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# CLINICAL AND BIOCHEMICAL STUDIES ON DYSTOCIA AND RETAINED PLACENTA IN CATTLE

(With 6 Tables)

By

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دراسات أكلينيكية وبيوكيميائية على عسر الولادة واحتباس المشيمة في الأبقار

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أجريت هذه الدراسة في قرى مركزى أبو صوير والفردان التابعة لمحافظة الإسماعيلية – اشتملت الدراسة على ٧٢ بقرة خليط منها ٣٠ بقرة تعانى من عسر الولادة –٣٢ بقرة تعانى من احتباس المشيمة وكذا ١٠ بقرات كانت فيها الولادة ونزول المشيمة طبيعيـا استخدمت كمجموعة ضابطة وقد أوضحت النتائج مايلى: ٤٣٫٧٥% من حالات عسر الولادة ناتجة عـن أسباب متعلقة بالأم مقابل ٥٦٫٢٥% منها ترجع لأسباب متعلقة بالجنين. ٥٠% من حـالات عسر الولادة لأسباب ترجع للأم تم علاجها بحقن هرمون الأسترومات مقابل ٤٢٫٩% منهـا عولجت بإجراء العملية القيصرية. في حين ٧٫١% من هذه الحالات تم العـلاج فيهـا بلـف الحيوان على الأرض لتعديل الالتفاف الرحمى. تم علاج ٦١٫١% من حالات عسر الـولادة لأسباب متعلقة بالجنين من خلال التدخل اليدوى وتصحيح الأوضاع الخاطئة للجنيـن بينمـا أسهمت العملية القيصرية في علاج ١٦٫٧% من هذه الحالات. فقط استخدم أسلوب التقطيـع للجنين في علاج ٢٢٫٢% من هذه الحالات. أوضحت التحاليل المعملية للسيرم وجود نقـص معنوى في مستوى الأستراديول والكورتيزول مع ارتفاع في مستوى البروجسـتيرون فـي حالات عسر الولادة مقارنة بالمجموعة الضابطة. تبين وجود فرق معنوى في طول فترة مـا بعد الولادة وحتى حدوث حمل آخر بين حـالات عسـر الـولادة (١٠٣٫٩± ١٢٫٦ يومـا). والمجموعة الضابطة (٨٣٫٦ ± ٧٫٢١ يوماً). تبين من الدراسة أن حقن هرمون الأسترومات حال إزالة المشيمة يدويا ٢٤ ساعة بعد الولادة هو أفضل العلاجـات لاحتبـاس المشيمة. أوضحت التحاليل المعملية للسيرم وجود نقص معنوى في مستوى السلينيم والكـاروتين فـي حالات احتباس المشيمة مقارنة بالمجموعة الضابطة. تبين وجود فرق معنوى في طول فترة

ما بعد الولادة وحتى حدوث حمل آخر بين حالات احتبـــــاس المشـــيمة (١٢٨٫١٣ ±١٧٫٣٤ يوماً) وكذا المجموعة الضابطة (٨٣٫٦± ٧٫٢١ يوماً).

## SUMMARY

At Abu-Soweir and El-Ferdan villages in Ismailia province, this study invloved 32 dystocias, 30 cows with retained placenta compared to 10 cows did normal calving and placental drop. Maternal dystocia accounted for 43.75% of all dystocias compared to 56.25% due to fetal factors. Dystocia was associated with a high significant (P<0.01) decrease in the serum levels of oestradiol -17β and cortisol compared to a higher concentration of progesterone. An association between high significant (P<0.01) decrease in the concentrations of selenium and β-carotene and retained placenta was found. Response to treatment revealed that estrumate was successful in relieving 70% of dystocias caused by closed or insufficient cervical dilation. Caesarotomy was also successful in relieving 42.85% of maternal dystocia with a maternal death rate 11.1%.16.7% of fetal dystocia was relieved by hysterotomy compared to 61.1% and 22.2% relieved by correction and fetotomy respectively.

