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Incidence of Fetal Monstrosities in India: A Review

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Abstract

Dystocia may be defined as process of delayed or prolonged calving resulting from severe assisted extraction or any fetal abnormalities. Injudicious handling of dystocia cases usually leads to large economic loss in terms of decreased productivity, increased morbidity and mortality. It has a considerable impact on production and future reproduction of dairy and beef animals. There are many fetal abnormalities like monsters, fetal ascitis and fetal maldispositions which are alone responsible for 5-10% of dystocia cases in bovines. Fetal monstrosities has long been recognized as a cause of dystocia in animals and humans. This is incompatible with life. This review focuses on the cases of different types of fetal monsters, its incidence and treatment done in bovines. It becomes difficult to deliver such fetuses because of their altered shape. These monsters are rare in cattle, but a large number of monstrosities have been reported in river buffalo; overall incidence is low.

Keywords: Bovine, dystocia, monsters, twins, fetotomy, caesarian section

Fetal dystocia is a condition in which there is abnormal size of fetus or position result in difficult calving. It is a leading cause for major losses among high producing animals like cattle and buffalo due to large numbers of abortion cases occurring routinely. There may be 2-23% of cows in a herd that require farmer or veterinarian assistance in difficult calvings (Mee, 2008). Dystocia is responsible for unpredictable reproductive event resulting in increased risk of calf morbidity and mortality (Bicalho *et al.* 2007;

Lombard *et al.* 2007), reduced fertility (Maturana *et al.* 2006; Tenhagen *et al.* 2007) and milk production (Berry *et al.* 2007; McGuirk *et al.* 2007) as well as pose risk to dam survival (McClintock, 2004; Bicalho *et al.* 2007). This condition can be diagnosed by examination, ultrasonography or delayed non responsive labor and can be treated using physical maneuvers like Fetotomy or Cesarean section. Among these one of the causes of dystocia is monstrosities in fetuses. Fetal monster is defined as fetus or infant with such pronounced developmental anomalies as to be grotesque and usually nonviable. These fetuses are suffered from either physical abnormalities or nervous disorders. Various predisposing genetic and environmental factors are responsible for these congenital abnormalities (Purohit *et al.* 2012). Chromosomal abnormalities are present in intergenerational and intragenerational patterns of inheritance such as the common simple autosomal recessive, e.g. syndactyly in cattle. These difficulties are difficult to detect and need modern molecular tools for identification of defective population like RFLP, Genotyping and Sequencing. Environmental causes responsible for dystocia can be just treated by preventing exposure of animal to these agents like maternal nutritional deficiencies, teratogenic drugs or chemical exposure, viral infections, toxic plant, radiology, rectal palpation for gestation diagnosis and toxic effects of any kind that dam would be exposed to during the early stage of organogenesis. The aim of this review is to list the incidence of different fetal monstrosities which have resulted in dystocia and their management perspectives.

Types of Fetal Monsters

1. Conjoined twins: There are numerous monstrosities reported in cattle and buffalo but not all result in dystocia. The most common group of monsters is coinjoined twins which arise from incomplete divison from fertilized ovum. These twins may vary from partial separation to complete duplication of two individuals. These cases are suspected when an apparently normal birth cannot be delivered as anticipated. The degree of variation has lead to formation of several forms like twins joined at or near sternum (thoracopagus) (Bhoi, 2009), twins connected at sacrum (Pygopagus), twins united at heads (Craniopagus) and twins joined at pelvic region and heads in opposite directions (Ischiopagus), partial duplication of the cranial and caudal parts of the conjoined fetuses can occur. Monocephalus monsters have partial duplication of the frontal region, nose and mouth, and are called diprosopus or double face. Monocephalus condition had been reported by Sinha *et al.* 1984 and Sharma *et al.* 1992 in which fetotmy was done to relive the fetus. Dicephalus monsters have two heads whereas dipygus monsters have duplications in the caudal region. Dicephalus condition had been reported in which manual operation was done to relieve dystocia (Parikh, 1931; Subbarayundie, 1934; Rekhi, 1939; Reddy and Balasubramanyam, 1950; Jothi, 1956; Majeed *et al.* 1971; Rao *et al.* 1971; Rao *et al.* 1976; Bishnoi *et al.* 1984; Dhingra *et al.* 1984; Markandeya *et al.* 1989; Bugalia *et al.* 1990; Panchal *et al.* 1990; Bhayani *et al.* 1991; Bishnoi *et al.*

