Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6448

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (2):** 872-876 (2018)

International Journal of Pure & Applied Bioscience

Review Article

OPEN ACCESS

Pathophysiological Changes Following Uterine Torsion in Bovines - A Review

A. Thangamani[1*], M. Srinivas[2], B. Chandra Prasad[3]

[1]M.V.Sc Scholar, [2]Professor, [3]Assistant Professor

Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh-521 102

*Corresponding Author E-mail: thangamtamil19@gmail.com

Received: 12.03.2018 | Revised: 18.04.2018 | Accepted: 22.04.2018

ABSTRACT

The bovines are at a high risk of torsion of uterus around last trimester of pregnancy, mostly the start of parturition process. The prevalence of torsion of uterus increases the adrenocortical activity and affects the blood vascular cellular components followed by deteriorate the metabolism of liver, kidney and muscular system. The recorded haemato-biochemical compounds varies according to severity of torsion. Based on the extent of haemato-biochemical alteration, prognosis of dam described. Prognosis of the dam best when duration of torsion is less than 24-36 hours and worsens with the further increase in the time. The present review provides the reader an overview of the pathophysiology and haemato-biochemical changes following uterine torsion.

Key words: *Bovine; Dystocia; Pathophysiology; Prognosis; Uterine torsion*

INTRODUCTION

Incidence of uterine torsion is more in bovine species. Srinivas *et al.*[32], reported that uterine torsion cases in buffaloes about 67-83% of the dystocia presented at the veterinary referral hospitals. clinical consequences of the pathological changes in the uterus appear to be increases with the degree and duration of existence of torsion. Survival of uterine torsion affected bovine depend upon the commencement of vascular compromise followed by alteration in the haemato-biochemical changes. Ghuman,[11] recently reviewed patho-physiological alteration that occur following torsion of uterus. These bio-chemical alteration use as a tool for predicting the prognosis of torsion affected animals[4,2]. A brief mention is made from clinically studied parameters.

Patho-Physiological Changes Following Uterine Torsion:

1. Changes in uterine blood flow: Uterine structures were supplied by middle uterine artery. It can be increases in diameter during pregnancy advances followed by increases the supply of blood to the fetus. Any alteration in the middle uterine artery decreases the blood supply to the uterus culminate uterine changes as well as affect the living fetus.

Cite this article: Thangamani, A., Srinivas, M., Chandra Prasad, B., Pathophysiological Changes Following Uterine Torsion in Bovines - A Review, *Int. J. Pure App. Biosci.* **6(2):** 872-876 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6448

Probably in torsion of uterus compression/strangulation of middle uterine artery and vein which results in disturbance in vascular circulation and increases carbon dioxide (CO_2) tension in the living fetal blood. That makes the fetus uncomfortable results into vigrous movements probably it increases the degree of torsion and further worsen the uterine status, moreover decreases the oxygen supply to the fetus[26].

Limited arterial perfusion and venous outflow in the rotated uterus leads to decreased oxygenated arterial blood to the uterus(Ischemia),decreased oxygen supply(Hypoxia) and cell death causing irreversible changes to the endometrium, myometrium and finally death of the fetus. Prolonged failure of blood supply results in decreases of uterine wall elasticity and viability and culminate the uterine wall becomes necrosed, brittle, fragile and prone to rupture of uterus[11,23]. Inflammatory process can be hastened in delayed treatment of torsion cases, that can cause adhesion of uterus with surrounding abdominal organ and tissues[29]. The extend of uterine damage can be accessed from plasma indicators like haptoglobin and creatine kinase[11]. The level of haptoglobin and creatinine kinase further increased following correction of torsion by rolling of the dam[8].

2. Damage of cervix: Cervix act as a barrier for uterus to prevent infection as well as guard the fetus by tightly closed with cervical seal of pregnancy. Cervix have visco-elastic properties that is responsible for ripening and dilation of cervix at parturition, that can be disturbed following torsion of uterus[6]. Depending upon the degree and duration of existence of torsion, there is variable amount of cervical ischemia leading to hypoxic degeneration of the epithelium of cervix, elastic fibers are markedly fragmented followed by irreparable coagulative necrosis of smooth cells present in the cervical tissues[30].