For retained placenta, estrumate injection immediately after the manual removal of the retained placenta 24 hours postpartum proved to be the best regime of therapy. Both dystocia and retained placenta were associated with a marked prolongation in the calving - conception interval.

*Key words: Biochemical, Dystocia, Retained, Placenta*

## INTRODUCTION

Parturition is one of the most critical stages of the reproductive cycle of the dairy cow. Calving problems such as dystocia or retained placenta are of major

Economic importance as they can adversely affect the life of the dam as well as future reproductive efficiency in bovine (Erb et al., 1958; Pelissier, 1972; Dubois and Williams 1980; Markusfeld 1987; Stevenson and Call 1988). As most of the periparturient reproductive troubles are

multietiological problems. The figure concerning etiology, response to treatment regimens as well as impact of these problems on subsequent fertility is not completely clear (Dohoo and Martin 1984; Prakash and Madan 1985; Gross et al., 1986 and Stevenson and Call 1988).

Therefore, this study aimed firstly to throw some light on response of cows with dystocia or retained placenta to different treatment regimens as well as impact of such problems on calving - conception interval length and secondly to investigate concentrations of a number of serum parameters which could have a possible etiological significance for dystocia or retained placenta.

## MATERIALS and METHODS

**\*\*Animals:** The material of this study involved 72 private cross bred (Friesian × Native) cows belonging to owners at Abu-Soweir and El-Ferdan villages in Ismailia province during the period form March 1997 till April 1999. The animals were 2.5 to 8 years old.

**(i)** According to the reproductive status, the animals of this work were classified as 32 dystocias cows, 30 cows with retained placenta and 10 cows did normal calving and placental drop as controls. Diagnosis of dystocial was based on the case history, careful vaginal examination as well as rectal examination when necessary. Parturient cows that retained fetal membranes more than 12 hours postpartum were defined as problem cows with placental retention (Roberts 1986).

**(ii)** *Handling or treatment of dystocia*: based on the type of dystocia, treatment regimens for dystocias may be one or more of the following procedures: a) Intramuscular injection of 2ml estrumate (500 µg cloprostenol, PGF2α analogue, Cooper) for 10 dystocias associated with closed or insufficient cervical dilation. b) Correction and traction of faulty alignments in 14 cases of dystocia. c) Fetotomy for oversized dead fetus, emphysematous fetus or fetal monsters in 4 dystocias. d) Detorsion by Schaffer's method of rolling in 2 dystocias with uterine torsion. e) Left flank approach caesarotomy for 9 dystocia cases (4 cows with feto-plevic disproportion, 3 cows with incomplete cervical dilation showed no response to estrumate injection, one cow with non

correctable uterine torsion as well as one cow had posteriorly presented oversized fetus showed no response to correction. Postoperative care including local and/or systemic antibiotics, antihemorrhagics, antipyretics as well as fluid therapy as dextrose 25% or saline were commonly used when necessary. Notes concerning the placental drop were also observed.

(iii) *Treatments of retained placenta*: according to treatment regimens, 30 cows with retained placenta were classified into 3 equal groups as follow: • Group I: in which the manual removal of the retained placenta 24 hours postpartum coupled with 2gm terramycin tablets (oxytetracycline hydrochloride-Pfizer Co.) infused intrauterine. A second dose was be given 24 hours later. • Group II: where each cow received 30mg oestradiol benzoate (Folone ampoules, MISR Co. For PHARM. IND., S.A.A) given I/M after the manual removal of the retained fetal membranes. • Group III: where the manual removal of the retained placenta was associated with I/M injection of 2 ml estrumate.

(iv) Blood samples were collected from 15 dystocial cows, 15 cows with retained placenta and 10 cows did normal calving and placental drop. After centrifugation, the obtained sera were kept at −20°C till being analyzed.

