

Ultrasonographic study of uterine involution in of Awassi ewes in Iraq

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Abstract

A study was designed to evaluate the effect of Prostaglandins (PGF2 α) and oxytocin on postpartum uterine involution of Awassi ewes in Iraq. The study was conducted on 21 pregnant Awassi ewes aged 3-5 years, presented in the farms of college of veterinary medicine during the period from February 2014 to August 2015. The feed and water of the animals were given add-libitum. After parturition ewes divided in to 3 equal groups, (7 animal for each group). The first group treated with 7.5 mg of prostaglandin F2 α . (I.M). The second group treated with (20 I.U) of oxytocin. (I.M) The third group received 2cc of distal water as a control group IM as placebo treatment. The completion of uterine involution was determined by means of transabdomenl and trans rectal ultrasonography. The results showed that uterine involution was completed in the majority of ewes between 28-30 \pm SE day postpartum. Furthermore, the results indicate that uterine involution was completed earlier in PGF2 α treated group than other groups. There was a significant difference. The ultrasonography imaging provide to be a valuable and safe tool in monitoring uterine involution.

Keyword: uterine involution, ultrasonography, Awassi ewes, postpartum.

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دراسة فوتو صوتيه لأوب الرحم لدى النعاج العواسي في العراق

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الخلاصة

أجريت الدراسة لمعرفة تأثير كل من PGF2 α والاكسيتوسين على أوب الرحم في النعاج العواسي في العراق باستخدام تقنية الأمواج فوتوصوتية. اجريت الدراسة على 21 نعجة عواسية حامل تتراوح أعمارها (3-5) عاما تواجدت في حقل كلية الطب البيطري/ جامعة الفلوجة. بعد الولادة قسمت النعاج الى ثلاثة مجاميع متساوية كل مجموعته متكونه من 7 نعاج، المجموعة الأولى حقنت 7.5 ملغم من هرمون PGF2 α في العضلة والمجموعة الثانية حقنت 20 وحدة دولية من هرمون الاوكسيتوسين في العضل أما المجموعة الثالثة فقد اعتبرت كمجموعة سيطرة وحقنت 2 مل من الماء المقطر كعلاج كاذب لتفادي تأثير الحقن على المعاملة. تم تقدير وقت أوب الرحم من خلال استخدام تقنية الأمواج فوت الصوتية (بالطن والمستقيم). بينت نتائج الدراسة ان أوب الرحم قد اكتمل في كل المجاميع في الفترة بين 28-30 \pm SD يوم بعد الولادة وان مجموعة PGF2 α كانت الاسرع تأثيرا في ارتداد الرحم من المجاميع الاخرى. لوحظ وجود فروق معنوية بين المجاميع الثلاث. ان استخدام تقنية الأمواج فوت الصوتية كان وسيلة قيمه وامنه في رصد وتقدير اوب الرحم لدى النعاج قيد الدراسة.

الكلمات المفتاحية: أوب الرحم، فوتو صوتية، الأغنام العواسي.

Introduction

The postpartum period of the ewe begins from parturition by uterine involution since to establish a new pregnancy (1). The completion of uterine involution (U.I) was defined as the day when the uterine returned to the original non-pregnant state (size) as observed in normal estrus cycle (1, 2). Uterine involution occurs in a decreasing logarithmic scale after parturition (3). In the past, there are several techniques used for the study the dynamics of uterine involution in sheep and goats such as Laparotomy, radiography and hormonal measurements (4, 5, 6). These previous techniques are not practical under field conditions (7). Recently applications of trans-rectal ultrasonography can be used under field conditions to determine uterine involution in different animals (8). Trans-rectal Ultrasonography is a useful and reliable method to observe the uterine involution in animal (9, 10). Ultrasonography plays an important role in detecting pregnancy and uterine pathology (11). Uterine involution occurs in a decreasing logarithmic scale after parturition (3). There is a rapid shrinkage and contraction of the uterus, practically during the day 3 to the 10 days postpartum, as determined by measurement of uterine weight and length, diameter of uterine body and previously gravid horn (12, 13). The time estimated for the completion of uterine involution in sheep varies between 17 and 40 day (6, 13, 14). The present study was undertaken to use ultrasonography to detect uterine involution in Awassi ewes under different hormonal therapy.