1992; Bakshi *et al.* 1992; Adsul *et al.* 1992; Saha *et al.* 1996; Khan *et al.* 2007; Khasatiya *et al.* 2008). In some dicephalous condition fetotmy was reported for removal of fetus (Tandle and Suresh, 1993; Chauhan and Verma, 1995; Sharma *et al.* 1996; Suresh *et al.* 1999; Raju *et al.* 2000; Bugalia *et al.* 2001; Thirumalish and Azeemulla, 2001; Mehmood *et al.* 2014). Even caesarean section was performed in reported cases of dicephalous (Rao *et al.* 1986; Saleem *et al.* 1996; Padile *et al.* 2001; Chandrahasan *et al.* 2003; Abraham *et al.* 2007; Ravikumar *et al.* 2012; Kumar *et al.* 2014). There were reports of dipygus condition in which fetotomy was done (Thakur, 1988; Bugalia *et al.* 1985; Sharma *et al.* 1992; Antonie *et al.*1997; Chauhan and Verma, 1995). There may be formation of extra number of limbs two pairs of limbs (dibrachuis), three pairs of limbs (tribrachius), four pairs of limbs (tetrabrachius),whereas there may be duplicacy of hind limbs may be known as dipus (two pairs) tripus (three pairs) and tetrapus (four pairs) .The majority of the conjoined monsters are dead during dystocia and hence efforts to relieve dystocia in these cases should aim at fetotomy with caesarean section adopted as a last resort (Mahalingam, 1968; Pandey and Shandomo, 1989; Saxena and Prakash, 1986 Kondala *et al.* 1997; Shulze, 2006; Shukla *et al.* 2011). Chauhan *et al.* 2012 reported a rare case of dicephalus, monostomus, tetraopthalmus, dipus, dibrachius, dicandatus monster in a kankrej cow and performed caesarean section to deliver the fetus. Sharma *et al.* 2013 described a rare case of conjoined female twin monster (Monocephalus Thoracopagus Tetrabrachius Tetrapus Dicaudatus) in a Holstein Friesian pluriparous crossbred cow and performed paramedian laparohysterotomy to remove the monster. Other cases of coinjoined twins has been reported in which fetus was removed manually (Kohli *et al.* 1980; Thakre *et al.* 1992; Naidu *et al.* 1996; Kasiraj *et al.* 2001;Selvaraju *et al.* 2002; Jerome *et al.* 2010; Rajani and Raghavan, 2010) and some have performed caesarean section (Velhankar *et al.* 1968; Nauriyal and Pandey, 1979; Urankar *et al.* 1994).

2. Schistosoma reflexus: This is a defined heritable defect in ruminants. Its defining features include spinal inversion, exposure of the abdominal viscera because of a fissure of the ventral abdominal wall, limb ankylosis, positioning of the limbs adjacent to the skull and, lung and diaphragm hypoplasia. The main feature of this defect include incomplete skeletal, thoracic and abdominal, ventrally exposing the visceral contents. This can be diagnosed by the presence of fetal viscera, all the four legs, head and tail in the vaginal passage. There may be many variable components of this defect like scoliosis, cleft sternum, exposure of thoracic viscera, and abnormalities of the digestive and urogenital systems. For delievery of such fetuses, adequate lubrication of the birth canal is essential. Partial fetotomy of the fetal parts is suggested if the spinal curvature is acute preventing passage of the fetus through the birth canal. Caesarean section adopted as a last resort. There are several reports of in cattle and river buffalo by various authors in which fetotomy was done (Sarma, 1949; Balasubramaniam *et al.* 1961; Bugalia *et al.* 1990; Jana and Ghosh, 2001; Rao and Sreemannarayana 1984;

