Comparison of maturation, cleavage and blastocyst rates in equine oocytes recovered by transvaginal aspiration from estrogen-subordinate follicles versus non-estrogen-subordinate follicles

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The in vitro production of equine embryos provides an alternative method for the preservation of valuable genetic lines. To optimize efficiency, oocytes are often collected from donor mares by transvaginal aspiration (TVA) every two weeks during which time the donor mares do not undergo estrogenic stimulation of the estrous cycle. However, the hormonal stage of the mare at the time of TVA of oocytes has been shown to affect the chromosomal and cytoplasmic characteristics of oocytes. Juvenile chromatin and higher mitochondrial activity appear to be more often associated with immature oocytes recovered from new wave follicles as opposed to oocytes from follicles that are under estrogenic stimulation (estrogen-subordinate). The purpose of this study was to determine if there was a difference in maturation, cleavage and blastocyst development rates between oocytes recovered from estrogen-subordinate follicles versus follicles that are not under estrogenic and human chorionic gonadotropin (hCG) stimulation. Our hypothesis was that there is a significant difference based on endocrine stage of the mare cycle. Immature cumulus-oocyte-complexes (COC’s) that were recovered from ovarian follicles <25mm by TVA every two weeks from mares not exhibiting ultrasonographic or behavioral signs of estrus (Group 1; n =301)) and from mares exhibiting signs of estrus 20-22 hours after ovulation induction (Group 2; n =100)) were held overnight at 20°C in embryo holding medium. After 28.5 hours, mature MII oocytes were denuded following exposure to 80iu hyaluronidase and fertilized by ICSI with thawed spermatozoa from a single fertile stallion. Fertilized oocytes were cultured as described by Foss et al. Data were analyzed using the Chi-square test. Although the maturation rate, cleavage rate, blastocyst rate per cleaved and mature oocyte were higher in Group 2 compared with Group 1 oocytes (p = 0.12, p = 0.22, p = 0.27 and p = 0.08 respectively), only the blastocyst production per oocyte recovered rate was significantly increased (p = 0.03) in the Group 2 oocytes. The results of this study suggest that oocytes recovered from estrogen-subordinate follicles are associated with a higher blastocyst production rate when compared with oocytes recovered during nonestrus and thus, may influence optimal timing of TVA of oocytes.

Keywords: Equine; oocyte; intracytoplasmic sperm injection; blastocyst.

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References