



### Is Peripheral Alopecia of the Distal Extremities a Courier of the Omphaloarteritis in Newborn Calves: A Case Report

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**Abstract:** Rapid diagnosis of omphalitis is important as it will speed up access to the treatment. The delay in diagnosis causes the lesion to progress and become complex. Nowadays there are different applications that can be used in the diagnosis of omphalitis. It is important to define the standard way to follow in the diagnosis and treatment of omphalitis. Although the evaluation of external clinical findings in the periumbilical region is of great importance, it is difficult to reach the condition of intra-abdominal remnants by examining external clinical findings. Although USG appears to be the gold standard in imaging intraabdominal lesions, it is not true for the omphalophlebitis. Infield conditions where USG is not available, the clinician needs more findings to strengthen his hand. In addition to the emphasis on the importance of the use of USG images and routine external clinical findings of omphalitis, it is thought that some non-routine external clinical findings may also help in the diagnosis of the disease. In addition to USG and external clinical findings, non-routine findings are also interpreted by the authors, and observations and recommendations regarding the diagnosis process are shared in this paper.

**Keywords:** Omphaloarteritis, Omphalitis, Navel infection, Newborn calves, Alopecia

### Buzağlarda Ekstremit Periferinde Görülen Alopesi Omfaloarteritisin Habercisi mi: Olgu Sunumu

**Özet:** Yeni doğan buzağlarda büyük ekonomik kayıplara neden olan omfalitisin hayvan sahibi ya da veteriner hekim tarafından erken teşhisi, tedaviye erişimi hızlandıracağı için önemlidir. Teşhisin gecikmesi lezyonun ilerleyerek kompleks bir hal almasına neden olmaktadır. Günümüzde omfalitisin teşhisinde saha ve hastane şartları arasında farklı uygulamalar söz konusu olabilmektedir. Omfalitisin tanı ve tedavisinde izlenmesi gereken standart yolun tanımlanması önemlidir. Periumbilikal bölgedeki dış klinik bulguların değerlendirilmesinin önemi büyük olsa da intraabdominal lezyonların durumuna dış klinik bulguların incelenmesiyle erişmek güçtür. Intraabdominal lezyonların görüntülenmesinde USG altın bir standart olarak karşımıza çıksa da omfaloflebitis olgularında aynı performanstan söz etmek çoğu kez mümkün olmamaktadır. USG'nin bulunmadığı saha şartlarında klinisyenin elini güçlendirecek daha fazla bulguya ihtiyacı vardır. USG görüntüleri ile omfalitis rutin dış klinik bulgularının kullanımının önemine yapılan vurgunun yanı sıra rutin olmayan bazı dış klinik bulguların da hastalığın teşhisine giden yolda yardımcı olabileceği düşünülmektedir. Bu çalışmada bir buzağda omfaloarteritisin teşhisinde rutin tanı araçları olan USG ve dış klinik bulgulara ilave olarak rutin olmayan bulgular da yazarlar tarafından yorumlanmakta ve teşhise giden süreçte gözlem ve öneriler paylaşılmaktadır.

**Anahtar Kelimeler:** Omfaloarteritis, Omfalitis, Göbek enfeksiyonu, Buzağı, Alopesi

#### 1. Introduction

Omphalitis is as known as the spread of infection to the umbilical cord, with contamination of the umbilicus in poor conditions, and is one of the most common diseases at a rate of about 5-15% in newborn calves (1-3). One or more

components of the umbilical cord can be infected at the same time in omphalitis (4).

Infection of the umbilical cord components prepares the infrastructure for the intraabdominal spread of the infection (5). Infection spreading to the body by the hematogenous way; it can create hotbeds of infection in joints, bones,

lungs, kidneys, eyes, endocardium, and cause slowing of growth plates (4-6). Infection progressing through the arteries can settle in the peripheral arteries of feet, ears, and tail (4).

Today, the diagnosis of omphalitis varies in the field and the hospital settings. Swelling of the extra-abdominal umbilicus, discharge of pus, and thickening of the inflamed tissues through palpation and observation of pain are the most common positive findings in the field (7). USG findings enriched with microbiological analyses, blood table, and clinical findings provide more detailed information about the course of the disease (7).

