Nonsurgical Uterotubal Insemination in the Mare

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Uterotubal insemination with a low number of spermatozoa serves as a possible assisted reproductive procedure for achieving pregnancy in mares. The procedure requires a minimal amount of fluid and a suboptimal number of progressively motile, morphologically normal sperm, and it bypasses the uterine phase of sperm transport and selection. Authors’ address: Veterinary Medical Teaching Hospital (Vazquez and Medina) and Dept. of Population Health and Reproduction (all other authors), School of Veterinary Medicine, University of California at Davis, Davis, CA 95616. © 1998 AAEP.

1. Introduction
Subfertility in horses represents a substantial economic and genetic loss to the horse industry. Attempts to manage male factor subfertility have resulted in inconsistent success rates. Stallions with fewer than a minimal number of progressively motile, morphologically normal sperm in their ejaculate account for a substantial number of horses in the subfertile category. The standard insemination dose to impregnate mares is 500 million progressively motile sperm.1 Although millions of sperm may be inseminated, relatively few will gain access to the oviducts as a result of sperm selection through the uterus and at the uterotubal junction (UTJ). Convincing evidence is provided that sperm found in the oviducts and within the folds of the UTJ of the uterus after insemination are morphologically intact.2,3 It has been further suggested that the UTJ may play a role in the selection of morphologically normal sperm and may also act as a storage site for sperm.2,3 The purpose of this study was to develop a nonsurgical approach for the delivery of a low number of sperm cells to the UTJ, bypassing the uterine phase of sperm transport, as a possible management tool for subfertility in stallions.

2. Materials and Methods
Ten cyclic mares (5-15 years of age) with unknown reproductive histories were used. Prior to insemination, the mares were placed in a restraining stock and sedated with 150 mg of xylazine, 5 mg of butorphanol, and 10 mg of acepromazine; the peri- neal area was aseptically prepared.

A cold sterilized Welch–Allen endoscope was inserted into the uterine lumen through the cervix, and the uterine lumen was partially distended with air. Twenty microliters containing a total of 7 million sperm cells, with a mean of 3.8 million progressively motile sperm from a fertile stallion, were washed twice with bovine serum albumin (BSA) modified clear extender at 300 g for 10 min prior to insemination.2 The semen was placed onto the surface of the UTJ of each mare ipsilaterally to the preovulatory follicle via a 4 French, 1.3-m polyethelene catheter inserted through the endoscope.3 The mares received human chorionic gonadotropin (2500 IU IV) when a 35-mm
follicle was detected, and the mares were inseminated 24 h later. Postovulation treatment was administered as needed, and an ultrasound examination was performed for pregnancy at 14 and 25 days postovulation.

3. Results
Three mares were diagnosed as pregnant with a fetal heartbeat at 25 days postovulation. Of the three mares that were pregnant, one mare was inseminated within 12 h of detected ovulation, and the other two mares were inseminated 24 and 48 h prior to the detection of ovulation. Six of the ten mares required postovulation treatment because of an accumulation of fluid within the uterine lumen. A maximum of three daily intrauterine treatments was required in only one of these six mares that received postovulation treatment.

4. Discussion
The intrauterine insemination of 50 million spermatozoa in horses has been reported to result in pregnancy rates of 22.2% in one cycle. Attempts to impregnate women with a suboptimal number of sperm through assisted reproductive procedures in humans have also been reported. In one study, pregnancy rates of 12% were reported following a transvaginal tubal insemination procedure. In our study, tubal insemination in the mare was not successful because of the large gauge diameter of the insemination catheter and the poor accessibility to the uterotubal lumen in the mare. Instead, we elected to deposit the aliquot of sperm onto the folds of the papilla of UTJ. Recently, Scott et al. described the relationship of sperm and the folds of the UTJ papilla during sperm transport. The study provided evidence suggesting the possible role of the folds of the UTJ as a storage site for sperm prior to its entrance into the oviduct.

5. Conclusions
To our knowledge, this is the first report of successful uterotubal insemination attempts in the literature. Although the number of mares included in this study (ten mares) is small, this study provides preliminary evidence that a low number of spermatozoa can result in pregnancy in the mare if sperm are deposited nonsurgically on the surface of the UTJ ipsilaterally to impending ovulation. This procedure may serve as a possible assisted reproductive procedure for the management of subfertile stallions with a suboptimal number of normal motile spermatozoa or as an alternate procedure for insemination with cryopreserved spermatozoa.

References

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