(v) All cows with dystocia, retained placenta as well as controls were examined per rectum and if necessary per vagina, 20 days postpartum to detect any puerperal troubles and to check if the uteri are involuting properly (De Kruif 1976).

(vi) Pregnancy was diagnosed by rectal palpation. The interval from calving to conception was calculated.

** **Biochemical analysis:** The sera collected from dystocia cases were assayed for oestradiol-17β, progesterone and cortisol. For cows with retained placenta, the sera were assayed for oestradiol-17β, progesterone, selenium, alkaline phosphatase and lactate dehydrogenase, enzymes, vitamin A and β-carotene. The sera from controls were assayed for all parameters measured in the sera obtained from dystocia and retained placenta cows.

Determination of serum levels of oestradiol-17β, progesterone and cortisol was conducted according to Kawalsk and Paul (1976); Xing

et al. (1983) and Kubosik (1984) using validated radioimmunoassay (Diagnostic products corporation, Los Angeles, CA).

Serum selenium concentrations were determined by SP9 atomic absorption spectrophotometry (PYE Unicum) using the method of Willis (1960).

Serum levels of alkaline phosphatase and lactate dehydrogenase enzymes were measured according to Wootton (1964).

Serum vitamin A and β-carotene were measured using the principals of Mc Cormic (1986).

** **Statistical analysis:** the obtained data were statistically analysed using statistical analysis system "SAS" (1987).

# RESULTS

**Dystocia:** As shown in Table (1), maternal dystocia accounted for 43.75% of all dystocia cases. 71.4% of the maternal dystocia was associated with incomplete cervical dilation compared to 14.3% with fetopelvic disproportion and 14.3% caused by torsion of the uterus. In the mean time fetal dystocia represented 56.25% of dystocias in this study. 66.7% of fetal dystocia was attributed to faulty disposition of the fetus compared to 16.7% due to emphysematous fetus, 11.1 oversized fetus and 5.5% with fetal monsters. Torsion of the uterus observed in this study was post cervical right torsion in two dystocial cows. One cow with high degree of torsion >180° compared to torsion <180° in the second cow:

Data concerning response to treatment regimens for dystocial cows were presented in Table (2). Left flank cesarean section was carried out on 9 dystocia cases. Out of these cases 4 cows suffering from feto-pelvic disproportion, 3 cows with incomplete cervical dilation showed no response to treatment with estrumate, one cow with posteriorly presented oversized fetus as well as one cow with irreducible uterine torsion. Retained placenta observed in one case of the dystocial cows treated with caesarotomy. The maternal death rate accounted for 11.11% of the group treated with cesarean section.

Estrumate was successful in 70% of the treated dystocias. Complete cervical dilation was achieved within an average of 20.9 ± 14.01 hour post treatment with $PGP_{2\alpha}$ analogue.

Data regarding the impact of dystocia and retained placenta on calving-conception interval length were recorded in table (4). Dystocia was associated with a high significant ($P < 0.01$) increase in days open ($103.9 \pm 12.6$ day) compared to $83.6 \pm 7.2$ days for controls.

*Biochemical analysis:* All data regarding serum levels of oestradiol – $17\beta$, progesterone and cortisol in dystocia cases as well as controls were presented in Table (3). Progesterone concentrations for cows with dystocia were significantly ($P < 0.01$) higher than in the controls. The observed values were $1.43 \pm 0.77$ ng/ml and $0.44 \pm 0.06$ ng/ml respectively. A high significant ($P < 0.01$) decrease in the concentrations of oestradiol-$17\beta$ ($51.6 \pm 11.2$ pg/ml) and cortisol ($0.69 \pm 0.2$ µg/ml) for dystocia cases compared to ($107.87 \pm 18.96$ pg/ml) and ($1.8 \pm 1.02$ µg/ml) for normally calved cows.

