# BIOCHEMICAL CHANGES IN PRIMARY UTERINE INERTIA IN BITCHES

**Prashantkumar[1], A. Krishnaswamy, T.G. Honnappa, V.C. Murthy[2], M. Narayana Bhat and L.Rangnath**

[1]M.V.Sc. Student, [2] Professor & Head, Department of Veterinary Gynaecology and Obstetrics, KVAFSU, Veterinary College, Bengaluru- 560024.

[Received: 14.11.2017; Accepted: 15.5.2018]

{DOI 10.29005/IJCP.2018. 10.1.029-033}

The most common form of uterine inertia in bitches is primary uterine inertia, which appears to be influenced by a significant number of factors and the suggested causes include a deficiency in serum calcium and blood glucose. Magnesium may be of importance when evaluating causes of dystocia, due to its involvement in normal muscular function. Studies were carried out on 40 clinical cases of dystocia in bitches, diagnosed to be due to complete primary uterine inertia, when presented to the obstetrical clinics in Veterinary College Hebbal, Bengaluru. A detailed clinical evaluation was carried out along with estimation of blood glucose, serum calcium and serum magnesium. Hypoglycaemia as a cause of complete primary uterine inertia was not identified in any of the dogs, serum calcium and magnesium levels were also within the normal physiological range.

**Keywords:** Blood glucose, Maternal dystocia, Serum calcium, Serum magnesium, Uterine inertia.

**D**ystocia defined as difficult birth or inability to expel the foetus/ foetuses through the birth canal without assistance constitutes a serious problem in the bitch. It is recorded that, the most common cause of maternal dystocia is uterine inertia, and the most common form of uterine inertia in bitches is primary uterine inertia (Van Den Weijden and Taverne, 1994).

The cause of primary uterine inertia is unknown, although a disturbance in the sequence of hormonal events required for normal labour may represent one possible cause (Bergstrom *et al.*, 2010). Bitches need a large amount of energy to deliver a litter of puppies, many lose their appetites even hours prior to whelping. Contraction of skeletal, cardiac, and smooth muscle cells requires ATP and calcium (Cunningham, 1992). Magnesium causes both smooth muscle relaxation and inhibition of myometrial contraction by both intracellular and extracellular mechanisms (Fomin *et al.*, 2006; Popper *et al.*, 1989). Hence, blood glucose, serum magnesium and serum calcium may be of importance when evaluating the causes of primary uterine inertia.

Therefore, the present study was aimed at estimation of blood glucose, calcium and magnesium in cases of primary uterine inertia in bitches.

## Materials and Methods

Studies were carried out on 40 clinical cases of dystocia in bitches of different breed age and parity, diagnosed to be due to complete primary uterine inertia, when presented to the obstetrical clinics in Department of Veterinary Gynaecology and Obstetrics, Veterinary College Hebbal, Bengaluru. A diagnosis that dystocia due to complete primary uterine inertia was made, if the animal presented had a history and ultrasonic evidence of completion of pregnancy term, complete absence or the presence of very weak signs of first stage of labour, and the presence of greenish or blackish-green lochia on the perineum, vulva or vestibule for at least two hours. In some cases when the history was suggestive of complete primary uterine inertia, but there was no evidence of lochia in the perineum, the anterior vagina was further examined using a rigid vaginoscope to identify the presence of discharges or cervical opening.

### *Clinical evaluation of female dogs with complete primary uterine inertia*

A detailed clinical evaluation was carried out, and the parameters considered for clinical evaluation included the recording of

*Part of M.V.Sc. Thesis*

temperature, pulse and respiration, the colour of vaginal discharges, duration of maternal dystocia, presence or absence of Ferguson's reflex and the assessment of vagina for relaxation. In addition, blood samples were also obtained from each animal before administration of drugs for determination of serum calcium, serum magnesium and blood glucose concentration.

***Temperature, pulse and respiration***

The temperature was recorded in Fahrenheit using a digital clinical thermometer. The pulse and respiratory rate was recorded as number per minute.

***Colour of vaginal discharges***

The colour of the discharge exhibited by the dogs with complete primary uterine inertia was recorded by obtaining the history from the owner, visual inspection of the perineum and vulva and endoscopic examination of the vaginal lumen which was carried out using a rigid fibroptic vaginoscope. The endoscopy also enabled the presence or absence of water bag in the vaginal lumen which could not be identified by digital examination of the vagina and the patency of the cervix. Based on the nature of the vaginal discharges, dogs with uterine inertia were categorized into, exhibiting thick black vaginal discharges, greenish and mucoid vaginal discharges and reddish black vaginal discharges.

