Acta Veterinaria Brasilica June 13 (2019) 60-64

Acta Veterinaria Brasilica

Journal homepage: https://periodicos.ufersa.edu.br/index.php/acta/index

Case Report

Subcutaneous abscess caused by *Trueperella pyogenes* in a bovine in the Western Amazon: case report

Abscesso subcutâneo por *Trueperella pyogenes* em bovino na Amazônia Ocidental: relato de caso

Guilherme Henrique Reckziegel[1], Yuri Almeida Gomes[2], Eduardo Oliveira Aquino[2], Tamyres Izarelly Barbosa da Silva[2]*

[1] Faculdade de Medicina Veterinária e Zootecnia, Universidade Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brasil.
[2] Unidade de Ensino e Pesquisa em Medicina Veterinária, Universidade Federal do Acre, Rio Branco, Acre Brasil.

A R T I C L E I N F O

Article history
Received 15 Januart 2019
Accepted 10 May 2019

Keywords:
Abscess
Microbiology
Nodule
Ruminant

A B S T R A C T

Trueperella pyogenes is a pathogenic bacterium that causes suppurative infections in domestic and wild animals as well as humans. This paper describes a clinical case of subcutaneous abscess by *T. pyogenes* in a bovine in the Western Amazon, Brazil. During anamnesis, intramuscular injectable drug administration in the middle third of the left gluteal biceps muscle and the practice of reusing needles were reported. The clinical examination revealed edema, hyperthermia and high pain sensitivity to the touch in the region. A sample was collected through a puncture incision for the bacterial culture, during which *T. pyogenes* was isolated. The therapeutic approach was the use of a systemic antimicrobial and topical care, with a good prognosis. This report is the first description of infection by *T. pyogenes* in cattle in the Western Amazon and underscores the importance of appropriate sanitary management in herds, especially the use of disposable needles and hygiene at the site of parenteral drug application.

Palavras-chave:
Abscesso
Microbiologia
Nódulo
Ruminante

R E S U M O

A *Trueperella pyogenes* é uma bactéria patogênica, causadora de infecções supurativas em animais domésticos e silvestres, além de seres humanos. Descreve-se um caso clínico de abscesso subcutâneo por *T. pyogenes* em bovino na Amazônia Ocidental, Brasil. Durante a anamnese, foi relatada a administração de fármaco injetável por via intramuscular no terço médio do músculo glúteo bíceps esquerdo, além da prática de reutilização de agulhas. No exame clínico, observou-se edema, hipertermia e elevada sensibilidade dolorosa ao toque da região. Foi realizada inciso-punção e colheita de amostra para cultivo bacteriano, no qual isolou-se a *T. pyogenes*. A conduta terapêutica instituída foi baseada no uso de antimicrobiano sistêmico e cuidados tópicos, apresentando bom prognóstico. O relato de caso apresentado denota a primeira descrição da infecção por *Trueperella pyogenes* em bovino na Amazônia Ocidental e alerta para a relevância do manejo sanitário adequado nas criações, sobretudo quanto à utilização de agulhas descartáveis e higienização no local da aplicação de fármacos por via parenteral.

INTRODUCTION

Trueperella pyogenes is a microorganism associated with sporadic clinical cases, but with significant economic losses in animal production activities. This bacterium is the etiological agent of an infectious-contagious disease that results in the formation of abscesses in different tissues (JOST; BILLINGTON, 2005; MEGID; RIBEIRO; PAES, 2016). *T. pyogenes* may be found in the oral, nasal and genital microbiota of apparently healthy ruminants and pigs (ROGOVSKYY et al., 2018; GALÁN-RELAÑO et al., 2019). It is also present in the environment and can be found in fomites. The persistence of this pathogen is a risk factor for animals in a state of susceptibility (JOST et al., 2002; ERTAŞ, 2005; NAGIB et al., 2017).