**Retained placenta:** In Table (3), response to treatment regimens for cows with retained placenta was noted. Non of the cows received estrumate after the manual removal of the placenta showed puerperal disturbances compared 30% and 40% for those received folone or terramycin tablets respectively.

As presented in Table (4), a high significant ($P < 0.01$) differences in the calving conception interval length between cows with retained placenta followed by puerperal metritis ($128.13 \pm 17.34$ days) and controls ($83.6 \pm 7.21$ days) were found.

*Biochemical analysis:* As noted in Table (4), serum levels of oestradiol $-17\beta$, progesterone, lactate dehydrogenase, alkaline phosphatase, vitamin A and $\beta$-carotene in the retained and not retained placenta cows were summarized. Retained placenta was associated with a highly significant ($P < 0.01$) lower levels of $\beta$-carotene ($123.87 \pm 5.99$ µg/L) and selenium ($1.68 \pm 0.53$ µg/L) than that ($137.32 \pm 4.42$ µg/L) and ($2.68 \pm 0.06$ µg/L) observed in the controls. No significant differences in the serum levels of oestradiol $-17\beta$ progesterone, selenium, lactate dehydrogenase enzyme, alkaline phosphatase enzyme, or vitamin A between retaining and not retaining placenta cows.

## DISCUSSION

**Dystocia:** In accordance with those of Marten and Cox (1968) and Shalaby (1973), our results showed that 56.25% of all dystocia were

attributed to fetal causes compared to 43.75% due to maternal factors. They also added that incidence of uterine torsion ranged between 5-7.3%. Our findings were also in support to those of Friedli (1965) and Sloss (1970) who indicated that 21-41% of all dystocias were due to faulty posture. On the contrary, the obtained results violate previous data showed that uterine torsion accounted for 13.2 to 18.6% of all difficult calvings (Wright 1958; Hazzaa et al. 1987). In that sense, our data disagreed those of Friedli (1965) and Marten and Cox (1968) who found that incomplete cervical dilation accounted for 3-10% of all dystocias. Discrepancies between our results and those mentioned in literature may be attributed to differences in the size of the materials, breeds, parity order and environmental and managemental circumstances between the different studies.

Regarding response to treatment regimens for dystocias, the obtained results indicated that estrumate was successful in 70% of dystocias associated with incomplete cervical dilation that came in line with those of Roberts (1986) who incriminated hormonal dysfunction to be a cause for incomplete dilation of the cervix. In the mean time, dystocia cases that showed no response to estrumate injection could be interpreted as incomplete dilation of the cervix in such animals may be a result of cervical fibrosis caused by trauma inflicted at previous calvings (Sloss and Dufty 1980).

In agreement with those of Sloss (1974), the present study showed that correction and traction were successful in relieving dystocias associated with faulty alignment of the fetus with a percentage of 91.7%. Failure of such procedures to relief dystocia in 8.3% of the treated cases may be explained as the faulty alignment was associated with oversized fetus.

On the other hand, the present results investigated that fetotomy was successful in relieving 22.2% of fetal dystocia associated with fetal monsters and emphysematous fetus with a percentage of 100%. Such findings disagreed those of Sloss (1974) who mentioned that 16% of fetal dystocia was relieved by fetotomy with 17.9% maternal death rate. Such discrepancies may be due to variations in the materials, incidence of forms of dystocia, environmental and managemental circumstances between the studies.

Moreover, the present work revealed that rolling the cow in combination with external abdominal pressure was successful in

relieving 50% of dystocias due to uterine torsion which was lower than previous data stated that such procedure was effective in 90% of the attempted cases (Frerking et al., 1975; El-Naggar 1978). Such variations may be due to differences in the incidence and degree of the uterine torsion between the studies.

Regarding dystocias relieved by caesarotomy, the obtained results declared that hysterotomy was successful in relieving 42.85% of maternal dystocia. Such data were lower than that mentioned 75% of maternal dystocia were relieved by cesarean section (Sloss and Johnston 1967). On the other hand, our results indicated that 11.11% of dystocias treated by hysterotomy showed retained placenta that may violate those of Top and Verdonck (1971) who claimed a higher incidence of retained placenta over 20% following cesarean section. Unfortunately we are not able to interpret such discrepancies.

