A REVIEW OF CURRENT BOVINE OBSTETRICAL PRACTICES

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ABSTRACT

The dairy animal population especially buffalo suffers from various obstetrical problems, the solution for some of these have been devised and are in process for the others. There is need to understand management factors associated with uterine torsion in buffaloes, the physiological and cardiovascular impact of dystocia. This will help in timely resuscitation of dystocia-affected dam through the use of tranquilizers, glucocorticoids plus anti-oxidants and crystalloid plus colloid based fluid therapy. Huge success has been achieved in cervical massage or intracervical treatment for dilatation of incompletely dilated cervix as well as timely and appropriate handling of an obstetrical case by understanding the importance of time factor. The use of uterine lubricants improves success rate. Fetotomy should be used as preferred obstetrical procedure by making the availability of an appropriate Fetotomy kit and the knowledge of 'Strength-Stamina-Skill' for carrying out fetotomy procedures.

Keywords: Buffalo, Doppler, Fetotomy, Obstetrics, Uterine torsion

For a veterinarian and a dairy farmer, getting a cattle or buffalo pregnant is very tough job, followed by health care during pregnancy. Unfortunately, if an animal suffers from difficult calving at the end of gestation period and the case is not handled properly, then the outcome may be death of fetus or dam or both. This leads to financial and emotional burden on the farmer. In case of survival of dam, if an obstetrical case is handled carefully there will be meagre gynaecological complications later on. In a study, available 34% conception data revealed that 90% buffaloes treated within 36h of occurrence of uterine torsion conceived successfully (Singh *et al.,* 2017). Considering the importance of bovine obstetric care, the present paper has focused on effective strategies that can be adopted for the judicious delivery of a calf and save the life of dam.

Management factors associated with uterine torsion in buffaloes

Uterine torsion is the major cause of dystocia in buffaloes which warrants immediate attention. Various existing suppositions concerning the maternal and the fetal destabilizing factors liable for the occurrence of uterine torsion in buffalo are unrealistic, however some of these have been justified by logical interpretations. Nevertheless, buffalo reared in open housing system and those reared by nomads in open grazing system rarely encounter uterine torsion. In addition, Indian Murrah buffalo imported by Brazil in 1960s and reared in big pastures on hills, never suffer from uterine torsion. In fact, a study involving 570 buffalo farmers revealed that extensively reared buffaloes were at lower risk of uterine torsion as compared to the stall-fed buffaloes (Singh *et al.,* 2017). Daily exercise in the form of walk/ wallowing reduced the risk of uterine torsion. Keeping buffaloes on kacha floor is associated with lower risk of uterine torsion. However, segregation of advance pregnant buffaloes and feeding practices had no impact on incidence of uterine torsion (Singh *et al.,* 2017). This suggests the possibility of poor musculature, due to failure of exercise, in buffalo suffering from uterine torsion as these buffalo usually belong to farmers who rear buffalo in closed/tie housing system. Thus, buffalo farming community can be advised to expose buffalo to free movement for some period of the day so that perineal/abdominal muscles are strong and well

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developed.

Understanding the cardiovascular impact of dystocia

Doppler ultrasonography-aided assessment of uterine blood flow in relation to duration and degree of uterine torsion was carried out in cattle (Singh *et al.,* 2016a). Fourteen dairy cattle with uterine torsion were detorted and fetal delivery was completed within 30 min after detorsion. Six live calves were delivered by cattle having torsion from lesser duration and rest dead calves delivered by dams with prolonged uterine torsion. Whereas the dams of majority of live (n=4/6) or dead (n=5/8) fetus had uterine torsion ≤180° or >180°, respectively. Doppler ultrasonography of middle uterine artery ipsilateral (IpsiUA) and contralateral (ContUA) to the side of torsion was carried out before uterine detorsion for doppler indices viz. blood flow volume (BFV), time-average peak velocity (TAP), resistive index (RI) and pulsatility index (PI). With increase in degree and duration of torsion, BFV in both IpsiUA and ContUA was reduced. In long standing uterine torsion, TAP values were found lower as compared to short duration torsions in both ipsilateral and contralateral uterine arteries. In ipsilateral uterine artery PI (PI-IpsiUA) increased with an increase in duration of torsion. The presence of Pre-diastolic notch in IpsiUA and ContraUA validates the hindrance in blood flow through the vessel and absence of diastole in higher degree and/or duration uterine torsion defined the severity of torsion which further relates to fetal viability (Singh *et al.,* 2016a). This suggested that assessing the blood flow parameters in middle uterine artery in relation to degree and duration of uterine torsion can serve as useful prognostic indicator. The cattle having lesser degree of uterine torsion could have more chances of fetal survival due to lesser alterations in blood flow.