USG findings and external clinical symptoms, which are the gold standard for the diagnosis of omphaloarteritis in a newborn calves, were evaluated together, and non-routine symptoms were interpreted in the diagnosis and various suggestions were made and observations were shared in this case report.

## 2. Case Presentation

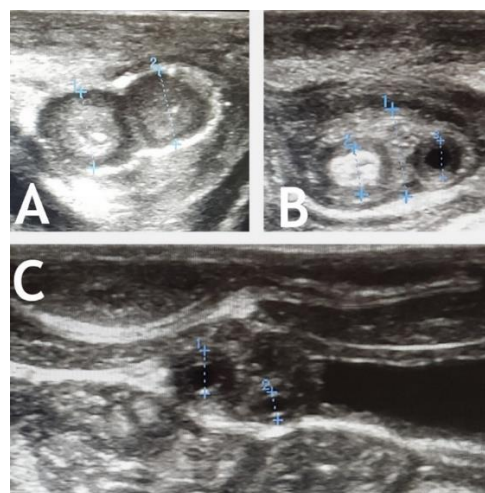
The material of the study was 18-day-old male Simmental crossbred calf weighing 42 kg, was brought to the Atatürk University Veterinary Faculty Animal Hospital. The anamnesis was lost of appetite and started to fall out. The clinical signs were; body temperature: 38.7 C, respiration: 68 rpm, and pulse: 96 bpm. There was irregular alopecia on the perineum and peri-inguinal areas (Figure 1A). The umbilicus was painful, smeared with an abscess like content and the umbilical cord was palpable with sharp borders like a pencil (Figure 1B). The scrotum was hardened compared to our clinical observations, the folds were increased and deepen (Figure 1C). Alopecic areas were starting from the corium and continuing to the level of the proximal phalanx, and were relatively dark (not intended to be described as cyanotic) compared to other areas on the extremities (Figure 1D).



**Figure 1:** A) Periumbilical and inguinal locus. B) Umbilical locus. C) Scrotum. D) Alopecia on the distal to the forearm.

For the monitoring of the intraabdominal remnants the ultrasonographic examination was decided. The USG examination was carried out via Vivid 5SN (General Electric, Horten, Norway) in B-mode with 9L-RS linear array transducer (3.33-10.0 MHz). The skin of the monitored areas was pre-shaved and ultrasound gel was applied over.

The ventral midline was scanned to craniocaudal for a possible omphalitis apostematosa and no positive sign in standing position. Umbilical vein and two arteries were seen in the lateral transversal examination of the umbilicus in the dorsal recumbency. A 10 cm midline area was scanned forwardly for possible omphalophlebitis, but no positive finding was seen. Intraluminal hyperechogenicity was observed in both arteries at the entrance of the abdominal wall and diameters were 10.5 - 10.3mm (right-left) measured via USG (Figure 2A).

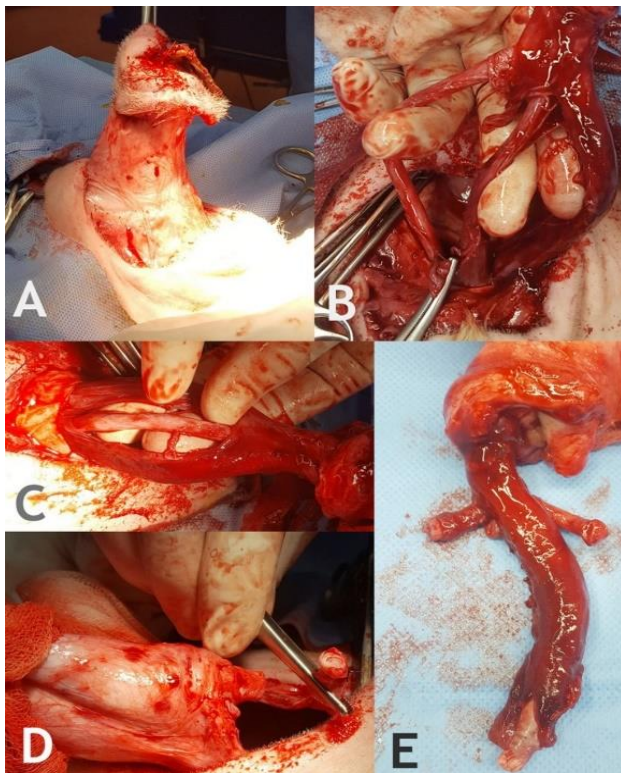


**Figure 2:** Ultrasonographic monitoring. A) The thickness of the umbilical arteries at the entrance of the abdominal wall. Diameters were 10.5 - 10.3 mm (right - left). B) Second measurement point was 5 cm caudal to the first point. Diameters were 5.3 - 4.2 mm (right - left). C) Anechoic locus at the 5 cm caudal to the second point, the diameters were 3.8 - 2.6 mm (right-left).