Concerning the impact of dystocia on subsequent fertility, our study showed a marked prolongation in the calving conception interval among dystocial cows that may in accordance with those of Thompson et al. (1983). Our results were also agreed Debackere et al. (1959) and Vandeplassche (1968) who stated that hysterotomy caused a marked depression of consecutive fertility. In that sense, Barkema et al. (1992) reported that the reproductive problems manifest in a longer interval from first service to conception and in a higher percentage of cows culled because of fertility problems.

***Biochemical analysis***: revealed that dystocia was associated with a higher concentration of progesterone and marked decrease in the concentrations of oestradiol $-17\beta$ and cortisol compared with those of the controls.

These observations were in line with those of O'Brien and Stott (1976) who found that the concentrations of oestradiol $-17\beta$ were lower and the concentrations of progesterone were higher in dystocial cows. Such hormonal profile associated with dystocia could be interpreted as depressing corticosteroids might delay the onset of luteolysis, maintain a high progesterone output and thereby the normal estrogenic preparations of the reproductive tract for parturition.

**Retained placenta:** Concerning response to treatment regimens for retained placenta, the obtained results indicated that the manual removal of the retained placenta coupled with estrumate injection was not

associated with any puerperal disturbances and proved to be the first successful regime for retained placenta compared with any further regimen. The high response associated with this regime could be explained as an injection of estrumate plays an important role in reducing or treating uterine infections throughout enhancing uterine contractions, hasten the uterine involution and/or may have stimulatory effect on phagocytosis by uterine leucocytes (Vandeplassche and Bouters 1983;El-Azab et al., 1988).

Moreover, the present results were in support to previous data incriminated the decreased concentration of PGF2α or lack of the conversion of PGE to PGF2α as a risk factor for retained placenta and recommended administration of PGF2α analogue for treatment of cows with retained placenta (Gross et al., 1986; Osman 1991).

In accordance with those of Dubois and Williams (1980) and Thompson et al. (1983), the obtained results showed that retained placenta was associated with a high significant (P<0.01) increase in days open compared with that of the controls.

***Biochemical analysis:*** In agreement with those of Nezhdanov (1983); Samburov (1985) and Inaba et al. (1986) the obtained results found no significant differences in the concentrations of oestradiol-17β and progesterone between the retaining and not retaining fetal membranes. Similarly our findings, found no association between serum levels of lactate dehydrogenase and alkaline phosphatase enzymes that may disagreed those of Dutta and Dugwekar (1982).

On the other hand, our data showed an association between β-carotene or selenium deficiency and retained placenta that was in accordance with previous findings obtained by Ronning et al., (1953), Eger et al., (1985) and Inaba et al. (1986) who incriminated lack of dietary β-carotene or selenium as a risk factor for the retained placenta incidence. In that sense, Bindas et al., (1984) reported that although it is not clear on the mechanism of β-carotene on retained placenta, it has been suggested that β-carotene itself has a specific role in reproductive efficiency independent of vitamin A. Alternatively, β-carotene may act in placental separation after conversion into vitamin A (Chew et al., 1984).

In agreement with the results of Inaba (1986) the present study found no significant differences in the serum levels of vitamin A

between cows retaining and not retaining placenta that may on contrast with those of Mahfouz (1987) who implicated vitamin A deficiency as a cause for retained placenta. Any how, although we are unable to interpret such variations it is worth to note that the results mentioned above are based only on the peripheral serum levels and that uterine or placental level analysis is necessary before final conclusion (Huang and Marshall 1983).