Materials and Methods

The study was carried out on 21 pregnant Awassi ewes, presented in the farms of college of veterinary medicine, Al-Fallujah university. The age of the animals ranged between 3-5 years with 2-3 parturition. Having similar management conditions and randomly selected from entire farm, the animals were fed green grasses and concentrated diet and supplied with water ad lib, every animal was given an identification number, the study extended from August 2014 to July 2015. After parturition the animals were divided into three groups (each group have 7 animals) ewes were treated as the following: First group injected with 7.5 mg of prostaglandin F_{2α}. (I.M). Second group injected with (20 I.U) of oxytocin.(I.M). Third group injected with 2ml of distilled water as a control group.(I.M, placebo treatment). For each group the following programs were done: For the first 2 weeks after parturition the examination repeated twice weekly: Ultrasonographic examinations were performed on all ewes every 3 days, in the 3rd day scanning was undertaken in dorsal recumbence for trans abdomen scanning using a 5-MHz sector probe for determination of the diameter of uterine horns and observation of uterine contents (7, 15). In the 6th day scanning was done by trans abdomen and trans rectal then trans rectal scanning was done for the following days till the completion of uterine involution. After the removal of fecal material from the rectum with a gloved finger, the rectal probe, made rigid by an extension rod, was gently inserted with reference to the cranial border of the bladder as a position landmark. Diameter of uterine horns was measured at the level of bifurcation by using built-in caliper of the machine, and previously gravid horn was determined based on larger diameter horn by ultrasonography. Ultrasonic images were frozen with the freeze-frame function and were printed on video printer. Uterine involution was considered to be complete when no further reduction in the uterine diameter for three successive examinations was recorded, in addition to absence of lochia in the uterus (13). Differences were considered at 0.05 level.

Results and Discussion

The postpartum uterus showed typical ultrasonographic pattern. The uterine wall and uterine lumen were readily identified by different ultrasonographic echo textures. The end of uterine involution was characterized by a small cross-sectional diameter of uterine horns and absence of lochia in the uterus Fig (1).

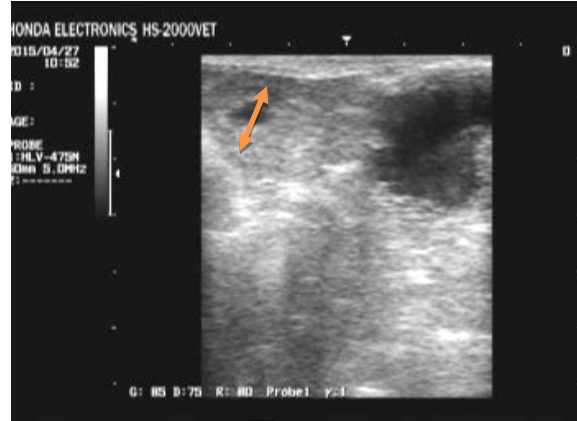


Fig. (1) Ultrasonographic image of complete uterine involution in ewe

There are only few reports on the potential of ultrasound imaging for monitoring of post parturient uterine involution in sheep and goats (9, 13, 16). Most studies on these events were based on gross post slaughter examinations of experimental animals. Postpartum gravid horn diameter, as estimated by trans rectal ultrasonography examination and by Laparotomy in the three groups was shown in Table (1). There was a rapid decline in uterine diameter from day 3 to day 14 pp. During this period, more than 50% of the size of the uterus was reduced. This result agreed with the report of (17) in Farafra sheep, who found an enormous decrease in uterine diameter during first two weeks following parturition (more than 50%). While this result disagreed with the findings in German sheep by (9), who reported more than 80% uterine involution occurred during first 11 days pp. The difference could be due to the variation in breed, climate and management. The diameter of the uterine horn was significantly decreased in ewes treated with PGF₂ α from (6.50 \pm 0.45) cm at the first week pp to (1.12 \pm 0.12) cm at the fourth week pp (28 -30) day after birth. Concomitantly, uterine horn diameter decreased in ewes treated with oxytocin from (6.45 \pm 0.25) cm at the first week pp to (1.70 \pm 0.12) cm at the fourth week pp. in control group the decrease of the uterine horn was from (6.52 \pm 0.31) cm at the first week pp to (1.57 \pm 0.24) cm at the fourth week pp. Uterine horn decreased significantly ($p < 0.01$) in PGF₂ α treated group the first, the second and third week.

Table (1) Postpartum gravid horn diameter in the three groups

Group Date	PGF ₂ α	Oxytocin	Control
7 days	6.50 \pm 0.45 A	6.45 \pm 0.25 A	6.52 \pm 0.31 A
14 days	5.25 \pm 0.44 Bb	5.15 \pm 0.13 Bb	5.80 \pm 0.30 Ba
21 days	2.92 \pm 0.43 Cc	3.45 \pm 0.13 Cb	4.45 \pm 0.44 Ca
28 days	1.12 \pm 0.12 Db	1.70 \pm 0.12 Da	1.57 \pm 0.24 Da
LSD=0.32			
Different capital letters showed significant differences between time and different small letters showed significant differences between different groups ($p < 0.05$).			

The reason for the decrease in uterine horn diameter from week to week due to the contractile action of the myometrium of the uterus, which plays an important role in the disposal of the mucus materials of the uterus pus and remnant of fetal membranes resulting from parturition and return of normal secretory action of the uterus. These results agreed with the observation of (13, 18, 19). Uterine involution occurred at day 22-25 postpartum in group 1 (PGF α treated group), while it occurred at day 24-28 postpartum in group 2 (oxytocin treated group) and at 30 day in the (control group) table (2). The results showed that uterine involution in the group (1) is completed in a shorter time as compared with the group (2) and group (3), which indicates that PGF 2α accelerate the uterine involution in postpartum Awassi ewes and may affect the resumption of the ovarian cycle, these ranges of uterine involution required time were similar ranges indicated by (20, 21). The mean time of uterine involution in Oxytocin treated group show that like PGF 2α the Oxytocin also hastens the process of uterine involution.

