Assessment of uterine involution and onset of ovarian act after caesarean section in small ruminants

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Abstract

The present study was carried out on nineteen pregnant animals "full ter goats and 12 ewes) which were included subjected to caesarean se Twelve of those animals (4 goats and 8 ewes) were bred and housed farm of the faculty of Veterinary Medicine at Sadat city and seven anima goats and 4 ewes) in a private farm on Alexandria- Cairo dessert Ultrasonographic assessment of postoperative uterine involution was c out, examination of the uterus on days 20, 25, 30 and 35 postoperative. Th point of uterine involution was considered as the transverse diameter of u horn ≤2 cm with lack of contents in the uterus. Most animals complete uterine involution between 25 to30 days after the operation. In case of u diameter exceeds 2cm or the lochia present in the uterine lumen; those considered delayed uterine involution. The onset of ovarian activity considered by the first increase in progesterone hormone concentration ≥ ml. Therefore, blood samples were collected from 7 ewes once weekly months after surgery. The blood serum was analyzed for progesterone hor The obtained results indicated that ovarian activity started after two m Progesterone concentration remained low until 58 days postoperative wh level increased to 1.425±. 335 ng/ml and remained high indicating on ovarian activity the postoperative fertility was assessed. Estrus respons 93.75% (15 out of 16), pregnancy rate was 81.25 (13 out of 16) and part rate of the second season was 92% (12 out of 13).

Key words: caesarean reproductive performance small ruminants.

Introduction

Sheep and goats contribute to provide meat, milk, wool, manure and byproducts. Goats are of the most fertile species among domestic anim usually there are no problems with mating and conception rate is high (96- (Majeed and Taha, 1989). Twice-yearly lambing or three lambing in two ye ideal goal of sheep production (Gordon, 1997). Farmers and nomad maint bulk of sheep and goats population in Egypt. The highly expensive rati cattle and the high investment costs attracted the interest for sheep and g meet our needs from animal protein. Since they are considered grazing an Moreover they need a minimum work in management and breeding as v they has high potentiality to convert the low price nutritive materi roughages to animal protein so rising of sheep and goats is highly esse our country. The small animals are often involved in difficult parturition, has to be manually, or surgically corrected for safeguarding of the life c and fetus (Younis, 1989). The postpartum fertility is based mainly on two f the involution of the uterus and the resumption of ovarian activity. For la more frequently than once a year, the postpartum interval to the resump ovarian activity must be reasonably short so that the ewes could b

pregnant again with a minimum of delay. To plan an effective lambing protocol, the time of complete postpartum uterine involution and the onset of ovarian activity must be known. Real-time ultrasound evaluation of small ruminant offers an unparalleled range of information (Haibel, 1990). However, the ultrasonic characterization of the postpartum uterus in sheep is very scanty in the literature. This work was planned to clarify the time of complete uterine involution and the onset and patterns of postpartum ovarian activity in ewes and goats after caesarean section using both ultrasound examination and hormonal analysis.

Material and methods

1. Animals:

A total of nineteen pregnant animals (7 goats and 12 ewes) were included in this study, 12 of them (4 goats and 8 ewes) were bred and housed at the farm of the faculty of Veterinary Medicine at Sadat City and 7 (3 goats and 4 ewes) in a private farm on Alexandria -Cairo desert road.

Those animals aged from 2-4 years and were clinically free from any infectious or parasitic infestation. The animals were classified according to the cause of the operation into experimental (4 does and 8 ewes) and suffering dystocia (3does and 4ewes).

2. Equipments:

The scanner: A real time B and M-mode linear array ultrasound scanner (Scanner 480 – Vet – Scan, Pie Medical Co.) Was used in this study. The scanner was provided with a transrectal linear transducer (5 and 7.5 MHZ) for endo-rectal scanning and thermal paper video-printer (up-895 CE, Sony) used for printing frozen images.

4. Evaluation of progesterone:

Resumption of the ovarian activity was considered by first increase ≥1ng / ml progesterone in the serum followed by normal cyclic activity **(Hoefler and Hallford, 1985 and Mukasa-Mugerwa and Ezaz, 1991)**. Therefore, blood samples were collected from all of the studied animals during the postoperative period every 7 days after one week of the operation until three months for estimation of progesterone level.

