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Maintenance of Pregnancy and Evaluation of Subsequent Fertility in Unilaterally Ovariohysterectomized Rabbits

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Abstract: Uterine pathologic changes can occur during pregnancy in rabbits. Unilateral ovariohysterectomy during pregnancy was performed in rabbits and pregnancy maintenance and the subsequent fertility after the operations were evaluated. The operation was performed in second term of pregnancy in 12 New Zealand White pregnant rabbits, weighing 2600-4600 g. Two rabbits were out of study and one rabbit was died during the operation. Five does whelped normally. Although, the number of remained implantation sites and corpus luteums were recorded during operation, precise number of live born fetuses was only observed in one doe. The nine does were mated again and whelped live and healthy fetuses after operation. Unilateral ovariohysterectomy had negative effects on pregnancies but the operation had no adverse effects on length of gestation, the weight of newborns and further fertilities. However, the procedure allows an alternative operation to ovariohysterectomy during pregnancy pathologies in rabbits.

Key words: Pregnancy, cornuectomy, rabbit, implantation, uterine, Turkey

INTRODUCTION

Total ovariohysterectomy or hysterectomy is a regular method in animals to prevent reproduction or to treat some behavior problems and uterine, ovarian pathologies. In rabbits the operation is mostly carried out to prevent unwanted pregnancy, pseudopregnancy, uterine neoplasia, to reduce territorial aggression and other sexually-related behaviors and to treat uterine disorders such as endometrial hyperplasia (Uterine polyps in rabbits), hydrometra, uterine infection, neoplasia and torsion in rabbits (Harcourt-Brown, 2002; Mehler, 2006). The significant shortening of the length of gestation and the number of stillborn pups were recorded after unilateral ovariectomy on 26 days post coitum in rabbits (Chiboka *et al*., 1978).

The difference of genital system in rabbits can sometimes cause pathologic changes during pregnancy (Caliskan *et al*., 2008). In order to remove these alterations total ovariohysterectomy should be performed which ends the breeding life of pregnant rabbits. It was suggested that unilateral hysterectomy could be an alternative to ovariohysterectomy in the case of pathological changes in one uterine horn in dogs (Seyrek-Intas *et al*., 2004).

A unilateral cornuectomy in the second term of pregnancy, parturition and subsequent fertility in rabbits have not been examined so far. In this study, the researchers tried to present a method of unilateral ovariohysterectomy in pregnant rabbits, to get information about ongoing pregnancy, parturition and further fertility of them.

MATERIALS AND METHODS

Animals, breeding and ultrasound examinations: Twelve healthy, 2 years old, New Zealand White rabbits of different Body Weight (BW) of 2.600-4.600 kg were used for this study. Approval of the ethical committee of the Uludag University for using the animals was obtained (2009-07/5). The rabbits were housed individually under day light conditions in cages and were fed a commercial dry food. Water was given *ad libitum*.

The does were placed into a cage of a fertile buck for 24 h. In all cases, the first mating was observed within 20-30 min and this day was designated as day 0 of pregnancy. Pregnancy confirmation was carried out by ultrasonographically (5-7.5 MHz linear array transducer; Dynamic Imaging MCV-Concept, UK) on day 15 after mating. The does were positioned in leg up position for clean imaging. Pregnancy was determined by the detection of gestational sacs and embryonic structures. The does were operated on 19 days of pregnancy.

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Surgical techniques: A combination of xylazine-hydrochloride (5 mg kg^{-1}, Alfazyne 20 mg, Alfasan International BV, Holland) and ketamine-hydrochloride (35 mg kg^{-1}; Alfamine 1000, Alfasan International BV, Holland) were administered intramuscularly for anesthesia induction. Hair was clipped from one ear and after 10 min, a 24 SWG Intravenous (IV) catheter (Abbocath-T; Abbot, Sligo, Eire) was placed in the auricular vein and secured. During anesthesia maintenance, ketamine-hydrochloride (1 mg kg^{-1}) and midazolam (Demizolam 15 mg/3 mL, Delta Select GmbH, Deutschland) (0.02 mg kg^{-1}) were administered intravenously. Pain control was achieved by intravenous injection of Carprofen (Rimadyl Pfizer, Turkey) (3 mg kg^{-1}).