* Corresponding author: tamyres_ibs@hotmail.com

http://dx.doi.org/10.21708/avb.2019.13.2.8365

Due to its pyogenic, opportunistic characteristic (taking advantage of a gateway), *T. pyogenes* causes suppurative infection in domestic and wild animals (RISSETI et al., 2017; ÇEÇEN et al., 2018; ROGOVSKYY et al., 2018), although virulence factors have not been fully elucidated (RISSETI et al., 2017; LIU et al., 2018; TAMAI et al., 2018). The evolution of the disease is related to cases of mastitis, arthritis, interdigital phlebitis, osteomyelitis, abortion, metritis, orchitis, omphalitis and bronchopneumonia as well as subcutaneous abscess or abscess in parenchymal tissues, with a variable prognosis (CAFFARO et al., 2014; ISHIYAMA et al., 2017; WARETH et al., 2018; KONTTURI et al., 2019; PIERSANTI et al., 2019).

The costs of veterinary care and medicine, milk discharge, infertility, early slaughter and the loss of carcass yield underscore the importance of sanitary management on farms for the control and prophylaxis of the disease (SANTOS; FONSECA, 2007; ASSIS et al., 2011; CHA et al., 2013). However, there is certain negligence in the notification of cases and few studies on this issue are found in the literature, despite the fact that this zoonosis can be fatal in some situations (PLAMONDON et al., 2007; LEVY et al., 2009; HOSHINA et al., 2017).

This paper describes a clinical case of subcutaneous abscess by *Trueperella pyogenes* in a bovine in the Western Amazon.

CASE REPORT

A two-year-old, mixed-breed, male bovine weighing approximately 400 kg was examined on a rural property in the municipality of Plácido de Castro (latitude: 10° 1' 2'' S; longitude: 67° 11' 18'' W) in the state of Acre (Western Amazon of Brazil). The complaint was an increase in volume in the left pelvic limb and claudication, with a clinical evolution of two weeks.

The animal could not hold a quadrupedal position, remaining with the left metatarsal-phalangeal joint in light flexion and lameness when moving. There was no history of trauma, but the owner reported the recent administration of an injectable intravenous multivitamin in the affected region with no previous hygiene of the area and having employed a reused needle.

The physical examination revealed a good nutritional and hydration status, rectal temperature of 39.2°C, normal heart and respiratory rates and slightly pale mucosa. The entire extension of the left pelvic limb presented pronounced edema, hyperthermia and painful tenderness upon palpation. A nodular lesion was found in the subcutaneous space in front of the middle third of the left gluteus biceps muscle, with a floating appearance (Figure 1). The left pre-crural lymph node was hypertrophied.

A puncture incision was performed to evaluate the content of the nodule (Figure 1), which had a purulent appearance with blood splotches, beige to brownish coloration and putrid odor, characterizing an abscess. Approximately 14 liters of exudate were drained, followed by curettage of the internal area with the aid of tweezers and gauze.

Figure 1 – Subcutaneous abscess in left pelvic limb of bovine: a) posterior view of the abscess; b) drainage of purulent content.

A sample of the content was sent to the Animal Infectious Disease Laboratory of the Federal University of Acre for bacteriological isolation in 5% bovine blood agar at 37°C for 48 hours in aerobiosis. The analysis of the isolates revealed macroscopically small whitish colonies approximately one millimeter in diameter, with β-hemolysis. Microscopically, Gram-positive coccobacilli were present. The biochemical profile of these isolates is displayed in Table 1. Based on the pertinent literature, the phenotypic and biochemical characteristics were compatible with *Trueperella pyogenes* (MEGID; RIBEIRO; PAES, 2016; ROGOVSKYY et al., 2018).

Table 1 – Biochemical profile of isolate from subcutaneous abscess in bovine in municipality of Plácido de Castro, state Acre, Western Amazonia, Brazil.

Biochemical tests	Result
Catalase	-
Oxidase	-
Indole	-
Urease	-
Gelatin hydrolyzate	+
Nitrate reduction	-
Glucose fermentation	+
Maltose fermentation	-
Sucrose fermentation	-

Legend: (-) negative reaction; (+) positive reaction.