Sampling:

Blood was taken by jugular vein-puncture using sterile dry wide gauge needle and allowed to flow freely and gently on the wall of sterile clean test tube. The samples were allowed to clot at room temperature then centrifuged at 3000 r.p.m for 20 minutes. Clear non-haemolysed serum was aspirated from the centrifuge tubes into sterile bottles using sterile Pasteur pipettes. The obtained sera were kept in deep freezer -20 c until hormonal analysis. The progesterone hormone was estimated by **ELIZA-Technique.** Biosource, Europe's, supplied the kits. A., Belgium. The assay was carried following the manufacturer instruction. Computer with M. State statistical program to determine the variation in progesterone in different days postoperative analyzed data.

4. Technique of ultrasonographic examination:-

For ultrasonic examination, the ewe was restrained in a standing position with the help of an assistant. The rectum was evacuated from feces and air with the aid of the lubricated fingers of the assistant or the operator. Thereafter, the transducer with some gel was introduced into the rectum. The transducer was

moved a little bit medially and laterally to get the best view of the exam uterus. The diameter of uterine horn was determined to evaluate the degr uterine involution also the uterine contents were determined to diagnose healthy and diseased condition of the uterus, which in turn determines normal and abnormal purperium.

Uterine involution:

The parameters which were considered for the determination of endpoint of uterine involution included the transverse diameter of uterine ho ≤2 cm and the lack of contents in the uterine cavity. This was done by repe ultrasonographic examination of all animals at 20-25-30and 35 postoperative. All animals were examined regularly with ultrasonograph detect any affection of the uterus after the operation. The animals diagnosed with endometritis were followed up till complete recovery

Assessment of postoperative fertility:

All animals in the experiment were followed up, the following traits evaluated:

Estrus response (number of ewes showing estrus / total ewes x 100).
Pregnancy rate (number of pregnant ewes / total ewes x 100).
Lambing rate (number of ewes lambing /pregnant ewes x 100).

Results

Postoperative Uterine involution

In this study, sonographic examination was carried out on days 20, 2 and 35 postoperative to determine the uterine involution of the operated anir The endpoint of uterine involution was the transverse diameter of the ut horns ≤2 cm and lack of content in the uterine cavity. The postpartum u showed typical ultrasonographic pattern. The uterine wall and uterine lu were readily identified by different ultrasonographic echo textures. The er uterine involution was characterized by a small cross-sectional diamet uterine horns and absence of lochia in the uterus **(Image 1)**. In cases of del uterine involution transverse diameter of uterine horn, exceeded **2 cm** and l was still present in the lumen **(Image 2)**. The average postoperative ut diameters were estimated (Table 1). Most animals completed uterine invol between 25 to 30 days (Table 2)

Table1: postoperative uterine horn diameters as determined by ultrasc examination.

Days of examination	Uterine horn diameters (cm)	
	Mean	Range
20	3.33	1.76-4.8
25	2.65	1.3-3.7
30	2.3	1.1-3.0
35	1.81	1.0-2.8

Table 2:The completion of uterine involution in examined animals at Post-operative days

Examined animals	Days post-operative							
13	20		25		30		35	
	No	%	No	%	No	%	No	%
	2	16.7	5	38.5	10	77	12	93

Progesterone concentration during the postoperative period and postoperative ovarian resumption.

In this study, we measured the progesterone concentration in 7 ewes starting from the second week after the operation until the third month after the operation. Progesterone concentration of ≥1ng/ml was considered as indicator of ovarian activity. The obtained results showed that the level of serum progesterone remained low until 58 days postoperative where the level increased to 1.425 ± 0.335 ng /ml and remained high. Then the progesterone dropped again at day 72 in some ewes and remained high in some ewes, which were suspected to be pregnant.

Serum progesterone levels at three months postoperative in ewes (ng/ml).