The hair was clipped off and the operation field was swabbed with surgical scrub. Suprapubic incision was made; fat tissue was removed from left ovary and the ovarian pedicle was ligated. Left uterine horn was removed carefully. Ligations were placed on utero-tubule junction, uterine vessels of the left uterine tube and in the distal area of the cervix junction with left uterine horn. The peritoneum, muscles and skin incision were closed with 3-0 absorbable and 2-0 non-absorbable sutures, respectively. The number of implantation sites (Fetus+Placenta) and Corpora Luteas (CL) were recorded on remained gravid horn.

Postoperative birth and breeding: The pregnant rabbits were placed in nest boxes and were daily observed until parturition. About 3 weeks after parturition the does were given to fertile bucks for 24 h and they were mated. Transabdominal ultrasonographic examination was performed on 15th day after mating to confirm pregnancy. The does were observed daily until whelping. The kittens and does were controlled regularly until the kittens had reached the age of 2 weeks.

RESULTS AND DISCUSSION

Two of the does were out of study after operations because of heavy ear fungus and a does was died during the opeartion. Postoperative complications were not observed in nine does. They were housed in intensive care unit and transported to nest boxes 3 days after parturition and observed twice a day. Five does gave birth to live kittens after a mean pregnancy length of 31.4±0.54 (Range 31-32 days).

The number of remained implantation sites during the operation was recorded. Mean number of remained fetuses were 3.7±1.0 (Range 3-5 fetuses) but the mean number of born live kittens were 1.3±1.4 (Range 0-3 kittens). After delivery the number of live born kittens was less than recorded data in four does. The number was precisely the same only in one rabbit. The information about fetuses was shown in Table 1.

Table 1: Information about the fetuses

No. of the rabbit	No. of remained implantation site (Fetus+Placenta)	No. of born live fetus
T1	5	3
T2	2	0
T3	5	2
T4	3	3
T5	5	0
T6	4	3
T7	3	0
T8	3	0
T9	4	1

Table 2: Summary of the reproduction data of unilateral ovariohysterectomized rabbits

Reproduction data	Values
Unilateral ovariohysterectomized rabbits	n = 12 (100%)
Losses (Dead or out of study rabbit)	n = 3/12 (25%)
Abortion after operation	n = 4/9 (44.4%)
Gestation period (Timed from first breeding)	31-32 days
Mated rabbits	n = 9/9 (100%)
Pregnant after mating	n = 9/9 (100%)
Total number of remained fetuses in operation	n = 34
Total number of live fetuses	n = 12
Parturition rate in second mating	n = 9/9 (100%)

About 3 weeks after parturition all does were mated again. Pregnancy confirmations were carried out ultrasonographically on 15th day of pregnancy. The all does remained pregnant, no abortions or any other pathologic conditions were observed and they whelped normal, vital litters after a mean pregnancy length of 31.3±0.8 (Range 30-32 days). Mean litter size was 1.8±0.6. The reproduction information of the does was shown in Table 2.

In this study unilateral ovariohysterectomy was performed during second term of pregnancy in rabbits. These results are only associated with maintaining reproduction ability.

It was reported that removal of a gravid horn or its components could show a significant difference in gestation maintenance (Chiboka *et al*., 1978). Since, ipsilateral ovary related to gravid horn was removed, the effect of unilateral cornuectomy could be a topic of further investigations. On the other hand, recorded number of corpus luteums was precisely the same with the number of fetuses implantated on gravid horn but fewer live fetuses were born. This remains unclear but it could be associated with luteal progesterone deficiency. Since, corpora lutea is the only source of progesterone in rabbits, remaining ovary could probably not increase its hormonal production and this lead the decreasement of number of born fetuses (Chiboka *et al*., 1978).

Further fertilities, nest building and milk ejection were not affected by unilateral ovariohysterectomy during pregnancies. The length of gestation was within physiological range.

The decreased mean number of live born fetuses was observed after unilateral ovariohysterectomy. Seyrek-Intas and others had suggested that dramatically reduced number of delivered fetuses after operation could be attributed to reduced number of ova reaching the uterus which were similar with the results (Seyrek-Intas *et al*., 2004). To the researchers' knowledge there is no information available about the effects of unilateral ovariohysterectomy on ongoing pregnancy, further fertility and parturition, performed during pregnancy.

CONCLUSION

According to the observation and experiences, unilateral ovariohysterectomy during pregnancy had negative effects on ongoing pregnancy. Because of the anatomical differences in genital system of rabbits, it's always possible to meet pathological changes on one gravid horn (Caliskan *et al*., 2008). In these cases unilateral ovariohystectomy could be suggested as an alternative method. It has no adverse effects on length of gestation; the weight of newborns and further fertilities.

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