

## A Case of Polydactyly Encountered in A Calf and Its One-Year Results

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### ABSTRACT

A 30-day-old Simental male calf brought with gait disorder and diagnosed with polydactyly as a result of clinical and radiographic examinations formed the study material. The over-formed metacarpal bone and nails were removed with operative intervention. No complications were encountered in the clinical examinations and radiographs taken on the 1st, 10th and 365th days. Thus, in such cases where the general condition of the patient is not bad, it was concluded that operative intervention is indicated to increase the quality of life of the patient and to prevent economic losses.

**Keywords:** Anomaly, calf, operative treatment, polydactyly, radiography

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### Bir Buzağda Karşılaşılan Polidaktili Olgusu ve Bir Yıllık Sonuçları

#### ÖZ

Çalışma materyalini yürüyüş bozukluğu ile getirilen, yapılan klinik ve radyografik muayeneler sonucu polidaktili tanısı konulan 30 günlük Simental ırkı erkek buzağı oluşturdu. Operatif girişim ile fazladan şekillenen metacarpal kemik ve tırnaklar uzaklaştırıldı. 1., 10. ve 365. günlerde alınan radyografiler ve yapılan klinik muayenelerde herhangi bir komplikasyon ile karşılaşılma. Böylece hastanın genel tablosunun kötü olmadığı bu tür olgularda, hastanın yaşam kalitesini arttırmak ve ekonomik kayıpları önlemek için operatif girişimin endike olduğu kanısına varıldı.

**Anahtar sözcükler:** Polidaktili, buzağı, anomali, radyografi, operatif sağaltım

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## INTRODUCTION

Congenital anomalies cause anatomic distortions and functional disorders. Anomalies in animals are generally caused by genetic, environmental factors or their combination, nutritional disorders, vitamin deficiencies, stress factors, not choosing artificial insemination, mistakes in breeding selection, and teratogens (Gugjoo et al. 2013, Leipold et al. 1972, Leipold et al. 1993, Rafee and Amarpal 2016).

Polydactylism is an anomaly characterized by the presence of one or more extra digits (Belge et al. 2000, Mosbah et al. 2012, Browning et al. 2020). Polydactyly is a genetic defect that is observed in many animal species and is increasingly common in cattle (Johnson et al. 1981, Leipold and Morris 1979). In a cattle with polydactyly, lameness increases over time as the animal gets older. This situation causes a decrease in the quality of life and productivity of the animal, and results with an economic loss. Although polydactyly is a genetic disorder, its inheritance is not fully understood (Johnson et al. 1981). It is thought to be caused by the gender-linked recessive gene (Aksoy et al. 2006, Belge et al. 2000, Johnson et al. 1981, Gugjoo et al. 2013).

It has been reported that the prevalence of polydactyly in cattle is higher in the front extremity compared to the hind extremity (Belge et al. 2000, Mosbah et al. 2012, Johnson et al. 1981, Gugjoo et al. 2013, Leipold and Morris 1979). There are seven types of polydactylism seen in cattle. Unilateral polydactyly of one forelimb with additional metacarpal bones and phalanges classified as type 2 is reported in our case (Braun et al. 2019). The aim of this study is to prevent economic losses and to increase the quality of life of the patients that can undergo surgery.

## MATERIAL AND METHOD

According to the anamnesis taken from the owner of the 30-day-old Simmental male calf brought to our clinic; It was mentioned that there was excessive claw formation on the left forelimb, the excess claw of the animal sometimes got stuck while the animal was walking and there was lameness on the same limb.

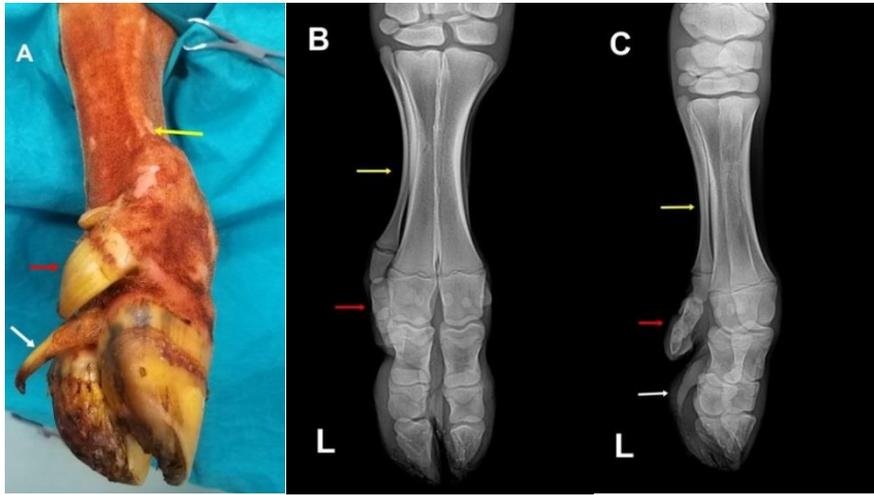
As a result of the clinical examination, it was observed that there was a 2 cm long extra claw which was thought to be rudimentary, just above the interdigital space on the palmar side of the same limb, extending caudomedially to the distal of the metacarpal bone of the left forelimb. A bone protrusion was observed along with the metacarpal bone space in the proximal part of the claw, which was directed caudomedially, and this was thought to