Days postoperative	Progesterone X±S.E
7 day	0.13±. 00c
14 day	0.01 ± 0.04^{d}
21 day	0.06 ± 0.07^{d}
28 day	0.25 ± 0.16^{c}
35 day	0.25 ± 0.17^{c}
42 day	0.40 ± 0.15^{c}
50 day	0.57 ± 0.28^{c}
58 day	1.42 ± 0.33^{ab}
66 day	1.11 ± 0.34^{b}
72 day	1.39 ± 0.31^{b}
80 day	1.98 ± 0.42^{a}
90 day	1.38 ± 0.41^{b}

Values in means (X) ± standard Error (S.E).Means with the same letter are not significantly different.A, b, c, d Means with different superscripts were significantly different ($p < 0.05$)

Postoperative fertility

In this study, the animals survived caesarean section 84.21 %(16/19) were followed up. Nine animals were induced to estrus using GnRH-$PGF_2\alpha$- GnRH program to shorten the lambing season. Seven animals were left to come in

estrus without induction. Six animals came in estrus with normal estrus signs and ultrasonographic examination revealed good functioning ovaries (**Image 3**). All animals were hand mated naturally. Moreover, followed up for pregnancy diagnosis, 5animals became pregnant (**Image 4**) and all of them lambed normally. In addition, followed up until lambing in the second season. All those animals lambed normally without dystocia or any problems. .

Postoperative fertility following caesarean operation

Total	Come in estrus		Pregnant at 20-25days		Parturition second season		
16	No	%	No	%	No	%	
	15	93.75	13	81.25	12	92	

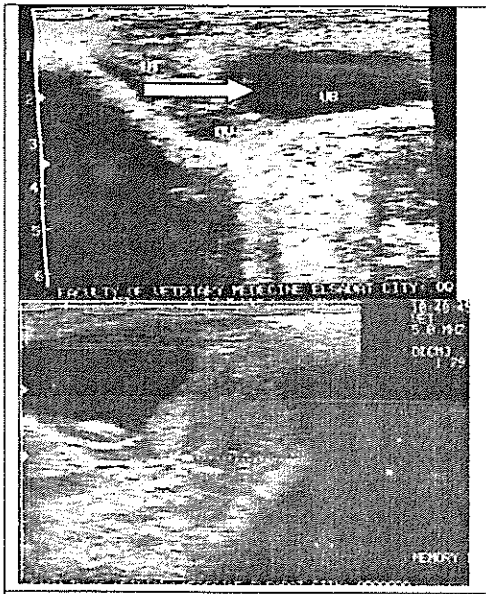

Image (1):
Ultrasound examination of the uterus after complete involution. The diameter of uterine horn ≤2cm (right image) and presence of follicles on the ovary (left image)

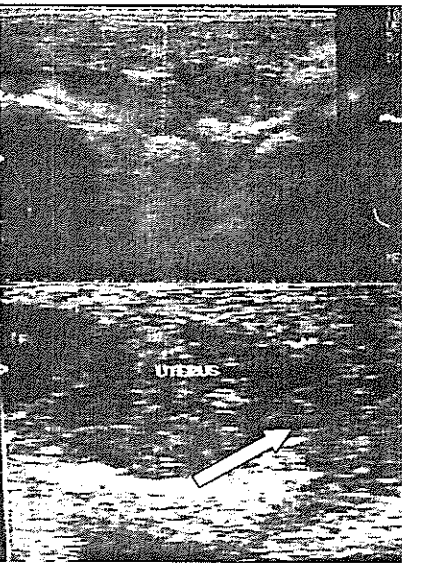

Image (2):
Ultrasound scanning of the uterus at postoperative. Uterine involution completed as the cross-sectional di of the uterine horn is more than 2 cr image) with accumulation of the fluid the uterine lumen (Right image)

