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In addition to clinical observation, endocrinological profiles in normal and induced parturitions were combined with hysterographic data. In those investigations our aim was to study:

- 1) the normal (physiological) myometrial activity during final pregnancy, parturition and early puerperium
- 2) the possibilities to influence uterine motility in a physiological way:
 - in preventing overnight farrowing, using tocolytics
 - in stimulating uterine contractions in cases of labour weakness using oxytocin.

METHODS

Eighteen Ni/cr electrodes in 6 groups were implanted in the uterine myometrium of 10 Belgian Landrace sows between 97-105 days of gestation. The 6 implantation sites were spread over both uterine horns. Recordings were made from 1 day after operation until 7 days after parturition.

As tocolytics, Duphaspasmin (Isoxsuprine-Philips Duphar) and Planipart (Clenbuterol-Boehringer Ingelheim) in a 10 ml dose i/m or i/v (112,5 mg, resp. 300 mcg) were tested during the complete recording period. Oxytocin in different doses was injected i/m or i/v from the expulsion phase until the end of recording.

RESULTS

Physiological activity during late gestation, parturition and puerperium.

Electrical activity until 108-109 days of pregnancy seems more pronounced when electrodes are implanted in the ampullae, compared to implantation between ampullae or "in non pregnant" uterine segments.

Spike(S) activity may differ from one electrode-set to another, while S-duration can change very strongly within the same electrode-set. At that period, uterine motility is not even "grouped" (=uterine motility recorded on all sets practically at the same moment, without coordination between the sets).

From 108-109 days of pregnancy, S-duration increases and becomes more "grouped". Still, much variation exists between and within implantation sets.

In most of the sows, parturition was induced on Day 111 (or 112) by i/m injection of 10 mg prostaglandin F_{2α} (Dinolytic-Upjohn) or 175 mcg synthetic prostaglandin (Planate-ICI). Side effects were only observed in the F_{2α} treated animals. Those effects were connected simultaneously at all implantation sites with a permanent spasm-like S-activity, within 10' after F_{2α} application, lasting for 10-20' and followed by an expulsion-like pattern for approximately 1 hr. Those spasms of the pregnant uterus may explain the colic-like symptoms in F_{2α} treated pregnant sows. Analogue symptoms and myometrial activity never were observed after Planate treatment.

Release of uterine fluids always was indicated by an increasing percentage of coordinated, prolonged S-activity, starting a few hours before fluids were released. Now, the duration of S-activity becomes maximal (70" + 20") with regular inactivity intervals of 2' + 0,4'. From now on, regularity and mostly coordinated S-activity and inactivity periods becomes a fixed pattern, which persists until the expulsion of the afterbirths. Most of the contractions are propagated in tubo-cervical direction, while also cervico-tubal contractions and little uncoordinated activity is recorded. Duration and coordination of S-activity already diminish during expulsion of the afterbirths.

During puerperium, especially from the second day after parturition, very long contractions (4-5') are recorded, totally incoordinated and alternated with very long inactivity periods. "Suckling" effect is recorded as a simultaneous 4-5' S-activity, starting 1-2' after stimulation of the udder. Endogeneous irregular S-activity was recorded until the last day of registration.

Effect of tocolytics and oxytocin.

Tocolytics as Planipart and Duphaspasmin (300 mcg

Clenbuterol, resp. 112,5 mg Isoxsuprine) during late gestation (<109 days pregnancy) within 4-5' after i/m injection provoke a shortening of the S-wave and a prolongation of the inactivity interval during 2 resp. 3-4 hrs. When Planipart was injected i/m just before release of fluids, S-duration is not clearly affected, but most of the contractions become "grouped" without coordination, for a few hours only. When injected just after expulsion of the 1st piglet, expulsion rate and electrical activity was not influenced. Administration of tocolytics during puerperium, and in absence of suckling piglets, decreases S-activity for a longer period.

Oxytocin given i/v at a dose of 2-3 IU during the expulsion phase, results in an intensified physiological activity pattern within 16-20". When higher doses are injected i/v (> 10 IU) uterine spasm was usually recorded during 10-15', followed by a reinforcement of uterine motility during at least 1 hr. Intramuscular injection of maximal 10 IU of oxytocin does respond within 4-5' with a physiological contraction pattern and does not induce uterine spasm. As recorded in early puerperium, in absence of suckling piglets, 10 IU of oxytocin i/m, provokes regular "grouped" activity at all implantation sites during 90-120'.

DISCUSSION AND CONCLUSIONS

According to the records of Taverne in the bovine, electrical activity, as measured by electrodes in "empty" parts of the pregnant uterus, is less pronounced under progesterone dominance. However, at the moment oestrogens are raising, electrical activity in those "empty" segments: increases to a similar amplitude and frequency as in the electrodes implanted in the ampullae. The highest activity is recorded when a higher oestrogen/progesterone ratio is present (i.e. from 6-4 hrs before expulsion until expulsion of the afterbirths). Similar results were obtained by Naaktgeboren in the ewe, by Ruckebusch during prooestrus in the bovine and by Rousseau in the goat. In vitro studies of bovine uterine strips revealed an increase in motility after PGF_{2α} treatment (Patil), which is confirmed in our in vivo experiments in swine. Expulsion of fluids and piglets always was preceded by increasing grouped activity 6-4 hrs before expulsion: a similar increased activity was reported in the rabbit (Naaktgeboren) and the miniature pig (Taverne).

Clenbuterol in an i/m dose of 300 mcg under our condition was unsatisfactory to prevent overnight farrowing; however, clinical experiments by Collins and uterine electromyography by Zerobin were more hopeful in that respect.

In order to provoke physiological contractions, we support the advice of Zerobin to inject only 1-3 IU i/v. When injected i/m, maximal 10 IU, eventually to be repeated after 45', will be used.

SELECTED REFERENCES.

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