be an extra metacarpal bone. Radiological imaging was requested to confirm the diagnosis. Radiographs of the extremity were taken in Dorso/Palmar, Dorsomedial/Palmarolateral oblique positions (Figure 1). Radiological evaluation revealed a second metacarpal bone, one-fifth in diameter and medial to the metacarpal bone belonging to the left anterior extremity. It was found that this extra metacarpal bone was related to the medial claw. As a result of clinical and radiological examinations, Type II Polydactyly was diagnosed. Surgery was decided as these attachments were causing problems in walking. Preoperative hemogram and biochemistry analysis results of the patient were normal and suitable for operation. 10 mg / kg intramuscular (IM) cephalexin (Cefatek® 15%, Teknovet, Turkey) for prophylaxis and 0.2 mg / kg IM morphine HCl (Morphine Hydrochloride®, Osel, Turkey) for analgesia were administered preoperatively. Diazepam (Diazem®, Deva Holding, Turkey) at a dose of 0.4 mg / kg was administered intravenously (IV) for sedation. For anesthesia induction, 2% propofol (Lipuro®, Braun, England) at a dose of 3 mg / kg was administered IV and anesthesia maintenance was provided with 2% isoflurane (Isoflurane USP®, Piramal Critical Care, USA).

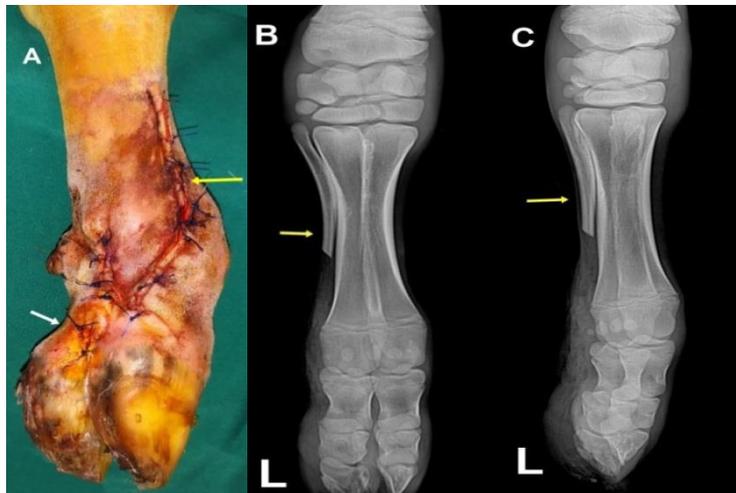
A palmaromedial approach was preferred, by making a skin incision starting from the mid-diaphyseal level of the medial metacarpal bone (extra bone). Subcutaneous connective tissues were separated by blunt dissection. The surrounding tissues were completely dissected while protecting the vena digitalis palmaris communis and the Musculus extensor digitorum medialis tendon. Extra metacarpal bone was osteotomized at the mid-diaphyseal level, and the associated claw was removed completely. The subcutaneous tissue and the skin were closed in a routine manner. The rudimentary nail on the palmar surface of the foot was removed by making a circular incision on the skin and the area was closed properly. Postoperative x-rays of the foot were taken and a dry dressing was made to the operated foot (Figure 2).

Intramuscular cephalexin (Cefatek® 15%, Teknovet, Turkey) was administered at a dose of 10 mg/kg every 12 hours for the first three days and every 24 hours for the next two days. Subcutaneous meloxicam (Bavet Meloxicam, Bavet, Turkey) was administered at a dose of 0,5 mg/kg once a day for three days for pain control. Sutures were removed 10 days after the operation.

One year later, control x-rays were taken using a portable x-ray unit under field conditions in order to see what kind of changes occurred in the extremity of the animal (Figure 3). No lameness was observed in the patient, and his walk was recorded by video (Figure 4).



**Figure 1:** A. Clinical image of the claw diagnosed with polydactyly; B. D\ P (Dorso/Palmar) radiography of the same claw; C. DM\ PLO (Dorsomedial/Palmarolateral oblique) radiography of the same claw. Yellow arrow: Extra metacarpal bone; Red arrow: Claw connecting with metacarpal bone; White arrow: rudimentary claw.



**Figure 2:** A. Post-operative clinical view of the claw diagnosed with polydactyly; B. Post-operative 1. day D\ P radiograph of the same claw; C. Post-operative 1st day DM\ PLO radiography of the same claw. Yellow arrow: Osteotomy site of the metacarpal bone; White arrow: Total extirpation of the rudimentary claw.



**Figure3:** A. Post-operative 365th day D\ P radiography of the claw diagnosed with polydactyly; B. Post-operative 365 days DM\ PLO radiography of the same claw. Yellow arrow: Osteotomy site of the metacarpal bone



**Figure4:** The patient's walking video 1 year after the operation and physical comparison of the patient with his peers.