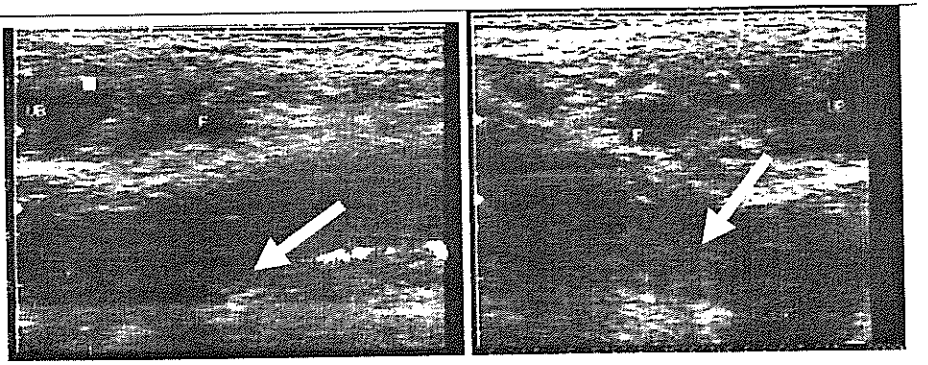

Image (3):
Ultrasonographic examination of the ovaries of ewes in postoperative period. N
presence of follicles indicating functional ovaries.

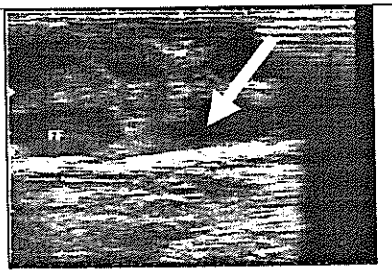

Image (4): Normal pregnancy after natural
following caesarean operation. Notice developed fetus

Discussion

Obstetrical disorders in small ruminants mainly dystocia affect the subsequent fertility, causing economic losses (Majeed and Taha 1995). Because of the small diameter of the pelvic canal, only limited manual manipulation of the fetus to relieve dystocia is possible; thus, caesarean section is often necessary.The caesarean section is probably one of the oldest surgical interventions in the veterinary medicine (Mijten 1996). However, information pertaining to complications and fertility following caesarean section is limited (Brounts et al 2004).

The ability to achieve maximum reproductive efficiency in ewes depends upon understanding postpartum changes of uterus, ovaries and pituitary (Lewis and Blot, 1983). The advantages of real-time ultrasonography are its sensitivity, accuracy, speed and safety. It provides a safe non-invasive method for direct visualization of ovaries, uterus and conceptus (Haibel 1990). Ultrasound examination not only for measuring the uterine dimension, but also it gave information about the nature of the uterine content (Ali et al, 2001). Therefore, Ultrasonographic examination was done in this study before the operation and in

postoperative period. Prior to the operation, fetal movement was visualized i examined ewes. This came with complete agreement with the observatio (Scott and Gessert 2000). Fetal viability and heart beating were detected du late gestation with difficulty and required more time for examination.

The uterine involution completed between 30 to 35 days in most anim This was in accordance with (Greyling and Van-Niekerk, 1991). In contr Rubianes et al, (1993), Rubianes et al, (1996) and Abeneh and Degefa, (2(observed the end of uterine involution approximately at 20 days postpartum. variability regarding the time required for complete uterine involution might re from breed differences, parity of the animal, presence of dystocia, obstet interference, caesarean section and suckling. (Hauser and Bostedt, 2(reported that uterine involution was delayed after caesarean section obstetrical disorders than normal parturition. Castro and Ibarra, (1996) four delay in uterine involution in suckling ewes. Foote, (1971) and Zdunczyk e (2004) reported that the uterine involution was more rapid in primiparous e than pluriparous ewes. Fthenakis, (2004) reported delayed uterine involu after retained placenta in ewes. Peripheral progesterone concentration has b widely used as a vital tool in studying the reproductive physiology in anir (Engeland et al 1997 and Zarkawi et al 1999). No literatures were avail describing the postoperative progesterone profile after caesarean sec Therefore, we compared our results with the results obtained after no parturition.