3. Deterioration of blood cellular components: Clinical reports on the haemato-biochemical value in torsion affected buffaloes have shown marginal differences[22,31]. However haematological indices including mean values of RBC, Hb, PCV, TLC, lymphocyte and nutrophile were significantly decreases in post-detorsion period when compared to late gestation mean values[18]. Relatively large loss of blood (or) accumulation of metabolic waste products causes normocytic normochromic anaemia (decrease in the RBCs, Hb and PCV) in abnormal parturition like uterine torsion[3]. The total leucocyte count (leukogram) of these buffaloes reveals lymphocytopaenia, elevation of neutrophils count and monocytosis in association with decreased esoniophils count[16,3]. Significant increase in monocytes and decrease in mean corpuscular concentration in the torsion affected buffaloes[2]. RBCs are relatively ready to rupture/damage in torsion affected buffaloes and remain so in buffaloes that fails to survive after detorsion. However, in survivors, erythrocytes get stabilized by 18 hours after detorsion due to recovery from stress of torsion[9].

4. Plasma electrolyte concentration: Electrolytes were distributed intracellular and extracellular for maintaining the osmotic gradient between the cells; however they need for body metabolism. If any derangement in the electrolyte status in the body culminate to detoriation of metabolism. Blood metabolic mineral profiles are significantly vary from gestation and early lactation period; moreover among the mineral profiles calcium and phosphorus levels were significantly decrease during early lactation period than pregnant buffaloes[5]. In torsion effected cattle, minor changes can be noticed in plasma ionic calcium, inorganic phosphorus, sodium and potassium ; however decreased level of magnesium in plasma after detorsion indicate poor prognosis[28]. Magnesium (Mg) need for proper function of heart and skeletal muscle, central nervous system and liver. Deficiency of magnesium (Hypomagnesemia) leads to muscle tremor, movement of the animal is decreased followed by pain and recumbency during obstetrical interventions[28]. Rukgauer, opined that precipitating factor for hypomagnesemia are stress of uterine torsion and caesarean, lowering down of renal

threshold for excretion of magnesium due to high dose of intravenous administration of glucose, moreover reduced food intake after caesarean. Buffaloes with low level of plasma calcium about below 8.44 mg/dl did not respond to detorsion by rolling of the dam.

5. Changes in liver function: Uterine torsion indirectly alter the liver and renal function due to excretion of fetal waste products into circulation during fetal death. In normal parturition, not appreciable changes in plasma enzymes[12]. Following torsion of uterus and after its correction by modified schaffer's method or caesarean, the activities of aspartate amino transferase (AST), Alanine amino transferase (ALT), Glutamate dehydrogenase (GLDH), Gamma glutamyl transferase (GGT) and creatine phosphokinase (CK) are increased[15,3].

The increase in plasma AST and muscle specific CK is due to severe abdominal contractions following uterine torsion and its correction[14,12]. Liver specific bio-markers like plasma GGT and GLDH were elevated in torsion affected buffaloes that were subjected to caesarean section[21,12] indicates hepatic dysfunction. No appreciable alteration in cholesterol level in torsion affected buffaloes[9] or concentration of cholesterol are high in some cases[31] that may be due to stress induced increases in adreno-cortical activity and hypothyroidism.

6. Changes in renal function: In uterine torsion, crossing over of broad ligaments lying under the ureter causes constriction of ureter that culminate reduces the urine output and renal functions may be affected[27]. Moreover the presence of stress induced shock, dehydration, decrease in blood flow to kidneys and nephropathy due to toxic substances liberated by dead fetus may cause renal insufficiency culminate decrease in the urea and creatinine elimination[20,3]. Buffaloes with high level of plasma creatinine about above 2.25mg/dl did not respond to detorsion by rolling of the dam.

7. Plasma protein concentration : Most of the plasma proteins are produced from liver. Failure of liver function due to circulatory impairment culminate huge decrease in total plasma proteins and albumin in uterine torsion cases[17,13,3]; However this hypoproteinemia may associated with negative energy balance because of reduced intake of protein content diet[24,25].

8. Plasma Glucose Concentration : Glucose can be produced from non-carbohydrate source is called gluconeogenesis; However in stress condition gluconeogenesis is activated by stress axis followed by release of cortisol and decreased peripheral utilization of glucose which culminate to hyperglycaemia[9,3,7]. Abdulkareem,[1] recorded plasma glucose concentration that showed steady pattern of glucose level that may be due to lack of changes in the absolute rate of maternal gluconeogenesis and glucogenolysis. In fact plasma ketone bodies (acetate, aceto-acetate, beta-hydroxy butyric acid) are elevated in these buffaloes due to failure of utilization of glucose[9].

9. Plasma Cotisol Concentration : Cortisol considered as stress hormone. That can be elevated in stressful event; However huge increase in plasma cortisol which further elevated by 15-30% following detorsion of uterus through conventional method like Modified Schaffer's method[9,3]. Continued presence of stress culminate persistent elevation of cortisol that detrimental for the dam survivability[10].

