

Plasma cortisol and blood glucose milieu as an index of stress in buffaloes with uterine torsion

S.P.S. GHUMAN, R.D. SHARMA, S. PRABHAKAR and A.S. NANDA

Department of Veterinary Gynaecology and Obstetrics
College of Veterinary Science
Punjab Agricultural University
Ludhiana, Punjab, 141004.

Uterine torsion is a highly stressful reproductive disorder in buffaloes (Ghuman, 1995; Manju *et al.*, 1985). However, the degree of stress inflicted due to rolling of the dam, employed to detort the uterus has not been evaluated. The dam responds to mild to intense physical stress by releasing glucocorticoids and catecholamins (Axelrod and Reisine, 1984), which may be related synergistically to glucose levels. The present study was therefore, planned to assess the intensity of stress due to number of rolings employed to detort the uterus, by taking into consideration the plasma cortisol and blood glucose milieu as the indices of stress.

Twenty full-term pregnant buffaloes with 12-36 hr old uterine torsion varying from 180 to 360 degree, were the subject of the study. Detorsion was achieved by Sharma's method (Singh and Nanda, 1996) within one to four rolls. Fetai delivery was effected at the time of complete cervical dilatation. Heparinized blood samples were collected through jugular venous cannula before and immediately after detorsion and subsequently at 6.0 hr post-detorsion. Standard procedures were followed for determination of plasma cortisol (Prakash and Madan, 1984) and blood glucose (Frankel *et al.*, (1970).

The pre-detorsion plasma cortisol levels in buffaloes requiring one to two rolls (43.12 ± 6.32 ng/ml; $n = 13$) or three to four rolls (43.73 ± 5.75 ng/ml; $n = 7$) for uterine detorsion increased immediately

after detorsion to 46.75 ± 6.69 and 50.25 ± 5.89 ng/ml, respectively. Thereafter, the levels declined by 48.56 and 16.35 per cent at 6.0 hr postdetorsion in the former and latter groups, respectively. It is evident that relieving the uterine torsion through rolling had a clear impact on the release of cortisol. Also, there is excessive adrenal stimulation due to one to two extra rolls in the latter group which might have led to relatively slower decline in cortisol levels.

Blood glucose showed the increment rise of 0.15 and 2.28 mmol/l immediately after detorsion over the initial levels of 14.54 ± 1.89 mmol/l (one to two rolls) and 12.11 ± 1.95 mmol/l (three to four rolls), respectively. The hyperglycaemic response in the latter group is proportional to the release of cortisol after detorsion process. A high positive correlation ($r = 0.89$) was observed between cortisol and glucose levels in the present study. Stress induced hyperglycaemia is generally ascribed to synergistic action of cortisol, catecholamines and glucogen (Eigler *et al.*, (1979).

Survival rate of the buffaloes requiring one to two rolls and three to four rolls for complete detorsion of uterus was 84.61 and 42.85 per cent, respectively. Increased number of rolls employed to detort the uterus were found to have a deleterious effect on the survivability of the animal (Dhaliwale *et al.*, (1991), which might be due to more

tissue damage and enhanced plasma cortisol levels (Schmidt and Brooker, 1982) that may disturb the normal metabolic homeostasis of the dam.

It is, therefore, obvious from the study that rolling of the dam leads to increased

adrenocortical activity and synergistic increase in glucose concentrations, which can be considered as the two indicators of stress. In addition, achieving the complete detorsion of uterus in more than two rolls may influence the survival of the dam.

REFERENCES

- Axelrod, J. and Reisine, T.D. (1984) Stress Hormones : Their Interaction and Regulation. *Science* 224: 452-459.
- Dhaliwal, G.S., Prabhakar, S., Singh, P. and Sharma, R.D. (1991) Effect of injudicious handling of uterine torsion on survival rate of dam in buffaloes (*Bubalus bubalis*). *Pakistan Vet. J.* 11 (3): 117-119.
- Eigler, N., Sacca, I. and Sherwin, R.S. (1979) Synergistic interactions of physiologic increments of glucagon, epinephrine and cortisol in the dog. *J.Clin. Invest.* 63: 114-123.
- Frankel, S., Reitman, S. and Sonnenwirth, A.C. (1970) In : Grodwohl's Clinical Laboratory Methods and Diagnosis. 7th edn. Vol.I. C.V. Mosby Company, Louis, U.S.A.
- Ghuman, S.P.S. (1995) Studies on stress of dystocia due to uterine torsion in buffaloes. M.V.Sc. Thesis. Punjab Agricultural University, Ludhiana.
- Manju, T.S. Verma, S.K., Gupta, R.C., Mandakhot, V.M. and Krishnaswamy, A. (1985) Profiles of some plasma biochemical constituents associated with uterine torsion and following its correction by laparohysterotomy in buffaloes. *Indian J. Anim. Reprod.* 6: 57-61.
- Prakash, B.S. and Madan, M.L. (1984) Radioimmunoassay of cortisol in peripheral blood plasma of buffaloes peripartum. *Theriogenology* 22 (3): 241-46.
- Schmidt, R.E. and Brooker, L.J. (1982) Effect of different surgical stresses on hematological and blood chemistry values in dogs. *J.Am. Anim. Hosp. Assoc.* 18 (5) : 758.
- Singh, P. and Nanda, A.S. (1996) Treatment of uterine torsion in buffaloes. Modification of Schaffer's Method. *Indian J. Anim. Reprod.* 17 (1): 33-34.