The level of serum progesterone remained low until 58 days postopera where it increased to 1.425 ±0.335 ng/ml (i.e. ovarian activity occurred a about two months after the operation). Our results were in agreement with reported after normal parturition by (Bosted et al, 1981), (Mukasa-Mugerwa Ezaz, 1991) and (Campbell et al, 1994). All the examined ewes showed a s of ovarian inactivity during the first three weeks after parturition, as indicate the low serum progesterone level. This is identical to the reports of (Sheva al., 1975), (Wright et al., 1980), (Lewis and Blot, 1983) who stated that, plasma progesterone level remained minimal (< 1 ng/ml) during the first t weeks after birth. The endocrine basis of postpartum ovarian inactivity is not understood. The immediate postpartum period in the ewe is characterized gradual recovery of ovarian activity, high prolactin level which gradu decreases after the first week (Lamming, et al., 1974) and a low of LH which increases slowly (Restall and Starr, 1977). Lack of ovarian activity thought to be due to an alteration in the response of the hypothalamic-pitu axis to the negative feedback effect of estrogen, similar to that showr ovariectomized ewes during anoestrus (Legan et al., 1977). The aut suggested that both seasonal anoestrus and postpartum anoestrus may inv suppression of tonic LH due to increased inhibition by estradiol.

It is known that the percentage of ewes responding to estrogen injection wit LH surge increases with the time postpartum Smart et al., (1994). Bartlewsk al., (2000) suggested that during the postpartum period in ewes, suppressio follicular growth was seen in all ovaries that had corpora lutea during pregna Moreover, about 40% of ewes with induced estrous 21 days postpartum v

found to exhibit abnormal luteal function (Wallace et al, 1989). Prolonged postpartum luteal activity might be the result of the high prolactin hormone observed in the first few weeks postpartum (Lamming, et al., 1974). There is evidence that both LH and prolactin contribute to the maintenance of the sheep corpus luteum. Delayed onset of the ovarian activity and cessation of cycle might be due to a negative energy or protein balance. Ewes nursing lambs were often in negative energy balance during the first month of lactation (Robinson et al., 1979). Estrus response was 93.75 %(15/16), pregnancy rate was 81.25 % (13/16), and parturition was 92 % (12/13). These results were comparable to the results in pervious studies. Newman and Anderson, (2004) reported (80-91%) postoperative pregnancy rate in cows. Mosdol, (1986) and Majeed et al, (1993) reported 86 % conception rate after caesarean section in ewes, Veksler-Hess et al, (2003) reported pregnancy rate of 75% and lambing rate of 87.5%. Veksler-Hess et al, (2001) reported 70 % lambing rate post caesarean.

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الملخص العربى

قياس انغماد الرحم وبداية نشاط المبايض بعد العملية القيصرية في المجترات الصغيرة

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أجريت هذه الدراسة على عدد تسعة عشر حيوان عشار "قرب الولادة" وهذه الحيوانات عبارة عن أثنتى عشر نعجة وسبعة ماعز. اثنتي عشر حيوان من هذه الحيوانات (ثمانية نعاج وأربعة ماعز) بمزرعة كلية الطب البيطري بمدينة السادات. بينما سبعة حيوانات (ثلاثة ماعز وأربعة نعاج) في مزرعة خاصة على طريق القاهرة – الإسكندرية الصحراوي. تراوحت أعمار هذه الحيوانات ما بين ٢-٤ سنوات ولا يوجد بهم أية أمراض معدية أو طفيلية. تم فحص الحيوانات بالموجات فوق الصوتية في الأيام ٢٠و٢٥ و٣٠و٣٥ . واعتبر أن نهاية انغماد الرحم عند وصول حجم الرحم لأقل من ٢ سنتيمتر وعدم وجود أية سوائل داخل تجويف الرحم. في معظم الحيوانات حدث انغماد للرحم في خلال ٢٠ إلى ٣٠ يوم بعد العملية. اعتبر بداية نشاط المبايض بزيادة هرمون البروجيستيرون في الدم أكثر من واحد نانوجرام/ مل. تم اخذ عينات من دم لسبعة نعاج بعد العملية كل أسبوع لمدة ٣ شهور. وجد أن الزيادة في هرمون البروجيستيرون بعد ٥٨ يوم إلى ١,٤±٣٣٥. وهذا دليل على بدء نشاط المبايض. ولوحظت النعاج وعند ظهور أعراض الشبق تم التلقيح الطبيعي. وتم فحص الحيوانات لوجود الحمل بعد ٢٥ يوم من التلقيح. كانت نسبة حدوث الشبق ٩٣,٧٥% ونسبة حدوث الحمل ٨١,٢٥% ونسبة الولادة في الموسم التالي ٧٥% .