Progressive Research 9 (Special) : 538-540 (2014) *Society for Sci. Dev. in Agric. and Tech.*

ALTERATIONS IN UTERINE LUMEN MICROBIAL DYNAMICS DURING POST-CESAREAN PERIOD IN BOVINES

S.S. Dhindsa[1] and G.S. Dhaliwal[2]

[1]Department of Animal Genetics and Breeding, [2]Department of Veterinary Clinical Complex
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab 141004 India

ABSTRACT

A total of 84 uterine swabs were collected from 41 dystocia affected bovines subjected to cesarean section, out of which 41 swabs were taken at the time of surgery, 24 swabs on day 6 post-cesarean and 19 swabs between days 30 to 40 post-cesarean. Cultural evaluation revealed presence of bacterial isolates belonging to 7 different genera. At the time of cesarean, the most common bacteria were *Escherichia coli, Pseudomonas* sp. and *Proteus* sp. Between days 30 to 40 post-cesarean, *Arcanobacter pyogenes* was the predominant (P<0.05) bacterium and *Proteus* sp. had diminished (P<0.05) compared to the day of cesarean. Severe alterations in uterine lumen microbial dynamics warrant appropriate antimicrobial therapy to combat uterine infections, toxemia, peritonitis and formation of uterine adhesions following cesarean section in bovines.

Key words : *Bovine, cesarean section, drug sensitivity, uterus*

Due to repeated vaginal examination, the uterus of dystocia affected animals is highly exposed to microbial contamination compared to normal calving (1). Cesarean section is a well known surgical procedure which is usually performed in dystocia affected animals when other obstetrical procedures have failed (2). However, bovine cesarean section remains associated with post-operative complications like peritonitis, impaired fertility and higher mortality rate, despite the fact that a variety of microbial treatments are available which are familiar to most veterinarians (3,4). Therefore, this study was planned to assess the uterine lumen microbial dynamics at the time of cesarean section and the alterations in microbial dynamics during the post-cesarean period. In addition, the drug sensitivity test was also carried out on the uterine swab samples.

MATERIALS AND METHODS

The initial uterine swab sample was taken from forty-one dystocia affected bovines (31 buffaloes and 10 cattle) at the time of uterine incision during cesarean section. Thereafter, with the help of a sterilized intra-uterine swab catheter, uterine swab samples were taken on day 6 (n=24) and between days 30 to 40 post-cesarean (n=19). Uterine swabs were individually streaked onto 10% sterile sheep blood agar plates and incubated at 37°C. After 18-24 h of incubation, individual colonies appearing on these plates were picked up for their morphological and cultural characteristics and identified by biochemical tests (5). The in vitro susceptibility test for various isolates was done using filter paper discs, impregnated with antibacterial drugs (Hi-media, Mumbai). The test was carried out against different chemotherapeutic agents by standard disc diffusion technique (5). Interpretation of results was done according to the specifications laid in the zone size interpretation chart supplied with discs by the manufacturer. The percentage of bacterial populations observed on different days was subjected to student's t-test (6). Statistical analyses were performed using MINITAB release 13.2 statistical software (Minitab Inc., State College, PA, USA).

RESULTS AND DISCUSSION

The uterine swabs collected from all the dystocia affected bovines subjected to cesarean operation revealed bacterial isolates belonging to seven genera viz., *Arcanobacter pyogenes, Escherichia coli, Pseudomonas sp., Staphylococcus aureus, Bacillus sp., Klebseilla* and Proteus sp. (Table-1). At the time of cesarean, the most common organisms were *Escherichia coli, Pseudomonas* sp. and *Proteus* sp. The other bacteria in decreasing order of their occurrence were *Arcanobacter pyogenes, Staphylococcus aureus, Bacillus* sp. and *Klebsiella* (Table-1). The observed high proportion of bacterial isolates suggested that dystocia predisposed the uterus to invasion by microorganisms, which could have been introduced into the uterus due to repeated vaginal examination. Others have also reported higher

Table-1 : Alterations in the percentage of various uterine lumen microorganisms.

Microorganism	Percentage			Drug Sensitivity	
	Pre-CS	Day 6 post-CS	Day 30-40 post-CS	Sensitive	Resistant
Arcanobacter pyogenes	12.5	11.4	40.0aa, bb	G, E, S, Amoxy, P	T, A, N, F
Escherichia coli	26.5	22.3	20.0	G, E, N, F, T, S, P	Ampi, Amoxy
Pseudomonas sp.	15.0	13.6	16.0	G, E, Ampi, Amoxy, S, P	T, F, N
Staphylococcus aureus	12.5	15.9	12.0	G, Amoxy, E, F, P, S	T, Ampi, N
Bacillus sp.	11.2	11.4	8.0	G, S, P, E, F	T, N, Ampi, Amoxy
Klebseilla	7.5	11.4	4.0	G, F, Amoxy, E, T	N, Ampi, P, S
Proteus sp.	15.0	9.1	0.0aa	G, E, S, P, Amoxy	Ampi, T, N, F

aa, bb $P<0.05$: significantly different within row from pre-CS and day 6 post-CS, respectively

CS = Cesarean section, Ampi = Ampicillin, Amoxy = Amoxycillin, E = Enrofloxacin, F = Furazolidone, G = Gentamycin, N = Nitrofurantoin, P = Penicillin, S = Streptomycin, T = Tetracycline

incidence of microorganisms especially *Escherichia coli* in the uterus of dystocia affected cattle and buffaloes (7,8).