The diameters for the second measurement point were 5.3 - 4.2 mm (right-left) which was 5 cm caudal to the first point. Although a hyperechogenic lumen was detected on the right arteria, the lumen of the left was anechoic. (Figure 2B). This measurement showed that the arterial diameters were gradually decreasing to the caudally. The diameters for the third point were 3.8 - 2.6 mm (right-left) which was 5 cm caudally away from the second point and the lumens were anechoic (Figure 2C).

The distal portion of the arteries was showing hyperechogenicity thought to be fibrous and caseated, and it was decided that umbilical ablation should be performed from this locus which includes the distal remnants of the umbilicus.

After the 22G angiocath placement into the auricular vein, 0.01 mg / kg xylazine (Xylazinbio, Bioveta, Ivanovice na Hane, Czech Republic) and 2 mg / kg ketamine (VetaKetam; Vetagro, Lublin, Poland) in normal saline were injected as an intermittent bolus injection. Infiltration anesthesia was performed with lidocaine (5 mg / kg) around the incision line. After the routine surgical preparation, the operation was started with the circumcision of the umbilicus located on the ventral midline under aseptic conditions (Figure 3A). Intraabdominal access was provided with the dissection of the periumbilical tissues. There were no omphalitis apostematosa sign observed on endovisceral exploration and USG diagnosis was confirmed. Although the intraabdominal umbilical vena did not appear clearly during USG monitoring, an omphalophlebitis remnant was seen extending towards the cranial at the intraoperative examination and was hard to differentiate compared to the surrounding tissues when palpated (Figure 3B). Umbilical vena was ligated by monofilament absorbable 2/0 suture material and freed from connectives tissues. Two arteries were extending to the dorsocaudal direction and were not undergo involution (Figure 3C). Two arterial ligations were performed with a monofilament absorbable 2/0 suture material from the accessible last point of the incision line (Figure 3D). Following the ligations, the mass containing umbilical vena, arteries, and umbilicus was totally ablated (Figure 3E).



**Figure 3:** A) Circumcision of the umbilicus. B) Intraabdominal remnants of arteries, vein, urachus, and Wharton jelly. C) Umbilical artery without involution. D) Ligation of the umbilical artery. E) Intraabdominal and extra-abdominal remnants after umbilical total ablation.

The peritoneum and muscles were sutured together with 0 silk suture material. After the subcutaneous connective tissue suture with 2/0 monofilament absorbable material, the skin was closed with a stapler. The calf reanimated after procaine benzyl penicillin + dihydrostreptomycin (Reptopen, Ceva, 4 cc, q24h, 3 days), and 0.5 mg/kg meloxicam injections (Metacam, 20 mg/mL solution for injection, Boehringer Ingelheim, Vetmedica, Ingelheim, Germany) and patient delivered to the owner. On the postoperative 45th day the calf was recovered completely, weight gained rapidly, and healthy.

### 3. Discussion

Omphalitis is a disease that develops depends on the unhygienic conditions in the postpartum period and causes significant economic losses in herding (3-6, 8). Most owners are unaware that the calf has omphalitis and do not think that the calf is sick unless when they see the reluctance to feed. Insufficient knowledge of the owner about omphalitis weakens the anamnesis and this complicates the diagnosis for the clinician. Therefore, after the omphalitis diagnosis, the clinician should contribute to the fight against omphalitis by teaching some tricks to the owner about umbilical care and physical examination of navel infection. This education will strengthen the anamnesis given to the veterinarian, as well as to contribute to the knowledge and experience of the breeder. A strong, informed history is the key to early diagnosis and treatment.