10. Blood Lactate (bLAC) Concentration : Lactate is intermediate metabolic by-products of carbohydrate metabolism via anaerobic pathway; However blood lactate concentration increased during intense muscular activity. Uterine congestion and necrosis culminate increased production of blood lactate that indicate the severity of uterine damage. It suggesting that bLAC might be useful in diagnosis of torsion severity and prognosis of dam[19].

CONCLUSION

Based on published data it appears that patho-physiology and haemato-biochemical status in uterine torsion affected animals, liver and kidney function tests can used as prognostic indicators and predict the outcome of uterine

torsion. Recently identified biomarker like *blood lactate* gives better prediction of prognosis of dam with uterine necrosis due to severity of uterine torsion. Early presentation to veterinary referral units culminate in good prognosis with high dam and fetal survival. Studies on evaluation certain parameters like blood-gas, acid-base balance, anti-oxidant status must remains the keystone of obstetrical research in bovines with different duration of torsion and fetal dystocia; moreover that may gives better idea about institution of various therapy can improve the likelihood of dam survival after obstetrical interventions.

REFERENCES

1. Abdulkareem, T.A., Some hematological and blood biochemical profiles of Iraqi Riverine buffaloes (Bubalus bubalis) during different gestation periods. *Journal of Buffalo Science*, **2:** 78-84 (2013).
2. Ali, A., Derar, R., Hussein, H.A., Abd Ellah, M.R. and Abdel-Razak, A.K., Clinical, hematological and biochemical findings of uterine torsion in buffaloes (Bubalus bubalis). *Animal Reproduction Science* **126 :** 168-172 (2011).
3. Amer, H.A. and Hashem, M.A., Relationship between clinical and biochemical picture of uterine torsion in Egyptian buffaloes (Bubalus bubalis). The Internet *Journal of Veterinary Medicine* **4:** 1 (2008).
4. Amin, S.M., Amer, H.A., Hussein, A.E. and Hazzaa, A.M., Creatine phosphokinase and aspartate aminotransverase profi les and its relation to the severity of uterine torsion in Egyptian buffalo. *Anim. Reprod. Sci*., **123(3-4):** 163-168 (2011).
5. Ashmawy, N.A., Blood metabolic profile and certain hormones concentrations in Egyptian buffalo during different physiological states. Asian *Journal of Animal and Veterinary Advances* **10:** 271-280 (2015).
6. Breeveld-Dwarkasing, V.N., Struijk, P.C., Lotgering, F.K., Eijskoot, F., Kindahl, H., van der Weijden, G.C. and Taverne, M.A., Cervical dilatation related to uterine electromyographic activity and endocrinological changes during prostaglandin F(2alpha)- induced parturition in cows. *Biology of Reproduction* **68:** 536–542 (2003).
7. Dhindsa, S.S., Gandotra, V.K, Nanda, A.S., Singh, S.P.S., Jindal, R. and Brar, P.S., Effect of duration of dystocia on haematobiochemical alterations in buffaloes. Indian *Journal of Animal Reproduction* **26 :** 117-119 (2005).
8. Ghuman, S.P.S., Kumar, A. and Honparkhe M. A., preliminary study on plasma haptoglobin concentrations in buffaloes following spontaneous or assisted delivery. *Buffalo Bulletin* **28:** 127–30 (2009).
9. Ghuman, S.P.S., Nanda, A.S., Prabhakar, S. and Sharma, R.D., Stress related endocrine and metabolic changes in normally calving and torsion affected buffaloes. *Indian Veterinary Journal* **73:** 1142–46 (1996).
10. Ghuman, S.P.S., Sharma, R.D., Nanda, A.S. and Prabhakar, S., Effect of certain clinical procedures and stressors on plasma cortisol milieu in dystocia affected buffaloes. *Buffalo Journal* **1:** 71–79 (1998).
11. Ghuman, S.P.S., Uterine torsion in bovines: a review. Indian *Journal of Animal Sciences* **80(4):** 289-305 (2010).
12. Hussein, H. and Abd Ellah, M.R., Effects of dystocia, fetotomy and caesarian sections on the liver enzymes activities and concentrations of some serum biochemical parameters in dairy cattle. *Animal Reproduction Science* **105:** 384–91 (2008).
13. Khatri, C.K., Khar, D.K., Singh, J. and Luthra, R.A., Changes in biochemical blood constituents of buffaloes with uterine torsion and the effect of caesarean section and certain post-operative therapeutic measures. *Archiv für experimentelle Veterinärmedizin* **40:** 461–68 (1986).
14. Kraft, W. and Dürr, U., Clinical laboratory diagnostics in veterinary medicine, pp. 6. *Aufl. Schattauer, Stuttgart*, New York (2005).
15. Kuhad, K.S., Sharma, D.K., Prem, S., Nagi, R.S., Bugalia, N.S., Khanna, B.M.

and Singh, P., Serum transaminases in prolonged cases of uterine torsion in buffaloes. Indian *Journal of Veterinary Surgery* **17:** 115 (1996).