Table (2) time require to complete uterine involution

Group	Mean	Range	(\pm SEM)
PGF 2α	24.4	22-25	1.62
Oxytocin	26.5	24-28	1.99
Control	33.3	30-35	1.72

P<0.05
significant difference between different groups

Early expulsion of fetal membranes in the treated group might have been due to prolonged uterine contraction induced by PGF 2α similar effect of prolonged uterine contraction after a single intramuscular injection of PGF 2α have been reported in sheep (22). In general there were no significant differences between the different groups. During the first 2 days postpartum, the uterus was not fully scanned by trans rectal ultrasonography. However, transabdominal scanning allowed a thorough examination and assessment of the involution uterus during this period (Fig.2,3). As the involution uterus was withdrawn into the pelvic cavity, it was not easily accessible by the trans abdominal route. On day 13 postpartum, the uterus became completely inaccessible by trans abdominal scanning because of the small diameter of uterine horns, whereas a detailed trans rectal ultrasonographical examination was easily performed on day 13 postpartum. The ultrasonographic examination on the first 3 day postpartum using the transabdominal approach showed clearly the caruncles, the uterine lumen and wall, (16) used transabdominal and trans rectal ultrasonography to measure the diameters of gravid and non- gravid uterine horns 1, 2, 4, 7, 10, 13, 19 and 25 days postpartum. They reported a strong positive correlation ($r>0.95$) between the post-slaughter outer uterine circumference and ultrasound measurement.



Fig. (2) Transabdominal ultrasonographical examination of uterus (4 days pp) PGF 2α Group (1)

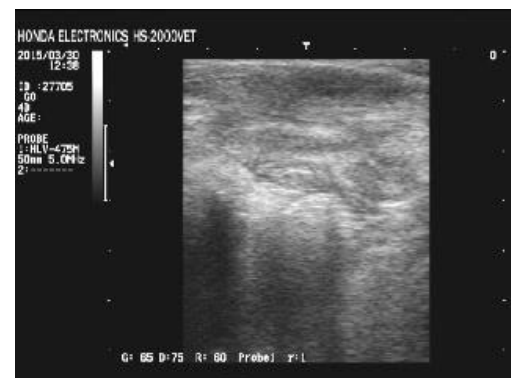


Fig (3) Transabdominal ultrasonographical examination of uterus (4 days pp) group (2) oxytocin

In our study the ultrasound imaging of caruncles was possible until the 10th day pp. Similar observation has been reported regression of caruncles during the first week postpartum by (16). Our data supported the findings of (9), which found that ultrasound imaging and measurement of caruncles were possible until the 8th day postpartum. They reported that the caruncular sizes of (2.02±0.16) cm and (1.24±0.17) cm by the 1st and 8th days postpartum respectively in ewes. The lochia was observed during 4-7 days pp. These findings are similar to the previous reports in sheep (9, 13). Reduced uterine body lumen and amount of uterine fluid were visualized on ultrasonographies performed on different days of the puerperium (1, 3, 6, 9, 12, 15, 20, and 30) (Fig. 4, 5, 6, 7, 8 and 9).



Fig. (4) Transrectal ultrasonography of uterus (8 day pp)



Fig (5) Transrectal ultrasonography of uterus (9 day pp)

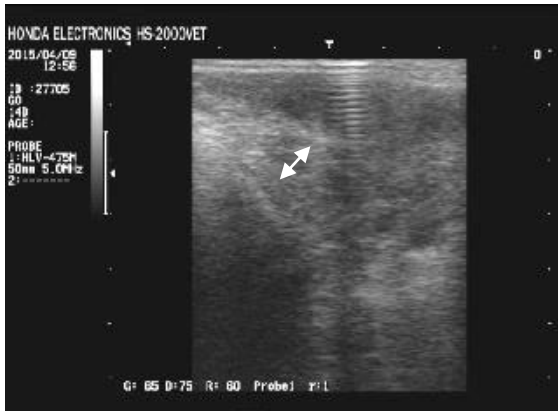


Fig. (6) Transrectal ultrasonography of uterus (14 day pp)

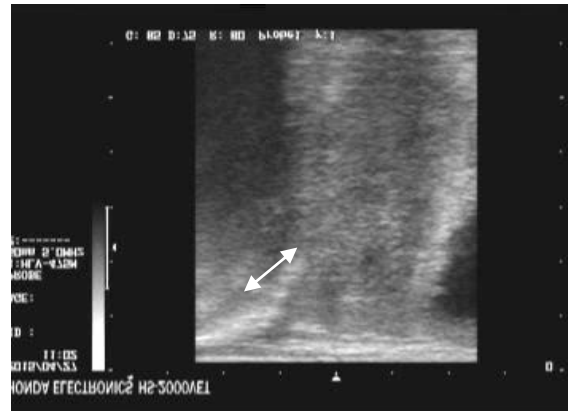


Fig (7) Transrectal ultrasonography of uterus (19 day pp)



Fig. (8) Transrectal ultrasonography of uterus (26 day pp)



Fig (9) Transrectal ultrasonography of uterus (36 day pp)

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