Effect of the GnRH Agonist Deslorelin Acetate on Pituitary Function and Follicular Development in the Mare

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The GnRH agonist deslorelin acetate is very effective in inducing ovulation in a predictable time period in cycling mares. However, deslorelin acetate treatment may cause decreased pituitary follicle stimulating hormone (FSH) secretion and decreased ovarian follicular development, which may lead to a prolonged interovulatory interval. Authors’ address: Equine Reproduction Laboratory, Colorado State University, Ft. Collins, CO 80523. © 2000 AAEP.

Introduction

The gonadotropin releasing hormone (GnRH) agonist deslorelin acetate has recently been approved for the induction of ovulation in mares. The commercial product consists of a pellet impregnated with 2.1 mg of deslorelin acetate that is released over a 2–3 day period. Administration of the agonist to an estrual mare with a follicle ≥ 35 mm in diameter usually results in ovulation approximately 42 hr later. However, anecdotal reports from veterinarians and mare owners suggest that some mares treated with deslorelin acetate experience delayed follicular development if they do not become pregnant. The goal of the present study was to evaluate pituitary gonadotropin secretion and ovarian follicular development in cycling mares following deslorelin acetate treatment.

Materials and Methods

Sixteen reproductively normal, cycling mares of light-horse breeds were utilized for this study in August and September, 1999. Mares were randomly assigned to one of two groups. Eight mares were administered the deslorelin acetate pellet subcutaneously when a follicle ≥ 35 mm was detected by transrectal ultrasonography. Eight other mares were allowed to ovulate spontaneously.

Ovarian follicular development was monitored ultrasonographically by measuring the diameter of all follicles > 15 mm on each ovary once daily for one complete estrous cycle in all mares. Blood samples were collected once daily over the same time period to measure gonadotropin concentrations. Ten days after the initial ovulation, a GnRH challenge was performed on all mares. Blood samples were collected at 15-min intervals for 1 hr beginning at 6:00 am. After one hour, 25 µg of natural Gn-RH was administered intravenously. Blood samples were collected every 15 min for 2 hr after GnRH administration. Concentrations of luteinizing hormone (LH) and follicle stimulating hormone (FSH) were measured by radioimmunoassay.

Follicular diameter, interovulatory interval, daily gonadotropin concentrations, and GnRH response curves were compared between mares treated with deslorelin acetate and untreated control mares.
Results
Diameter of the largest follicle tended (p = 0.09) to be lower in deslorelin acetate–treated mares than untreated control mares from days 7 to 18 postovulation.

Serum FSH concentrations were significantly lower (p < 0.05) in GnRH agonist–treated mares on days 5 through 14. A mid-cycle surge of FSH was not present in GnRH-treated mares. Concentrations of LH were not significantly different (p > 0.05) between mares in the two treatment groups during most of the observation period. Administration of a GnRH challenge 10 days after ovulation elicited significantly lower FSH and LH responses (p < 0.0001) in mares treated with deslorelin acetate as compared with untreated control mares.

Interovulatory interval for mares treated with deslorelin acetate (25.6 ± 0.8 days) was significantly longer (p < 0.05) than the interovulatory interval for untreated control mares (22.9 ± 0.8 days). One mare in the GnRH agonist group developed a persistent corpus luteum and was administered cloprostenol sodium (250 mcg, intramuscularly) on day 28 postovulation, and ovulated on day 34. One mare in the untreated control group had a 33-day interovulatory interval. The two mares were considered to be statistical outliers and were excluded from the analysis of interovulatory interval.

Discussion
Administration of the deslorelin acetate pellet was associated with a reduction in daily FSH concentrations and an absence of the mid-cycle FSH surge. A surge of FSH secretion normally occurs approximately 10–12 days after ovulation in the mare. The marked decrease in FSH response to a GnRH challenge 10 days after ovulation in mares treated with deslorelin acetate suggests that a prolonged desensitization or downregulation of the pituitary had occurred. Diameter of the largest diestrous follicle was lower in GnRH-treated mares than in control mares and the interovulatory interval was longer in GnRH-treated mares. Several previous studies have reported diminished follicular activity, prolonged interovulatory intervals, or lower FSH levels in mares treated with deslorelin acetate.

In summary, deslorelin acetate treatment was associated with decreased pituitary FSH secretion during the diestrous period following ovulation. The decreased FSH serum concentration in treated mares may lead to decreased follicular development and a delay in the emergence of a dominant follicle. Consequently, if a mare treated with deslorelin acetate to induce ovulation does not become pregnant, an increase in the duration of the interovulatory period may subsequently occur.

References and Footnotes