

Short Communication

SURGICAL CORRECTION OF CONGENITAL ARTHROGRYPOSIS OF CARPAL JOINT IN CALVES

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ABSTRACT: Fifteen calves having age between 30 to 60 days were brought to Veterinary Polyclinic, Berhampore, Murshidabad, West Bengal, India during last one year suffering from lameness associated with varying degrees of congenital arthrogryposis of Carpal joint. Surgical treatments were tried to correct the problems. Flexor tenotomy with partial capsulotomy of carpal joint was done. Thirteen calves were found to bear weight completely after surgery without any other external supports.

Key words: Congenital arthrogryposis, Carpal Joint, Calf.

Occasionally calves are born with crooked legs, lax or contracted tendons or some other abnormality that need serious care attention. Some situations straighten on their own with time and exercise, while others require intervention, and some defects are so severe the calf became useless for the dairy farmer. Contracted tendons are the most common limb abnormality at birth. Arthrogryposis is a congenital defect described as an extreme form of contracted tendons in which many joints are flexed or extended and is considered to be secondary to a primary neuromuscular malformation and was reported to occur in horses, cattle, sheep and pigs (Latshaw 1987). The condition may involve two, three or all four limbs. The etiology for this anomaly appears multifactorial, with varying symptoms. Agerholm (2001) indicated genetic etiology for arthrogryposis, as the cases occurred following breeding especially between genetically related individuals. Jones (1999) described persomus elumbis as vertebral agenesis and arthrogryposis in a still born Holstein calf and he opined that chromosomal aberrations within the homeobox gene family were the contributory factor. Inherited ovine arthrogryposis has an autosomal recessive mode of inheritance (Murphy *et al.* 2007). Viruses like Akabane virus in cows (Kurogi 1977), Cache valley virus in lambs (Bermejello 2003) and Aino virus (Coverdale 1978) in neonatal calves were also attributed to be the cause of arthrogryposis. The wide spread use of semen from sires of different pedigrees of affected calves made several countries to transmit this anomaly.

Case history

Fifteen (15) calves of 30 to 60 days of age, suffering from lameness associated with varying degrees of congenital arthrogryposis of carpal joint were brought to Veterinary Polyclinic, Berhampore, Murshidabad, West Bengal, India. Clinical examination revealed that one or both the carpal joints of all the calves lacked normal angulation. As the calves were otherwise normal and healthy an attempted was made to relieve the contracture by performing tenotomy of flexors.

Treatment

The calves were pre-hydrated with 500 ml of Ringers lactate solution and anaesthetized by xylazine HCl @ 0.1 mg/ kg i.m. followed by ketamine @ 4 mg/kg and diazepam @ 0.25 mg/kg i.v. After endotracheal intubation, the animals were kept in lateral recumbency with the affected limb upward. 5 cm linear vertical incisions were given in the caudal aspect of the limb to expose the carpal joint. The contracted flexor tendons are severed and a small part of the joint capsules were incised. Exerting fare amount of pressure over the carpal joints the limbs were straightened as far as possible without opening the joints completely. The joint capsules were kept open and the articular ends of the bones were covered by suturing the fascia with Vicryl No.-1. The skin was routinely closed by simple interrupted fashion using nylon (Fig. 1 and Fig. 2). The limbs were supported with cotton as well as 4 bamboo splints leaving the windows for the suture lines for about 15 to 21 days with routine dressing by antiseptic ointments daily through

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Fig. 1. Various angular deformities of carpal joints (Unilateral and bilateral).



Fig. 2. Calves after surgical operations.

Fig. 3. Restoration of weight bearing capability after operation.

the windows. A course of antibiotic as well as analgesic were given for seven post operative days. The skin sutures were removed after 12 days of operation. 13 out of fifteen calves were recovered uneventfully and became successful in bearing weight after removal of splints (Fig. 3).

The congenital anomalies characterized by the presence of arthrogyrosis (flexure of a joint) of the forelimbs, may typically involve one or both the elbow and the carpal joints. Alkaloids in certain plants, if consumed by the dam during early pregnancy (such as between 40 and 70 days, for lupine), can affect the developing skeletal structure. The toxins act as a sedative. If the fetus is not moving as much as it normally does, tendons become shortened and joints tend to become fixed. Limbs may be twisted or fixed in flexed positions and cannot straighten. Often the bones themselves develop abnormal structure and rotational defects (Latshaw 1987). In the present study, the calves were normal sized, and did not show any other associated congenital defects. Contrary to these findings, calves borne with arthrogyrosis were small sized with a dome shaped head, scoliosis, maxillary retraction, sunken eyes, cataracts and irregularities of teeth hypotonia and palatoschisis and growth retardation (Agerholm 2001). General anesthesia was preferred over local analgesia as it provides better restraining of the calves which enable better visualization, easier handling of the deformed carpal joint and maintaining asepsis (Trim 1987). In the present study, we have found a higher incidence of

