

The Effect of Ovarian Cyst Aspiration on the Dairy Cow Pregnancy Rate

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Abstract

In dairy cows' reproduction, ovarian cysts are one of the most significant contributors to infertility, leading to considerable economic losses. The approach to treating ovarian cysts can vary depending on the type of cyst. For follicular cysts, the recommended treatment is the administration of GnRH. In contrast, luteal cysts are typically treated with PGF2 α . This study aims to evaluate the effects of ovarian cyst aspiration on reproduction of dairy cows. For this study, twenty repeat-breeding dairy cows diagnosed with follicular cysts were divided into two groups, each consisting of 10 cows: the OCE group (n = 10) and the OCP group (n = 10). In the OCP group, the ovarian cyst aspiration was performed on the day of cyst diagnosis, while the cows in the OCE group did not receive any treatment for 21 days. Compared to the OCE group, in which 20% registered a spontaneous recovery, in the OCP group, 60% of the cows recovered from the first aspiration, 40% required a second ovarian cyst aspiration. Finally, the pregnancy rate was 40% in the OCP group and 10% in the OCE group. This preliminary result provides the premises for future studies regarding ovarian cysts ultrasound-guided transvaginal aspiration.

Keywords: dairy cow, ovarian cyst, pregnancy rate, therapy.

1. Introduction

Over time, the increase in milk production among dairy cows has been associated with a rise in reproductive disorders. One of the most significant of these is cystic ovarian disease, which has considerable economic implications. While most experts recommend treating this reproductive disorder using the OvSynch protocol, some argue that accurately diagnosing the type of cyst is crucial for selecting the appropriate treatment [1-3].

Recently, we defined ovarian cysts—either follicular or luteal—as anovulatory ovarian

structures with a cavity larger than 20 mm in diameter, occurring in the absence of a corpus luteum. The distinction between follicular and luteal cysts lies in the thickness of their walls: follicular cysts have walls that measure less than 3 mm, while luteal cysts have walls thicker than 3 mm [4]. Thus, for follicular cysts, the recommended treatment involves using a gonadorelin (GnRH) product, while for luteal cysts, prostaglandin F2 α is the suggested treatment. An alternative treatment for ovarian cysts involves the use of intravaginal progesterone implants for a duration of 9 to 12 days. This treatment reduces secretion of LH (luteinizing hormone), resulting in the regression of cysts and the development of a new follicular wave, about 5 days after inserting the progesterone implants [5]. The study by Abdalla et al. [6] found that cows with ovarian follicular cysts experienced an improvement in pregnancy rate when they were

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pre-treated with GnRH until a luteal structure was identified, before starting the OvSynch treatment regimen. However, another study reported a decrease in pregnancy rate following treatment with Pre-GnRH [7].

Although various therapeutic approaches have been explored, there have been limited studies assessing the impact of ultrasound-guided transvaginal cyst aspiration on the reproductive performance of dairy cows. This study aims to evaluate the effects of this treatment on the pregnancy rate of dairy cows.

2. Materials and Methods

A dairy herd of Holstein-Friesian cattle in northeastern Romania was included in this study. During the study period, the average number of lactating cows in the herd was 350, and each cow produced an average of 9,000 kg of milk annually. The cows were housed in free-stall barns with concrete floors and straw bedding. They were fed a Total Mixed Ration twice daily, with access to water available at all times, based on their milk production and size. During the study period, the farm milked about 330 cows, two times a day, at 0400 and 1600, for a daily average of 30 kg milk/cow/day.

For this study the 20 repeat-breeding dairy cows with follicular cysts were divided into two groups of 10 cows each: the OCE group ($n = 10$) and the OCP group ($n = 10$). The OCE group didn't receive any treatment for a period of 21 days. In contrast, the OCP group, which also included cows diagnosed with ovarian cysts, underwent an unconventional therapy: ultrasound-guided transvaginal aspiration of the cysts was performed to drain their contents. An experienced veterinarian conducted all ultrasound examinations for ovarian cysts diagnosis. Ultrasound scanning of the uterus and the ovaries was performed using a 5–7.5 MHz rectal convex probe (Iscan2 Ultrasound Scanner, DRAMIŃSKI S.A., Poland) for ovarian structure evaluation and pregnancy diagnosis. The pregnancy confirmation was based on the visualization of an anechogenic fluid-filled uterine horn and embryo presence, in association with a CL on the ipsilateral uterine horn. The diagnosis of an ovarian cyst was established when follicular structures larger than 20 mm were observed, along with the absence of a

corpus luteum (CL), during two consecutive ultrasound examinations. The first ultrasound examination was performed at the time of anestrus diagnosis, and the second occurred 10 days later.