## FINDINGS AND DISCUSSION

Anomalies in animals are generally caused by genetic, environmental factors or their combination, nutritional disorders and teratogens (Gugjoo et al. 2013, Rafee and Amarपाल 2016).

Polydactyly is a congenital disorder that often progresses bilaterally and rarely unilaterally (Mosbah et al. 2012). There are seven types of polydactylism seen in cattle; Type I-Bilateral polydactyly of both forelimbs with additional metacarpal bones or phalanges, Type II- Unilateral polydactyly of the forelimb or hindlimb with additional metacarpal or metatarsal bones and phalanges, Type III- Additional digits on all four limbs, Type IV- Occurs rarely, involving a bilateral duplication of digits, either of the forelimb or hindlimb, Type V- Polysyndactyly, Type VI- A bilateral incomplete formation of metacarpal II and Type VII- Polydactylism in combination with a malformation-complex. Polydactylism usually affects both forelimbs but less commonly a malformation of one or all four limbs is described (Mosbah et al. 2012).

In this study of type II polydactylism, it was observed that after surgical removal of the extra-shaped claw, the patient's quality of life was positively impacted, as mentioned in other studies (Mosbah et al. 2012, Rafee and Amarपाल 2016, Özak et al. 2009). Information about the patient was obtained by phone calls at 30-day intervals for 1 year. It was reported that there was no lameness during the year.

On physical examination of the patient one year postoperatively, it was noted that cido height and body weight of the patient was lower compared to his peers, suggesting that the patient had another anomaly other than polydactyly (Figure 4). Posture disorder in the forelimb was noted in the patient, the forelimbs were outward rotated from the distal of the carpal joint level. On radiographic evaluation performed one year postoperatively, no osteophytic growth was observed in the relevant area.

According to a study conducted in 2016 by Rafee et al., osteotomy of the over-formed

metacarpal/metatarsal bone was recommended to increase the welfare of the animal and to obtain a good aesthetic appearance in these cases (Rafee and Amarपाल 2016).

### Results

Polydactyly is an increasingly common type of anomaly in cattle. The results are in compliance with the literature for this patient who was operated. It is recommended that the causes of this anomaly should be revealed by genetic studies, as it negatively affects animal welfare and causes economic loss.

**Çıkar çatışması:** Yazarlar bu yazı için gerçek, potansiyel veya algılanan çıkar çatışması olmadığını beyan etmişlerdir.

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## REFERENCES

- Aksoy Ö, Kılıç E, Öztürk S, Özaydın İ, Kurt B, Baran V. Congenital Anomalies Encountered in Calves, Lambs and Kids: 1996-2005 (262Cases). Kafkas Üniv Vet Fak Derg. 2006; 12(2).
- Belge A, Gonenci R, Biricik HS. The cases of congenital anomalies in calves. YYÜ Vet Fak Derg. 2000; 11: 23-26.
- Braun M, Hellige M, Gerhauser I, Ciurkiewicz M, Lehmecker A, Beineke A, Distl O. De-novo variants in XIRP1 associated with polydactyly and polysyndactyly in Holstein cattle. bioRxiv. 2019; 574061.
- Browning Jr. R, Hayes E G, Lear AS. Spontaneous Appearance and Transmission of Polydactyly in Dexter Cattle. Case Rep Vet Med. 2020; 2020: 6407847.
- Giofré F, Caracciolo V, Zanotti M, Polli M, De Giovanni AM. Polydactyly in a Murgesse horse: a case report. JEVS. 2004; 24(6):248-250.

- Gugjoo MB, Sarode IP, Kumar S, Amarpal A.** Bilateral polydactyly in a nondescript calf. *J Adv Vet Res.* 2013; 3(2):86-88.
- Johnson JL, Leipold HW, Schalles RR, Guffy MM, Peeples JG, Castleberry RS, Schneider HJ.** Hereditary polydactyly in Simmental cattle. *J Hered.* 1981; 72(3):205-208.
- Leipold HW, Dennis SM, Huston K.** Polydactyly in cattle. *Cornell Vet.* 1972; 62(2):337-45.
- Leipold HW, Hiraga T, Dennis SM.** Congenital defects of the bovine musculoskeletal system and joints. *VET CLIN N AM-FOOD A.* 1993; 9(1): 93-104.
- Leipold HW, Morris LN.** Polydactyly. In: Andrews EJ, Ward BC, Altman NH (Ed), *Spontaneous Animal Models of Human Disease VOLUME II.* Academic press, UK. 1979; pp. 216-218.
- Mosbah E, Karrouf G, Rizk A.** Congenital limb deformities in some farm animals. In: *Fifth Animal Wealth Research Conference in the Middle East and North Africa.* Cairo University, Egypt. 2012; pp. 23-38.
- Özak A, Nisbet HÖ, Yardımcı C.** Polymelia in two calves. *Ankara Univ Vet Fak Derg.* 2009; 56(4):305–307.
- Rafee MA, Amarpal A.** Surgical Management of Bilateral Polydactyly in Twin Calves Surgical Management of Bilateral Polydactyly in Twin Calves. *SKUAST J Res.* 2016; 18:62-64.