Furthermore, the uterine blood flow during peripartum period in buffalo was associated with shedding of placenta (Singh *et al.,* 2016b). The values of TAP and BFV in the uterine artery recorded at the start of calving process invariably exhibited a decreasing trend by 30 min post-calving which continued till 6 h post-calving. The values of RI and PI in uterine artery ipsilateral to side of pregnancy increased consistently till 6 h post-calving as compared to pre-calving values. At 6 h post-calving, both in IpsiUA as well as ContUA, the values of TAP and BFV were higher, and RI and PI were lower in buffalo that failed to shed placenta within 6 h post-calving in comparison to their counterparts taking >6 h after calving for shedding placenta (Singh *et al.,* 2016b). Thus, the reference values for doppler indices for uterine artery during peripartal period were generated and it was observed that the decrease observed in blood flow in uterine artery was slow in buffalo with delayed shedding of placenta.

Understanding the physiological impact of dystocia

The occurrence of dystocia and the extent of obstetrical manipulations are highly stressful and are directly reflected through an increase in adrenal activity. In dystocia-affected buffalo, plasma cortisol is much higher compared to their normal calving counterparts (41.61±4.18 *vs.* 8.65±1.14 ng/ml; Ghuman *et al.,* 1998). Furthermore, applying uterine detorsion procedures exhibits clear impact on plasma cortisol with excessive adrenal stimulation due to one to two extra detorsion rolls (Ghuman *et al.,* 1997b). The survival rate of buffalo requiring 1-2 or 3-4 rolls for complete detorsion of uterus was 85 and 43%, respectively (Ghuman *et al.,* 1997b). The type of obstetrical procedures also impacts the physiology of the dam. The release of plasma cortisol in buffalo subjected to caesarean was more and for longer duration than their counterparts subjected to fetotomy, thus, leading to poor survival rate in buffaloes following delivery of calf through caesarean section (25-95%) compared to per-vaginal delivery (88-100%; Ghuman and Dhaliwal, 2011).

Resuscitation of dystocia-affected dam

Tranquilizers: Tranquilization of buffalo before detorsion of uterus failed to prevent the stressful impact of uterine torsion (Ghuman *et al.,* 1997a). Moreover,

during post-detorsion period, alleviation of stress was poor in buffalo detorted under chlorpromazine and diazepam tranquilization. In fact, tranquilization with chlorpromazine and diazepam had paralyzing action on skeletal muscles leading to recumbency for longer duration (Ghuman *et al.,* 1997a). This warrants more studies on tranquilization therapy for alleviating the stress of dystocia.

Glucocorticoids plus anti-oxidants: Dystocia affected buffalo administered dexamethasone sodium (40 mg, *i.v.*) before relieving dystocia and subsequently once daily for 2 days postpartum lead to significant reduction in plasma cortisol on Day 1 postpartum, thus suggesting that Hypothalamus-Pituitary-Adrenal axis was responsive to dexamethasone-induced negative feedback during the immediate postpartum period following dystocia (Sathya *et al.,* 2005). A decline in plasma cortisol, erythrocytic malondialdehyde level and superoxide dismutase activity was greater in vitamin E and Selenium supplemented dystocia-affected buffalo (78.62±2.7%, 13.38±9.75% and 28.83±7.72%, respectively) compared to their unsupplemented counterparts (54.33±12.62%, 3.48±4.16% and 17.69±12.93%, respectively; Sathya *et al.,* 2007), thus suggesting that providing antioxidant supplementation is beneficial in reducing oxidative stress in dystocia affected buffalo.