Compared to the day of cesarean, uterine infection was still persisting on the day 6 post-cesarean as revealed by the absence of difference ($P>0.05$) in proportion of bacterial isolates (Table 1). This could be attributed to trauma and contamination of the uterus during handling of abnormal calvings. Uterine swabs collected between days 30 to 40 post-cesarean revealed *Arcanobacter pyogenes* as the predominant bacterium, followed by *Escherichia coli, Pseudomonas, Staphylococcus aureus* and *Bacillus* (Table 1).

Between days 30 to 40 post-cesarean, the population of *Arcanobacter pyogenes* was increased ($P<0.05$) in comparison to the day of cesarean (Table-1). In the uterine lumen, *Escherichia coli* was reported to be localized only during early post-partum, while Arcanobacter pyogenes was the pathogen of chronic endometritis (9). The cattle which developed endometritis were reported to have *Escherichia coli* and *Arcanobacter pyogenes* as the main microorganisms (10), which is in accordance with the present results which detected major population of *Escherichia coli* and *Arcanobacter pyogenes* between days 30 to 40 post-cesarean (Table-1). Furthermore, Bacillius and Staphylococci were rarely responsible for endometritis while Klebsiella and Proteus were not the uterus pathogens (11). Similarly, in the present study, between days 30 to 40 post-cesarean, the uterine lumen population of *Proteus* sp. was decreased ($P<0.05$) in comparison to the day of cesarean (Table 1).

With regard to drug sensitivity of uterine organisms in the present study, Gentamycin followed by Enrofloxacin, Amoxycillin, Streptomycin and Penicillin were the sensitive drugs (Table 1). However, Tetracycline followed by Ampicillin and Nitrofurantoin were found to be resistant. Similar findings have been reported by other researchers (7,12).

CONCLUSION

Severe alterations occur in uterine lumen microbial dynamics during post-cesarean period in bovines which warrant immediate and appropriate antimicrobial therapy to combat development of uterine infections, endotoxemia, peritonitis and uterine adhesions following cesarean section in bovines.

REFERENCES

1. Jadon, R. (2003). Studies on uterine microbial flora and their treatment in dystocia affected buffaloes. *M.V. Sc. Thesis. Punjab Agricultural University,* Ludhiana, India.
2. Dhindsa, S.S.; Dhaliwal, G.S. and Ghuman, S.P.S. (2008). Biochemical alterations in bovines due to caesarean operation with reference to suture material and intra-peritoneal lubricant. *Indian Journal of Animal Sciences, 78 :* 1082-85.
3. Barkema, H.W.; Schukken, Y.H.; Guard, C.L.; Brand, A. and Vander, W.G.C. (1992). Fertility, production and

culling following caesarean section in dairy cattle. *Theriogenology, 38 :* 589-94.

4. Dhindsa, S.S.; Dhaliwal, G.S.; Sood, N.K. and Ghuman, S.P.S. (2009). Blood biochemical and uterine tissue alterations in relation to duration of dystocia in caesarean-operated bovines. *Indian Journal of Animal Sciences, 79 :* 30-33.
5. Quinn, P.J.; Carter, M.E.; Markey, B.K. and Carter, G.P. (1994). Clinical Veterinary Microbiology. Wolfe Publishing, an imprint of Mosby-Year Book Europe Ltd. Printed in Spain by Grafos, S.A. Arte Sobre papel.
6. Dytham, C. (1999). Choosing and Using Statistics, A Biologoist's Guide. Vol. 2. *Blackwell Science Press,* London.
7. Sobiraj, A.; Draeger, K.G. and Bostedt, H. (1987). Influence of the course of parturition and placental expulsion on the bacterial content of the bovine uterus with particular reference to changes in drug resistance of bacteria after repeated local antibiotic treatment. *Zuchthygiene, 22 :* 173-183.
8. Singh, R. (1998). Studies on uterine histopathology and microflora after different medications in dystocia affected buffaloes. *M.V. Sc. Thesis, Punjab Agricultural University,* Ludhiana, India.
9. Rutter, B.; Russo, A.F. and Capdevielle, E.F. (1999). Isolation of bacteria from dairy cows after normal parturition and assisted parturition with puerperal disorders. *Vet Argentina, 16 :* 731-739.
10. Zerbe, H.; Badnik, C.O.; Libold, W. and Schuberth, H.J. (2002). Lochial secreation of E. coli or Arcanobacter pyogenes infected bovine uteri modulate the phenotype and the functional capacity of neutrophilic granulocytes. *Theriogenology, 57 :* 1161-1177.
11. Laven, R.A.; Biggadike, H.J.; Proven, M.J. and Tickle, L.R. (2000). Changes in vaginal microbiology associated with the use of progesterone releasing intra vaginal devices. *Veterinary Record, 146 :* 760-762.
12. Singh, M. (1991). Studies on changes in blood and ruminal functions in buffaloes with dystocia. *M.V. Sc. Thesis, Punjab Agricultural University,* Ludhiana, India.