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**Table (1):** Forms of dystocia

| Type of dystocia | Number of the animals | % |
|---|---|---|
| Incomplete cervical dilation | 10 | 31.25 |
| Uterine torsion | 2 | 6.25 |
| Feto-pelvic disproportion | 4 | 12.5 |
| Faulty posture | 10 | 31.25 |
| Posterior presentation | 2 | 6.25 |
| Emphysematous fetus | 3 | 9.37 |
| Fetal monsters | 1 | 3.13 |
| Total | 32 | 100.00 |

**Table (2):** Response to treatment regimens for dystocial cows

| Treatment regimens | Number of the animals | Response to treatments | Efficiency | Mortality rate | |
|---|---|---|---|---|---|
| Non hysterotomy regimens (hormonal, correction & traction, fetotomy, rolling) | 23 | 18 | 78.3% | - | |
| Hysterotomy | 9 | 8 | 88.9% | 1 | 11.1% |
| Total | | | 32 | | |

*Hysterotomy group comprised 5 dystocial cows showed no response to non hysterotomy regimens plus 4 dystocias with feto-pelvic disproportion.

**Table (3):** Serum levels of oestradiol-17β , progesterone and cortisol in dystocia cases and controls.

| Blood parameters | Animals | |
|---|---|---|
| | Dystocial cases N = 32 | Controls N = 10 |
| Oestradiol −17β "Pg/ml" | 51.61 ± 10.62 [a] 11.19 | 107.87 ± 18.96 [b] |
| Progesterone "ng/ml" | 1.43 ± 0.77 [a] | 0.44 ± 0.66 [b] |
| Cortisol "μg/ml" | 0.69 ± 0.20 [a] | 1.83 ± 1.02 [b] |

*Different superscripts a,b mean highly significant differences ($p < 0.01$).

**Table (4):** Response to treatment regimens for cows with retained placenta.

| Treatment regimens | Number of the animals | Response to treatments | Efficiency % |
|---|---|---|---|
| Manual removal of placenta + intrauterine treatment with antibiotic | 10 | 5 | 50% [c] |
| Manual removal of placenta + I/M injection of 6 ml folone | 10 | 7 | 70% |
| Manual removal of placenta + I/M injection of 2ml estrumate | 10 | 10 | 100% [d] |
| Total | | 30 | |

*Different superscripts c,d mean significant differences ($p < 0.05$).

**Table** **(5):** Serum levels of oestradiol-17β , -progesterone, selenium, alkaline phosphatase, lacatate dehydrogenase, vitamin A and β-carotene in cows with retained placenta and cotnrols.

| Blood parameters | Animals | |
|---|---|---|
| | Retained placetna N = 30 | Controls N = 10 |
| Oestradiol −17β "Pg/ml" | 105.73 ± 20.17 | 107.87 ± 18.96 |
| Progesterone "ng/ml" | 0.40 ± 0.03 | 0.44 ± 0.05 |
| Selenium "μg/L" | 1.68 ± 0.53 [a] | 2.68 ± 0.06 [b] |
| Alkaline phosphatase K.A.Units/L. | 142.22 ± 34.22 | 113.78 ± 29.88 |
| Lacatate dehydrogenase U/L | 930.53 ± 146.9 | 927.20 ± 97.88 |
| Vitamin A "I.U/dl" | 34.02 ± 2.90 | 49.91 ± 4.05 |
| β-carotene "μg/dl" | 123.87 ± 5.79 [a] | 137.32 ± 4.19 [b] |

*Different superscripts a,b mean highly significant differences ($p < 0.01$).

**Table (6):** Effect of dystocia and retained placenta on subsequent fertility (calving-conception interval length).

| Reproductive status | Number of the animals | Calving-conception interval "days open" |
|---|---|---|
| Controls | 10 | 83.6 ± 7.21 [a] |
| Dystocia | 32 | 103.9 ± 12.6 [b] |
| Retained placenta | 30 | 128.13 ± 17.34 [b] |

*Different superscripts a,b mean highly significant difference ($p < 0.01$).