Sastry and Murthy 1984; Bishnoi *et al.* 1987; Murthy *et al.* 1999; Chandolia *et al.* 2003; Selvaraju *et al.* 2010; Kumar *et al.* 2012; Manjunatha *et al.* 2013; Barua *et al.* 2014; Patel *et al.* 2015). Successful Per-vaginal handling delivery of Schistosmus Reflexus Monster Fetus by Cervicotomy can be done for successful removal of Schistosomus reflexus (Suthar *et al.* 2011; Manokaran *et al.* 2014; Rehman *et al.* 2015).

3. Perosomus elumbis: This is a rare congenital anomaly of unknown aetiology characterized by the aplasia of the lumbosacral spinal cord and vertebrae, mostly associated with multiple other malformations of the hind limbs and the urogenital and intestinal tract. The hind limbs of the fetus are very rigid and may exhibit arthrogryposis and the musculature completely replaces adipose tissue which results in dystocia. Furthermore, atresia ani and recti, agenesis of one kidney, one adrenal gland, and a hypoplastic and atretic female genital tract have been detected in this condition. The primary abnormality is, however, hypoplasia of the spinal cord. It is difficult to deliver the fetus manually. Various reports of this condition have been reported in India and treated by Caesarian section (Kulasekar *et al.* 1996; Jana and Mousumi, 2010; Tiwari *et al.* 2011).

4. Cyclopia: Cyclopia is a rare form of holoprosencephaly and is a congenital disorder (birth defect) characterized by the failure of the embryonic prosencephalon to properly divide the orbits of the eye into two cavities. There is elongated soft tissue growth in the lower jaw region of the monster. Due to small body parts fetus can be removed manually. Cyclopia has been recorded in sheep (Bryden *et al.* 1971), goat (Sivasudharsan *et al.* 2010), and cattle (Gupta and Anand, 2002; Ozcan *et al.* 2006; Honparkhe *et al.* 2008; Mohanty, 1968; Chakraborti and Ganguli, 1977; Venu, 2001). However, this anomaly has been rarely reported in buffaloes (Thippeswamy *et al.* 1996; Bugalia 1990; Singh *et al.* 2013). The fetus is usually dead and has a single orbit and eyeball in the central head region. Sutarian *et al.* 2012 recently reported an unusual case of cyclopic and arhinia monster in Mehsana buffalo monster calf having a typical monkey face and it's successful per vaginum delivery through obstetrical maneuvers in Mehsana buffalo.

Conclusion

There are number of factors which are influenced by genetic and environmental conditions for formation of monsters. Mild developmental abnormalities of the ovum, embryo or fetus result in structural abnormalities in the fetus leading to *monstrosities*. Most of the anomalies occur in early stage of cell differentiation when the conceptus is subjected to genetic and maternal influences. The incidence of monstrosities reported for cow is 0.5% (Craig, 1930) whereas an incidence of 7.9% to 12.8% has been reported for river buffalo (Singla *et al.* 1992). Most of the monstrosities reported in buffalo are related to river buffalo; there are very little data available on swamp buffalo.

Genetic selection programmes with adequate farmer education can be proven as useful for control of dystocia.

Future research should prioritise across-breed genetic evaluations for calving ease, marker assisted selection for calving traits and dairy crossbreeding on calving performance, protocols for pain relief in parturient cows to prevent dystocia. This is usually relieved by cesarean section since fetotomy is of limited usefulness except in a few monsters. The dairy animals undergoing cesarean section usually have higher mortality rate, longer interval from first service to conception than those with mutation. The animals subjected to caesarean have been found to have lower survival rate (45.1%) as compared to those with/without partial fetotomy (Singh *et al.* 2013). Conception rate in dams with caesarean deliveries and mutations with/without partial fetotomy have been found 36 and 23%, respectively (Frazer *et al.* 1997). So it's the foremost requirement to explore the suitable way for detecting fetal monsters at early stage. To conclude, brief description about different forms of monster and their handling can be proven as suitable help for veterinarians.

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