The ovarian cyst aspiration was performed using an OPU device (Minitube GmbH, Germany) attached to an ultrasound machine (Aloka Prosound 2, Hitachi, Tokyo, Japan) and an aspiration pump (Rocket medical, Watford, England). During the study, cows were balanced between pens by (days in milk) DIM and parity. Calving dates, breeding dates, and DIM were obtained from the AfiMilk management software (AfiMilk, Kibbutz Afikim, Israel). Estrous cows were identified through the AfiMilk (AfiMilk, Kibbutz Afikim, Israel) daily estrus report, and each cow was examined by an experienced veterinarian. Signs that suggested a cow might be in estrus included attempts to mount other cows, chasing the herd mates, restlessness, chin resting, sniffing the vaginas of the herd mates, bellowing, congestion, relaxation and mucus discharge from the vulva. The definitive sign of estrus was confirmed when a cow was observed standing still while being mounted.

Blood samples were collected from both groups of animals to determine serum progesterone levels. After the serum was collected, it was stored at -80°C until the progesterone concentration was measured using the ELISA immunoenzymatic system (Tecan, model Sunrise RC, Männedorf, Switzerland) along with the Bovine ELISA kit. The kit has a sensitivity of 0.188 ng/ml and a detection range of 0.313 to 20 ng/ml (AssayGenie, sensitivity: 0.188 ng/ml, range: 0.313-20 ng/ml).

3. Results and Discussions

Among the various treatment options available, such as manual rupture [8], cystic fluid aspiration [9,10] and hormonal administration [11, 12], the latter method appears to be the most effective [13]. Manual rupture is not recommended due to the risk of hemorrhages and adhesions. In certain cases, minor manipulation of the ovaries can lead to the rupture of the thin-walled cysts. Thus, it's important to avoid excessive force when performing transrectal examinations of dairy cattle [5].

Due to the limited studies on the impact of ovarian cyst aspiration on the reproduction of dairy cows,

this study aims to provide the first preliminary results of this therapeutic approach. Thus, from the total of 10 cases in which ultrasound-guided transvaginal aspiration was performed, four of them (40%) showed recurrence of ovarian cysts and required a new ultrasound-guided transvaginal cyst aspiration. Six cows (60%) from the OCP group showed estrus after approximately 10 days from the first ultrasound-guided transvaginal aspiration, being artificially inseminated 12 hours

after the end of estrus. Of the total cases used for ultrasound-guided transvaginal cyst aspiration, four of them were diagnosed as pregnant at 30 and 90 days after artificial insemination (pregnancy rate = 40%). In the OCE group, two cows showed spontaneous recovery (20%) after ovarian cyst diagnosis, and after artificial insemination procedures, one cow was diagnosed pregnant at first pregnancy check (pregnancy rate = 10%).

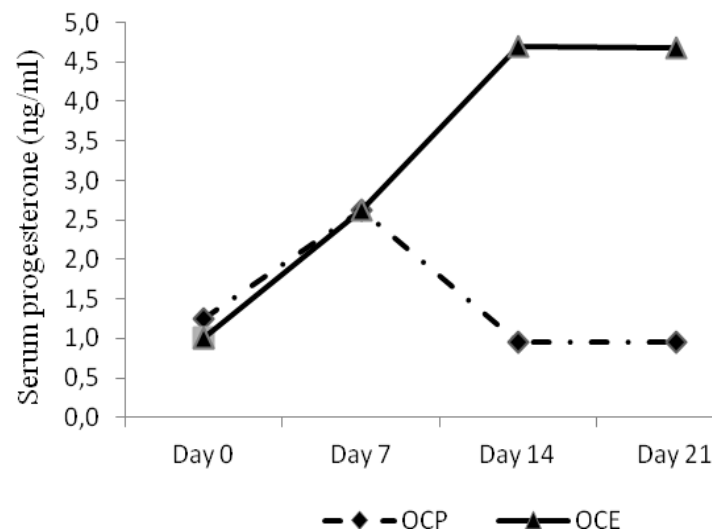


Figure 1. Serum progesterone evolution in OCP group vs. OCE group. Day 0 represent the day of ovarian cysts diagnosis which coincides with ovarian cyst aspiration in OCP group and with no treatment in OCE group.

Regarding the evolution of serum progesterone, it is observed that after the diagnosis of ovarian cysts (Day 0), they registered an increase in concentration levels until day 14 after diagnosis. The upward evolution of serum progesterone in non-punctured ovarian cysts (OCE group) signifies that they evolve into luteal cysts, and anaphrodisia appears as a clinical symptom. In the case of follicular cysts, after their drainage by ultrasound-guided transvaginal aspiration (OCP group), an increase in serum progesterone levels occurs by day 7 after the procedure, followed by its sudden decrease (Figure 1) and the resumption of the sexual cycle. Determinations made from the cystic fluid revealed values above the limit of 20 ng/ml.

4. Conclusions

According to this study, it can be concluded that ovarian cyst treatment by ultrasound-guided transvaginal cyst aspiration can be considered an unconventional therapy for ovarian cysts or cases in which ovulation of the dominant follicle does not occur after the end of estrus. Further studies, with a larger sample size, are necessary to validate the use of ultrasound-guided transvaginal cyst aspiration as a therapeutic approach in dairy cattle reproductive management.

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