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## Management of congenital flexural tendon contractures with stretching in calves

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**ABSTRACT:** It has been reported that mild to moderate congenital flexural limb contractures of the calves can be treated with stretching. This study was carried out on eleven calves with mild to moderate flexural foot - tendon contractures (three mild and eight moderate cases). The mild cases were treated successfully with only splints or wooden hoof block/PVC application adhered to the ground under the sole of the hoof with acrylic adhesive. The moderate cases, however, were treated successfully with the combined application in which a splint was placed on an entire limb to correct it and then a wooden hoof block/PVC was adhered to the ground under the sole of the hoof with an acrylic adhesive.

**Keywords:** Calf, tendon, flexural contracture, management

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## INTRODUCTION

The reports suggest that congenital flexor tendon contractures are a common disorder in cattle that can occur in many breeds (Leipold et al., 1993; Leipold et al., 1987) and cause significant economic losses (Steiner et al., 2014; Weaver et al., 2014). Previous research showed that environmental and genetic factors or both may be the cause of some of these disorders, however, the causes of many of them have not been fully clarified (Leipold et al., 1993; Akin et al., 1976). In addition to the inherited factors, it has been suggested that malnutrition during fetal development in the uterus, misposition of the fetus or its large size compared to the uterus play a role in the etiology of this disease (Adams and Santschi, 2000). It is also suggested that this disease is associated with species, race, geographic region, season and other environmental factors. Congenital flexural tendon deformities usually occur around the carpal or heel joint and can range from mild flexion of one joint to severe flexion of several joints. Flexural deformities are primarily caused by the musculotendon units that are shorter than the skeletal structure (Steiner et al., 2014).

Flexural limb deformities of calves are classified as mild, moderate and severe. In bilaterally affected cases, if it is a mild one, the calf can walk by standing the tips of the hoof, but the heel is off the ground. In the moderate cases, the calf can stand upright on the dorsal aspect of the hooves and it can stand without assistance. In severe cases, the animal lies on its side and it usually has difficulty in standing on the dorsal side of the carpus and walking (Adams and Santschi, 2000).

This study was carried out to demonstrate the effectiveness of the physical stretching technique performed by applying pressure bandage and / or wooden hoof block / PVC adhered to the hooves of the calves with first and second degree congenital flexural tendon contractures.

## MATERIALS AND METHODS

The study material consisted of eleven calves with flexural limb contractures. Of these cases, three of them were mild and eight were moderate. The calves from various breeds and genders, between 1-day-old to 5-day-old, were brought to Ondokuz Mayıs University Veterinary Faculty Animal Hospital between 2017 and 2019.

After obtaining an anamnesis and performing

physical examination, the calves were evaluated to see whether there was a problem with the rotation of the feet and ability to get up and stand. The calves were examined further to rule out any other problems, such as joint disorder, cleft palate and nervous disorder and then, radiography was carried out in suspected cases.

The calves diagnosed with congenital flexural tendon contracture were administered with 0.2 mg / kg xylazine IM and 0.3 mg / kg meloxicam SC before applying each bandage. The calf was placed on its side for bandage and after wrapping the leg with cotton, PVC was placed on the palmar / plantar side of the extremity and a splint was applied on the entire leg. The owners were told that the calf needed help lying down and getting up and instructed accordingly. The bandage application was sustained 3 to 6 times with an interval of 4-7 days until the foot joint returned to its proper position.

When the metacarpophalangeal or metatarsophalangeal joints became flat with the bandage and the calves were able to stand on the tip of the toes, the wooden hoof block / PVC were glued to the sole of the hooves with acrylic glue to prevent the hooves from bending back and to help the calf gain balance on its feet and also to extend the hooves by 3-4 cm (Figure 1). Support bandages were placed to prevent back bending in those who bent back despite the wooden hoof block / PVC. (Figure 2).



**Figure1.** PVC application on the sole of the hooves with acrylic



**Figure 2.** Support bandage application/PVC to the foot joint of the calf glued to the sole of the hooves

The heat generated by the acrylic use was relieved by applying cold water and wet cotton.

A 2-cm-thick wooden block was used in three cases and a 0.5-mm thick PVC pipe was used in eight cases. These procedures were sustained until the hoof-ground contact was observed. When the hoof-ground contact was observed, the procedure was terminated by breaking the acrylic mold.