16. Malhotra, P., Sharma, R.D. and Singla, V.K., Haematological studies in periparturient and with uterine torsion buffaloes. *Indian Veterinary Medical Journal* **17:** 111–114 (1993).
17. Manju, T.S., Verma, S.K., Gupta, R.C., Manadskhot, V.M. and Krishnaswamy, A., Profiles of some plasma biochemical constituents associated with uterine torsion and following its correction by laprohysterotomy in buffaloes. Indian *Journal of Animal Reproduction* **6:** 57–61 (1985).
18. Mohamed, G.A.A., Abdel naser, E.M. and Hanan, K.E., Preliminary study on lipid profile with relation to total antioxidant capacity and some hematological and biochemical changes of pre-post-partum buffalo heifers at Assiut city. *Assiut Veterinary Medical Journal* **61 :** 159-165 (2015).
19. Murakami, T., Nakao, S., Sato, Y., Nakada, S., Sato, A., Mukai, S., Kobayashi, M., Amada, Y. and Kawakami, E., Blood lactate concentration as diagnostic predictors of uterine necrosis and its outcome in dairy cows with uterine torsion. *J. Vet. Med. Sci*. **79(3):** 513–516 (2017).
20. Noakes, D.E., Parkinson, D.J. and England, G.C.W., Maternal dystocias. Arthurs veterinary reproduction and obstetrics, (Ed.) Noakes, D. E., Saunders Harcourt, *India* (2001).
21. Pearson, E.G., Diseases of the hepatobiliary system. Large Animal Internal Medicine. pp. 837. (Ed.) Smith B P. The C VMosby Co., *St. Louis* (1990).
22. Phogat, J.B., Bugalia, N.S., Verma, S.K. and Singh, I., Plasma cholesterol and haemogram in buffaloes affected with uterine torsion. *Indian Veterinary Journal* **68:** 1048–52 (1991).
23. Purohit, G.N. and Gaur, M., Uterine torsion in buffaloes: a critical analysis. *buffalo bulletin*. **33(4):** 363-378 (2014).
24. Rowlands, G.J., Manston, R., Sturk, A.J., Bussell, A.M., Collis, K.A. and Collis, S.C., Studies on some blood constituents in pregnant buffaloes. *Journal of Agriculture Science Cambridge* **94:** 517–27 (1980).
25. Schönfelder, A., Richter, A. and Sobiraj, A., Prognostic indicators for conservatively incorrectable uterine torsion in the cow. Tierärztliche Umschau **58:** 512–17 (2003).
26. Schönfelder, A. and Sobiraj, A., Etiology of torsio uteri in cattle—a review. Schweizer Archiv für Tierheilkunde **147:** 397–402 (2005).
27. Schönfelder, A., Schoon, H.A. and Sobiraj, A., Macroscopical and histological findings on the uterus in cattle with surgically treated uterine torsion. *Tierarztliche Praxis* **35(G):** 325–34 (2007b).
28. Schönfelder, A., Fürll, M., Richter, A. and Sobiraj, A., Dynamic of the electrolyte concentration in blood plasma of bovines with surgical treated uterine torsion during parturition. *Tierarztliche Praxis* **35(G):** 414–21 (2007c).
29. Sell, F., Eulenberger, K. and Schulz, J., Use of clenbuterol to control dystocia of cattle. *Mh Veterinary Medicine* **45:** 413–17 (1990).
30. Singla, V.K., Roy, K.S., Sharma, R.D., Gandotra, V.K. and Dhaliwal, G.S., Histopathological studies of cervix and vagina in buffaloes suffering from uterine torsion. Proceedings of VIIIth National symposium of Indian Society for the Study of *Animal Reproduction, Anand, Gujrat, India* (1989).
31. Singla, V.K., Sharma, R.D., Dhaliwal, G.S., Gandotora, V.K. and Prabhakar, S., Uterine torsion in cows—an analysis of 34 cases. *Indian Veterinary Journal* **69:** 281–82 (1992).
32. Srinivas, M., Sreenu, M., Lakshmi Rani, N., Subramanyam Naidu, K. and Devi Prasad, V., Studies on dystocia in graded murrah buffaloes: a retrospective study. *Buffalo Bulletin* **26:** 40–45 (2007).