***Duration of maternal dystocia in dogs diagnosed as cases of complete primary uterine inertia***

In dogs diagnosed as cases of complete primary uterine inertia, the approximate duration of dystocia was determined as the interval from the time when the owner first observed vaginal discharges to the time of its presentation to the obstetrical clinic for the further treatment. Based on the duration of dystocia, dogs diagnosed as cases of complete primary uterine inertia were categorized into subgroups as dogs in dystocia for two to four hours, four to six hours, six to eight hours and more than eight hours.

***Blood glucose concentration***

In all cases of complete primary uterine inertia, blood samples were drawn into EDTA coated vacutainers and the blood samples were immediately subjected for estimation of glucose. Glucose concentration was estimated using GOD/POD (Glucose Oxidase/ Peroxidase) method and the concentration was expressed as mg/dl. On the basis of blood glucose concentration dogs were categorized as normoglycemic when the blood glucose was between 65 to 120 mg/dl, hypoglycaemic when it was less than 40 mg/ml and hyperglycaemic when it exceeded 120 mg/ml.

***Serum calcium and magnesium concentration***

Blood samples from cases of complete primary uterine inertia were drawn into serum separating vacutainers. The blood samples were allowed to clot and then subjected to centrifugation at 1500-3000 rpm for 15 minutes. The supernatant was then aspirated into serum storage vials and the collected serum samples were subjected for determination of calcium (mg/dl) and magnesium concentration (mg/dl) using the method of Monoreagent Endpoint.

On the basis of serum calcium concentration, the dogs were considered as normocalcemic when the serum calcium concentration was between 9.2 to 11 mg/dl, hypercalcemic when it was greater than 11 mg/dl and hypocalcemic when it was less than 9 mg/dl.

## Results and Discussion

***Clinical evaluation of the female dogs with complete primary uterine inertia rectal temperature, pulse and respiration***

The temperature, pulse and respiratory rates were within normal limits (Table 1) and none of the dogs exhibited any clinical evidence of toxaemia or septicaemia, perhaps due to the fact that they were presented within a reasonably short time after the onset of delivery. These results are in agreement with the findings of Vibha (2012).

**Table-1: Mean temperature, pulse and respiration in bitches (n= 40) with complete primary uterine inertia**

| Clinical parameters | Complete primary uterine inertia |
|---|---|
| **Temperature (°F)** | 101.56 ± 0.18<br>(99.9 to 102.2) |
| **Pulse/minute** | 71.28 ± 0.96<br>(77 to 88) |
| **Respiration rate/minute** | 19.20 ± 0.52<br>(14 to 23) |

***Colour of vaginal discharges in bitches with complete primary uterine inertia***

Eighty per cent of the dogs diagnosed with complete primary uterine inertia exhibited a copious greenish mucoid vaginal discharges at the time of presentation (Table 2), suggesting that dystocia had been existing for a shorter period of time. It was also observed in the present study that the dogs tended to exhibit a mucoid and greenish coloured discharge up to 8 hours after the onset of labour and invariably, live foetuses were encountered on ultrasound examination. Our findings are in agreement to Vibha (2012), who also reported that 82 per cent of bitches with uterine inertia had greenish mucoid vaginal discharge and Narasimha Murthy (2011) who stated that the discharge was greenish / blackish- green in 75 per cent of bithces with uterine inertia.

The vaginal discharges were reddish black in 5 per cent of dogs with complete primary uterine inertia (Table 2) indicating that dystocia had been for a considerable period of time and the possibility of most of the foetus being invariably dead. Ultrasonographic examination of 2 dogs with reddish black discharges failed to reveal any evidence of foetal viability.

**Table-2: Colour of vaginal discharges in bitches (n=40) with complete primary uterine Inertia**

| Nature of discharge | No. of cases | Percentage (%) |
|---|---|---|
| Thick and black | 11 | 15 |
| Greenish and mucoid | 27 | 80 |
| Reddish black | 02 | 05 |

***Duration of complete primary uterine inertia***

Nearly 75 per cent of the cases of complete primary uterine inertia were presented at a considerably advanced stage of uterine inertia (Table 3). The viability of the foetus is dictated by the length of time for which complete primary uterine inertia has been existing and it is reasonable to presume that with increased duration the viability of the foetuses reduced. These results are in agreement with Narasimha Murthy (2011) and Vibha (2012).

**Table-3: Duration of dystocia in bitches (n=40) with complete primary uterine inertia**

| No. of hours | No. of cases | Incidence (%) |
|---|---|---|
| 2-4 | 00 | 00 |
| 4-6 | 08 | 20 |
| 6-8 | 15 | 37.5 |
| >8 | 17 | 42.5 |
| **Total** | **40** | **100** |

***Blood glucose concentration (mg/dl) in dogs with complete primary uterine inertia***

In the present study, the blood glucose concentration was within normal limits in 75 per cent of dogs with complete primary

uterine inertia (Table 4). The rest of the dogs exhibited hyperglycaemia and none of the dogs exhibited any evidence of hypoglycaemia as a cause of dystocia. The results of the present study are in agreement with the reports of Linde- Forsberg and Eneroth (2000) and Bergstrom *et al.* (2006) that dogs with uterine inertia may not be hypoglycaemic as it is commonly believed. On the other hand, hyperglycaemia may be observed in some dogs secondary to high cortisol concentration.