Crystalloid plus colloid based fluid therapy: The delay in handling of dystocia leads to progression of dam towards dehydration and toxaemia due to decrease in plasma and blood volume. Intravenous fluid administration is considered best method for treating dehydrated bovines. In routine dystocia cases, a meager amount of intravenous normal saline therapy (NSS) is used. However, a large amount of NSS is required as the bovines suffering from mild to severe dehydration (8-12%) are recommended around 50-120 ml NSS/kg b wt, which is a huge amount and not practicable to administer due to exuberant cost, catheterization of vein, prolonged restraint and periodic monitoring. The possible way out is the use of large volume of oral fluid (fresh water) with small volumes of intravenous hypertonic saline either with or without Dextran-40 (7.2% HSS @ 4ml/kg + Dextran-40 @10ml/kg + Oral fluid 25L). Intravenous administration of Dextran-40 is necessary to maintain elevated plasma and blood volume for longer durations and thus decrease the degree of dehydration. Thus, it was recommended that administration of fresh water through oral route along with intravenous hypertonic saline and Dextran-40 could be a quicker, practical, easy and effective method for resuscitating the dystocia affected buffaloes suffering from variable degree of toxaemia and hypovolemia, and thereby decreasing their mortality rate (Kumar *et al*., 2009a, b).

Cervical massage or intracervical treatment: The challenge of achieving complete cervical dilatation in successfully detorted uterine torsion affected buffalo carrying dead fetus can be taken care by cervical massage with SCMC, otherwise leaving the soft or moderately soft cervix on its own to dilate will lead to hardening of cervical texture followed by its failure to dilate. In a study, a procedure of manual dilatation of cervix was developed for buffalo in which cervical massage for 15 minutes (3 times at hourly interval) can be carried out using warm SCMC (Honparkhe *et al.,* 2009). Using this procedure, cervix can be dilated in all the buffalo with soft cervical texture, whereas success rate up to 50% can be achieved in buffalo with moderately soft cervix. Out of buffalo with soft cervical texture and not being subjected to cervical massage, only 29% achieved cervical dilatation whereas none of the buffalo with moderately soft cervix achieved cervical dilatation. In the absence of cervical massage, soft cervical texture was converted to hard texture within 24 h following detorsion of uterus and subsequently cervix failed to dilate (Honparkhe *et al.,* 2009). In another study, 24 buffaloes with incomplete dilation after successful detorsion were subjected to different cervical dilation treatments. The complete dilation of cervix occurred in buffaloes (87.5%) treated intracervically with hyaluronidase enzyme, whereas Prostaglandin E1 led to dilation in 62.5% of buffaloes

(Singh *et al.,* 2017).

Timely and appropriate handling of an obstetrical case

Importance of time factor: An obstetrical case handling in the field by quacks is a major constraint behind the poor survivability of bovines. Depending upon injudicious handing, survival rates of torsion affected bovines presented in <36 h, 36-72 h and >72 h of occurrence of torsion are 52-86, 29-74 and 32-62%, respectively (Ghuman, 2010). Cases around lower range of the survival rate are those that are first handled in the field. In fact, survival rate in torsion affected bovine declines linearly (from 87 to 43%) with an increase in duration of uterine torsion (Ghuman, 2010). The duration of uterine torsion and the time taken for complete dilatation of cervix increases the severity of uterine necrosis, fetal putrefaction, maternal toxemia, dehydration, shock and peritonitis. The buffalo that ultimately died following detorsion and the buffalo that delayed the fetal delivery following detorsion had prolonged elevated plasma cortisol as compared to surviving counterparts and the early delivering counterparts, respectively (Ghuman *et al.,* 1998). This warrants creating awareness among farmers and field practitioners' for timely and appropriate handling of an obstetrical case.