Umbilical cord involution occurs within 7 days in the postnatal period, and umbilical arteries originating from the iliac arteries pull toward the bladder over time and become a round ligament in healthy animals (4). Although umbilical arteries can be clearly seen  $8 \pm 2$  mm diameter via USG examination in the first days of postnatal period, it becomes difficult to see after day 7 depends on involution (2, 7). Healthy umbilical arteries can be observed with a hypochoic lumen within the echogenic wall on an ultrasonogram in the first days after birth (2). In the first days of the postnatal period, the umbilical arteries can become infected and this condition is called omphaloarteritis (4).

Although involution of the umbilical arteries is expected on the 7th postpartum day, intraabdominal progressive inflammation delays involution of the umbilical arteries even if 18 days pass over the birth. Delayed involution due to infection was monitored via USG at the entrance of the intraabdominal cavity and the diameters of arteries were 10.5 – 10.3 mm (right-left). There was a hyperechogenicity on the first 10 cm portion of the arterial lumens. We thought that this was a full of fibrocaceous formation that developed in the arterial lumen. When we examine the caudal portions of umbilical arteries, the diameters were thinning comparing to the cranial and the fibrocaceous formation was fading out. But the the arteries were still over there even 18 days passed

over birth. We argue that wound healing was stuck between the inflammatory phase and the proliferative phase due to the persistence of infectious agents in the arterial lumen, and therefore the umbilical arteries cannot involute and turn into ligaments. Therefore, in omphaloarteritis cases, before the umbilical ablation is performed the limits of the infected remains should be determined under the guidance of USG. An infection residue left behind may result in a secondary abscess.

It is known that infectious agents in omphalitis are localized to peripheral arteries (4). Based on the clinical evaluation of this case, we believe that the infection was spread hematogenous from the umbilical arteries to the peripheral arteries. Although there is no history of diarrhea, there was alopecia on the legs, inguinal and perineal regions. This was thought a circulatory disturbance depends on peripheral arteries. The presence of color changes in the distal ends of the legs due to circulatory disturbance, and differentiation of the scrotal shape and consistency were pointing out peripheral vascular malnutrition. We think that inflammation due to infection was triggered the stenosis of the peripheral arteries and this has resulted malnutrition and alopecia. Although we do not have any other findings to prove this hypothesis, in our clinical observations, we encounter regional alopecia in calves with omphalitis similar to diarrhea originated alopecia in calves. On the other hand, the absence of alopecia on the tail despite remaining in the periphery making us question whether this hypothesis is correct.

It is a close possibility that diarrhoea will also take shape in animals with navel infections at the same time. The feces contact to the skin can result alopecia in scouring calves (9). Therefore, it should be considered that alopecia seen in the body is not pathognomonic for omphaloarteritis and is possible to be diarrhea originated.

Although USG is an important diagnostic tool for intraabdominal imaging in omphalitis, it was not given convincing findings for the diagnosis of omphalophlebitis for this calf. This information supports the hypothesis of *Guerri et al.* that the purulent material sometimes prevents the venous wall from being seen in cases of omphalophlebitis (1).

Information about USG imaging of the umbilical arteries in the postpartum period varies. While an article was describing the impossibility of viewing arteries after the 7th day in the postpartum period, another study stated that they were observed around the bladder till the 4th week (1). This variation in the involution time of omphaloarteritis can be expressed by the sequelae remnants which a result of the presence of subclinical inflammation or not.

#### 4. Conclusions

In addition to external clinical findings, intraabdominal remnants should also be evaluated for the diagnosis of the omphalitis. Although USG appears to be the gold standard in the diagnosis of omphaloarteritis, it should be thought that it may be poor for the diagnosis of omphalophlebitis. If there is a hyperechoic area observation on the ventral midline arteries in the caudal of the umbilicus on USG imaging in the postnatal period, this could evaluate as omphaloarteritis and total ablation of the intraabdominal remnants with the umbilicus should be performed without waiting. Possible missed lesions on USG should be looked for during the surgical intervention via endovisceral exploration.

Knowing that the infection may spread hematogenous from umbilical arteries to the peripheral arteries may be an idea when evaluating clinical findings in omphalitis. Observation of regional alopecia on the distal extremities, inguinal and perianal regions, could be a sign of omphaloarteritis and the findings should be confirmed quickly by USG. Possible hyperechogenic USG findings should be resulted in radical surgery without waiting.

We believe that biochemical examination of the relationship between peripheral artery perfusion and regional alopecia will decrease the prevalence of perinatal morbidity in omphaloarteritis cases.

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