromide and clenbuterol were administered to each mare during anoestrus, transition, oestrus, and dioestrus, where applicable. Quantities (60-1000ml) of sterile double distilled water were infused intra-uterine into each mare at various cycle stages. One intact mare was bred on four occasions and followed through the first 20 days of her pregnancy.

Mares in oestrus recorded synchronous short bursts (3-5 min) of high amplitude emg activity following a crescendo-decrescendo pattern. In dioestrus burst duration increased (15-25 min) and amplitude decreased with increasing plasma progesterone levels. Emg results during anoestrus and transition were intermediate. During early pregnancy emg characteristics varied depending on whether the conceptus was in the oviduct, migratory or fixed. It is proposed that in oestrus emg changes manifest as contractions, while in dioestrus as increased uterine tone.

Oxytocin and cloprostenol caused uterine responses at all cycle stages with the most pronounced response during oestrus where drug administration was followed by prolonged emg activity (10-25 min) initially and then followed by short burst activity. The least response was seen during dioestrus. Propantheline bromide decreased emg activity especially in dioestrus and is an effective uterine relaxant; clenbuterol however caused minimal measurable change.

Infused intra-uterine fluids resulted in a single spike pattern of emg activity which was generally asynchronous between electrode sites during the first infusion and depressed uterine activity following a subsequent second infusion.

Natural service resulted in minimal emg changes similar to those seen after rectal palpation, ie a short term (5-10 min) burst of densely grouped action potentials. This response is so short it seems unlikely either endogenous oxytocin and/or prostaglandins would have any significant influence on sperm transport in the mare; it is suggested that the emg change seen at this time is more in the nature of a local response to vaginal stimulation by the penis of the stallion, and is similar to that seen during palpation per rectum.

Electrode site emg variation was common, especially during dioestrus and early pregnancy.

The emg activity recorded in early pregnancy is different to that found in the non-pregnant dioestrus mare and probably related to the position of the embryo; it is suggested that abnormal uterine motility could be a cause of early embryonic death in this species.

During the oestrous cycle there was little correlation either statistically or visually between emg and IUP with or without drug treatment, but IUP increased with uterokinetic drugs and decreased with relaxants.

IUP changes may not be a reliable method of measuring uterine activity in the mare. This is supported by the finding that there was no statistical difference in IUP parameters measured between cycle stages, whereas there were important emg variations. As the experimental mares experienced signs of intestinal discomfort after administration of the uterine stimulants, and propantheline bromide is a known intestinal relaxant, the author argues that IUP results recorded after drug treatment could be influenced by the effects of these substances on intestinal motility rather than solely the consequence of a direct uterine response.

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