***Serum calcium concentration (mg/dl) in dogs with complete primary uterine inertia***

In the present study, none of the 40 dogs with complete primary uterine inertia had any evidence of hypocalcaemia (Table 4). The results of the present study are in agreement with the reports of Bergstrom *et al.* (2006a) and Vibha, (2012) who have similarly found that the serum calcium concentration was within the reference range in both bitches with normal parturition and bitches with primary uterine inertia.

***Serum magnesium concentration (mg/dl) in dogs with complete primary uterine inertia***

The serum magnesium concentration in all 40 cases of complete primary uterine inertia was ranged between 1.82 to 2.28 mg/dl and the mean concentration was determined as 2.04 ± 0.17 mg/dl (Table 4). These findings are in agreement with Bergstorm, (2009) who analysed the concentrations of magnesium, potassium and phosphorous in bitches with primary uterine inertia and found that they were within the normal reference range with no signs of abnormality.

**Table-4: Blood glucose, serum calcium and serum magnesium concentrations in bitches (n=40) diagnosed as cases of dystocia due to complete primary uterine inertia**

| Parameter | Status | No. of cases | Percent (%) | Mean concentration (mg/dl) |
|---|---|---|---|---|
| **Blood glucose** | Normoglycemic (65-120 mg/dl) | 34 | 75 | 110.74 ± 5.82 (81 to 117) |
| | Hyperglycemic (>120 mg/dl) | 06 | 25 | 141.82 ± 7.85 (134 to 157) |
| **Serum calcium** | Normocalcemic (9.0-11 mg/dl) | 40 | 100 | 10.12 ± 0.48 (9.4 to 10.9) |
| **Serum magnesium** | Normomagnesaemic (1.8-3.0 mg/dl) | 40 | 100 | 2.04 ± 0.17 (1.8 to 2.28) |

## Conclusions

Hypoglycaemia as a cause of complete primary uterine inertia was not identified in any of the dogs, while a few dogs exhibited hyperglycaemia. Serum calcium and magnesium levels were also within the normal physiological range in every dog with complete primary uterine inertia and hypocalcaemia and hypomagnesaemia as a cause of complete primary uterine inertia could not be ascertained. Further, the colour of the vaginal discharges can be used by the obstetrician to approximately determine the duration of dystocia and it can be used as a prognostic indication of foetal viability.

## References


Bergstrom, A., Fransson, B., Lagerstedt, A.S. and Olsson, K. (2006a). Primary uterine inertia in 27 bitches: aetiology and treatment. *J. Small Anim. Pract.*, **47**: 456-460.

Bergstrom, A. (2009). Dystocia in the Bitch: Epidemiology, aetiology and treatment. Ph. D. thesis. Submitted to Swedish University of Agricultural Sciences, Uppsala, Sweden.

Bergstrom, A., Fransson, B., Lagerstedt, A.S., Kindahl, H., Olsson, U. and Olsson, K. (2010). Hormonal concentrations in bitches with primary uterine inertia. *Theriogenology*, **73**: 1068-1075.

Cunningham, J.G. (1992). Fetal and neonatal oxygen transport, In: Cunningham, J.G. Textbook of Veterinary Physiology, 3rd edn., Saunders., Philadelphia, U.S.A. Pp. 516–521.

Fomin, V.P., Gibbs, S.G., Vanam, R., Morimiya, A. and Hurd, W.W. (2006). Effect of magnesium sulfate on contractile force and intracellular calcium concentration in pregnant human myometrium. *Am. J. Obstet. and Gynecol.*, **194**(5): 1384-1390.

Linde-Forsberg, C. and Eneroth, A. (2000). Abnormalities in pregnancy, parturition and the periparturient period. In: Textbook of Veterinary Internal Medicine. Ettinger, S.J., Feldman, E.C., 5th edn., Saunders., Philadelphia, U.S.A. Pp. 1527-1539.

Narasimha Murthy (2011). Comparative evaluation of different methods of management of dystocia in dogs, Submitted to Ph.D. thesis. Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar (Karnataka), India.

Popper, L.D., Batra, S.C. and Akerlund, M. (1989). The effect of magnesium on calcium uptake and contractility in the human myometrium. *Gynaecologic and Obstetric Investigation*, **28**(2): 78-81.

Van Den Weijden, B.C. and Taverne, M.A. M. (1994). Aspects of obstetric care in the dog. *Veterinary Quarterly*, **16**: 20-22.

Vibha (2012). Medical management of primary uterine inertia in female dogs, M.V.Sc. thesis. Submitted to Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar (Karnataka), India.