## RESULTS

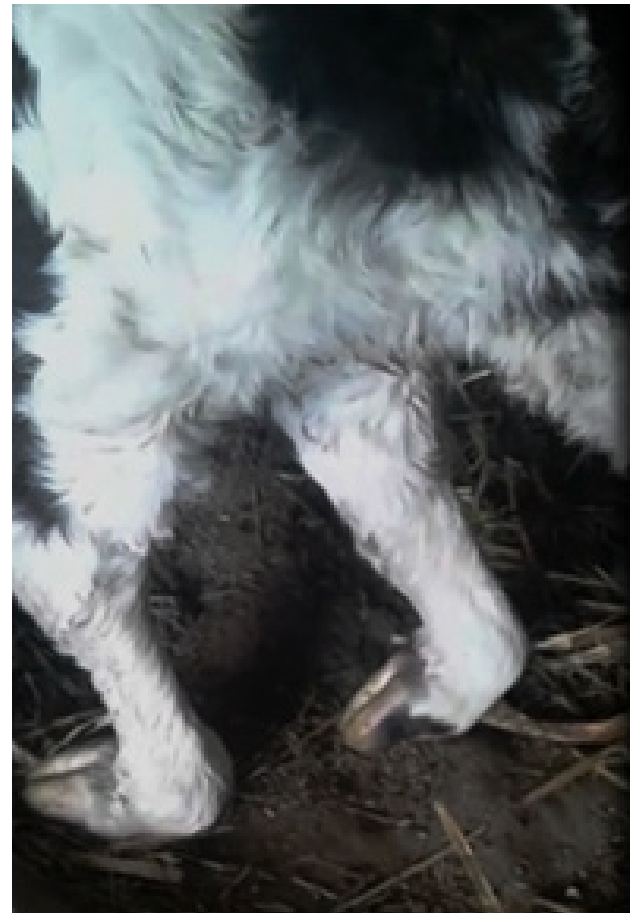
The application of pressure bandage prevented back bending of the foot in three calves with light - grade flexural tendon contractures. The heel touched the ground with weight gain after two or three bandages. Afterwards, these calves did not show any problems.

When the contracted tendon in the mild - grade (Figures 3 and 4) case extended and the foot became flat (Figure 5) after the application of splint, the calf(n=8) had difficulty standing on the tips of toes and in this case the feet were bent back again. The calf was unable to walk properly.

As a second application, a wooden wedge / PVC were adhered to the sole of hooves to prevent the foot from bending back (Figure 6). In this case, the heels were lifted and were off the ground. The calf was able to walk with some difficulty in a hesitant manner (Figure 7). Afterwards, it was able to lie down and suck its mother. The calf got used to this new state after 3 to 4 days.



**Figure 3.** Moderate contracture on the forefoot



**Figure 4.** Moderate contracture on the hind legs





**Figure 5.** Foot and hooves' joint after the splint



**Figure 7.** Wooden block application after split bandage use



**Figure 6.** Gait after bandage application

The calves preferred to lie down more than 3 to 4 days after the wooden block / PVC were glued. During the feeding period, they stood up and lay down after a while.

In two cases, the foot was bent back despite the wooden block/ PVC. Support bandages with the wooden block / PVC were placed on the feet of these calves to make sure they wouldn't bend back (Figure 2). However, the wooden blocks used in both hooves in one case and PVCs in three cases were broken within 5 to 10 days. A new one was reapplied in the place of the broken wood block and PVC.

After the hoof-ground contact within 3-4 weeks, acrylic and wooden block / PVC were broken and therefore, removed (Figure 8). Although there were mild contractures in a few cases after the application, the calves were able to walk without bending their feet (Figure 9).



**Figure 8.** Hind leg after the recovery



**Figure 9.** Forefront after the recovery

## DISCUSSION

It is reported that mild and moderate congenital flexural contractures occurring in the limbs of calves can be treated with aluminum, PVC or plaster casted splints and it would be useful for extending the joints (Rashmi et al., 2018; Steiner et al., 2014). Additionally, starting the treatment soon after the diagnosis is advised, otherwise the contracted tissues may become less responsive to the treatment (Gençcelep et al., 2017; Fazili et al., 2014; Steiner et al., 2014).

In the present study, it was observed that the three mild cases of flexural contractures improved with the help of splints or wooden hoof block / PVC application.

Some authors recommend leaving the hooves out of the bandage to apply weight pressure and increase tendon tension (Steiner et al., 2014). However, the results in the current study revealed that leaving the hooves out of the bandage did not contribute to walking and standing, on the contrary, the hooves were bent back again in moderate deformities. As the hooves were bent back, it was concluded that the splint application did not create enough tension in the feet and distal phalangeal joint tendons and ligaments.

As a result of the application of the splints to the entire leg to deliver enough tension, the feet and distal phalangeal joint tendons were elongated and straightened (Figure 4). At the end of this stretching process, the calf could only press on the tips of the toes, and this was not enough to walk, the tendons were re-contracted over time and the joint angle was also narrowed.

After the wooden base wedge / PVC were glued to the sole of the feet (Figures 1, 2 and 7) to prevent tendons and ligaments from re-contracting and to help the extension of tendons until the distal phalanx joint gained its normal angle, the calves were able to walk and their heels were off the ground. But they were not able to stand for a long time and preferred to lie down after a while.

Even though wooden block/ PVC were adhered following splints, the occurrence of re-contraction in two of the calves was thought to be associated with the long periods of lying down and lack of exercise. However, they recovered in two weeks after the bandage application was repeated, in which the foot was prevented from bending.

It is thought that the reason for the wooden blocks

/ PVCs adhered to the sole of the hooves to break within 5-10 days may be due to the softness of the hoof tissue or its softening after the hooves got wet.

## CONCLUSIONS

As a result, this study reveals that applying splints or wooden hoof blocks/ PVC to the sole of the hooves of the calves in mild cases of congenital flexural limb contracture could lead to successful results. Also, again successful results can be achieved by applying a splint on the entire leg of a calf and gluing a wooden hoof block/ PVC to the sole of the calf's hoof immediately after the moderate cases of congenital flexural limb contracture.

Overall, the current study provides a compelling evidence that application of wooden hoof block / PVC to the sole of the hooves of the calves may be routinely used in the clinical settings for the treatment of congenital flexural limb contracture.

## CONFLICT OF INTEREST

The author declares no conflict of interest.

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