Uterine lubricant: The use of adequate amount of uterine lubricant allows the correction of fetal malpresentation and helps in carrying out procedures like fetotomy for successful per-vaginal delivery. In fact, for appropriate handling of dystocia, the importance of uterine lubricant can be understood from the fact that by the time, an obstetrical case is presented in a referral hospital, the birth passage becomes dry due to continuous contraction of the uterus and the previous handling of case through repeated vaginal examination. Moreover, the uterus gets contracted on the fetus following the expulsion of uterine fluid. In the absence of uterine lubrication, fetal delivery through fetal mutations by an obstetrician becomes impossible. Thus, if the birth passage is dry, then copious volume of a non-irritant lubricant like sodium carboxy methylcellulose (SCMC, a commonly available chemical from laboratory chemical suppliers) is required for birth passage lubrication. One per cent solution of SCMC can be prepared by boiling 200 ml of clean water and slowly adding 10 gram SCMC powder while stirring (Ghuman, 2015). Additional clean water can be added while stirring to bring the total volume to a litre. Few crystals of potassium permanganate can be added to the gel solution. This product is extremely slippery, and good footing is essential. A sterile stomach tube and pump are used to gently instill the mixture into the uterine lumen.

Fetotomy as preferred obstetrical procedure

Fetotomy is usually advantageous because dam survival rate is high following fetotomy compared to caesarean, future fertility is not compromised, post-operative complications are less and excessive stress to dam associated with forced traction is avoided (Singh *et al.,* 2013). Fetotomy is usually indicated in case of emphysemated fetus to avoid the risk of peritonitis following caesarean operation as well as in cases of fetal malpresentation that can not be corrected by mutation (Hip-lock, Breech presentation), feto-pelvic disproportion (narrow pelvis, oversized fetus) and in case of partially dilated cervix (Ghuman, 2010). However, it should be considered that fetotomy is a time-consuming process, exhaustive for the obstetrician and there is risk of injury to obstetrician and dam. Moreover, fetotomy should be avoided in case of tear in the birth canal of dam as the tear can be aggravated with fetotomy instruments and may prove fatal for dam.

Fetotomy kit: The non-availability of good quality fetotomy kit is a major constraint and hence some obstetrical cases, which can be relieved through per-vaginal delivery, are subjected to caesarean operation. In the kit, a good quality Thygesen's fetotome is a prime necessity. A poor quality fetotome usually leads to breakage of fetotomy wire due to failure of fetotome to allow free movement of wire. The second major kit

component is a strong and flexible fetotomy wire (27 interwoven steel wires in a group of 3 x 3 x 3 wires) which is required to compete the cut through soft and bony tissues of the fetus (Ghuman, 2014). The non-availability of this fetotomy wire in local market is also a constraint, as the wire needs to be imported. Other important fetotomy kit components are calving rope carrier, guarded knife and eye hooks.

Strength-Stamina-Skill: The perfection in fetotomy depends on technical knowledge, adequate training and experience, correctly designed instruments and proper lubrication. Clinician intending to carry out fetotomy should consider the rule of 3S viz, 'Strength-Stamina-Skill' for completing a fetotomy procedure and the technical knowledge regarding where the cut(s) should be made. If clinician is not familiar with correct technique then the best option is caesarean section (Ghuman, 2010). A common fault is to choose fetotomy only after the birth canal has already been traumatized by unproductive attempts at manual correction. Avoid manipulating dry birth canal as this may lead to uterine rupture and ultimately unsuccessful fetotomy. The obstetrician should ensure that the wire threaded around the fetal part to be amputatd is not crossed or kinked, head of the fetotome is in the correct position, cover fetotome head with a hand and avoid producing sharp skeletal edges as they may damage the birth canal. An assistant is instructed to start the cut by slow, short, to-and-fro arm movements. Longer movements decrease the amount of heat generated and spread the wear on the wire. Minimize the number of cuts required for delivery of all the fetal parts. This will shorten the intervention time and permit a less traumatic delivery of dead fetus.

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