congenital carpal arthrogyrosis in up-graded Sahiwal calves. With the decrease in the angle of deformity subsequently decreased the success of surgical outcome as well (Verschooten 1969). This operative procedure was found to fail where the angular deformity $< 45^{\circ}$. Here after straightening of the limbs the circulation failed to establish in the rear part resulting into ischemia, necrosis and sloughing (Kinsley 1910).

Different degrees of arthrogyrosis were found to have varying degrees of surgical outcome. Leipoid *et al.* (1993) suggested that the calves having this problem should be euthanized but under Indian socio-economic as well as religious perspective it is not feasible. Devi Prasad *et al.* (2010) had successfully corrected the anomaly in a new born calf by performing flexor tenotomy. Thus, in the present study we have found flexor tenotomy along with partial capsulotomy proved to be very effective in correcting congenital carpal arthrogyrosis in calves.

REFERENCES

- Agerholm JS, Bendixen C, Andersen O, Arnbjerg J (2001) Complex vertebral malformation in Holstein calves. *J Vet Diagnost investi* 13: 283-289.
- Bermejillo DLC (2003) Cache Valley virus is a cause of foetal mummification and pregnancy loss in sheep. *Small Ruminant Res* 49(1): 01-09.

Coverdale OR (1978) Congenital abnormalities in calves associated with Akabane virus and Aino virus. *Aust Vet J* 54: 151-152.

Devi Prasad V, Hari Krishna NVV, Sreenu M, Thangadurai R (2010) Arthrogyrosis in a Calf. *Vet World* 3(7): 335-336.

Jones CJ (1999) Persomus elumbis (Vertebral agenesis and Arthrogyrosis) in a still born Holstein calf. *Vet Pathology* 36: 44.

Kinsley AT (1910) *A Text Book of Veterinary Pathology for Students and Practitioners*: 2nd edn. 122-135.

Kurogi H (1977) Congenital abnormalities in newborn calves after inoculation of pregnant cows with Akabane virus. *Infection Immunol* 17: 338-343.

Latshaw WK (1987) *Veterinary developmental anatomy: a clinically oriented approach*. BC Decker, CV Mosby & Co. 3rd edn. 144.

Leipold HW, Hiraga T, Dennis SM (1993) Congenital defects of the bovine musculoskeletal system and joints. *Vet Clin North Am: Food Anim Practice* 9(1): 93-104.

Murphy AM, De MH, Part SD, Scraggs E, Haley CS, Lynn DJ, Boland MP, Dhohrty ML (2007) Linkage, mapping of the locus for inherited ovine arthrogyrosis; (IOA) to sheep chromosome. *Mammalian genome*, 18 (1): 43-52.

Trim CM (1987) Special Anesthesia considerations in the ruminant. In: CE Short (Editors) *Principles and Practice of Veterinary Anesthesia*. Williams and Wilkins, Baltimore. 285-300.

Verschooten F, DeMoor A, Desmet P *et al.* (1969) Surgical treatment of congenital arthrogyrosis of the carpal joint associated with contraction of the flexor tendons in calves. *Vet Rec* 85: 140-171.

Table 1. Breed, Age, Sex, Weight, Degrees of angular deformities and Surgical outcome of study cases.

Sl no.	Breed	Age (Days)	Sex M/F	Weight (Kg)	Degrees of angular deformities	Surgical Outcome
1.	Up graded Sahiwal	36	M	22	***	++
2.	Do	43	M	27	**	+
3.	Do	44	M	23	*	-
4.	Do	34	M	24	**	+
5.	Do	60	F	21	***	++
6.	Do	57	M	24	***	++
7.	Do	38	F	25	***	++
8.	Do	32	M	26	***	+
9.	Cross Breed Jersey	51	F	28	**	+
10.	Do	60	M	32	***	++
11.	Do	38	F	30	***	++
12.	Non-Descript	48	F	20	*	-
13.	Do	51	F	18	***	++
14.	Do	58	F	21	**	+
15.	Do	42	M	21	**	+

++ = Good weight bearing after removal of splints. + = Fair, certain degree of angular deformity still persist but successful in weight bearing. - = Poor (The lower portion became necrosed and sloughed off).

*** = Angular deformity < 45°. ** = Angular deformity b/w 45° to 90°. * = Angular deformity > 90°.

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