Based on the antimicrobial susceptibility test, the therapeutic protocol was penicillin G procaine (30.000 IU/kg/SID/IM) for 15 days and flunixin meglumine (2.2 mg/kg/SID/IM) for three days. Topically, daily cleansing of the abscess was prescribed with 0.9% physiological solution, followed by chemical cauterization with iodine and the application of a repellent containing silver sulfadiazine (0.1 g), aluminum (5 g) and cypermethrin (0.4 g) only in the area surrounding the lesion.

At the end of treatment, the abscess had regressed. Edema and claudication remained, albeit in a discrete manner, suggesting sciatic nerve damage due to the abscess. Thus, flunixin meglumine (2.2 mg/kg/SID/IM) was indicated for an additional three days and vitamin B1 supplementation (500 mg/SID/IM) was prescribed for 30 days. Complete recovery was achieved at 45 days, when the animal exhibited a good general condition, with no clinical alterations.

The owner was advised with regards to good management practices and conduct at the time of administering injectable drugs as well as the adequate containment of the animals, hygiene with 10% iodinated alcohol at the drug application site, the use of disposable syringes and needles of adequate size for each situation. The owner was also instructed that any intervention with animals should be carried out with proper veterinary guidance.

DISCUSSION

In its most diverse clinical presentations, infection by *Trueperella pyogenes* is associated with inadequate sanitary management in cattle. Bacteria can be found in soil, water and working material, such as buckets, ropes, surgical instruments, branding materials, gloves and needles. Thus, these risk factors on a property are potential sources of infection (JOST; BILLINGTON, 2005; RADOSTITS; GAY; HINCHCLIFF, 2007; NAGIB et al., 2017).

Although it is commensal to the microflora of ruminants and pigs, *T. pyogenes* is easily isolated from the cutaneous and mucosal tissues of these animals (ROGOVSKYY et al., 2018; GALÁN-RELAÑO et al., 2019). Thus, it is believed that the case described here is directly related to needle reuse for the intramuscular application of drugs in the bovine or the failure to perform antisepsis of the skin at the application site (MOTTA et al., 2011; CAFFARO et al., 2014; MEGID; RIBEIRO; PAES, 2016), as reported by the owner.

After colonization in a specific tissue, *T. pyogenes* promotes cellular necrosis and stimulates the chemotaxis of leukocytes through the action of proteolytic enzymes, with the accumulation of a purulent substance at the infection site, which is subsequently surrounded by a fibrous capsule (RODRÍGUEZ; LEIVA; GARCÍA, 2015; MEGID; RIBEIRO; PAES, 2016; HOSHINA et al., 2017). However, other microorganisms are also pathogenic to cattle and have the capacity to form abscesses in the subcutaneous space or other tissues, such as *Actinomyces bovis*, *Corynebacterium bovis* and *Escherichia coli*. Therefore, complementary microbiological analysis enables the identification of the etiological agent and helps guide the treatment process (ERTAŞ, 2005; LARA et al., 2011; HARIHARAN et al., 2015; PIERSANTI et al., 2019).

The recommended treatment is the use of broad-spectrum systemic antimicrobials, such as penicillin, but it is important to perform antimicrobial susceptibility testing (GIUFFRIDA; BIGNARD, 2011; TAMAI et al., 2018; GALÁN-RELAÑO et al., 2019). Refractoriness of the protocol is seen in some cases, mainly due to the difficulty of certain drugs in penetrating the fibrous capsule of the abscess and achieving an effective therapeutic concentration capable of impeding bacterial multiplication. Moreover, the rupture of the capsule of an abscess and drainage of the purulent content through a puncture incision are indicated simultaneously with the infusion of a local antiseptic solution (RODRÍGUEZ; LEIVA; GARCÍA, 2015), as performed in the present case.

Neurological conditions associated with subcutaneous abscesses may occur but are infrequent. In the present case, the pronounced edema and considerable size of the abscess in the pelvic limb exerted compression on the musculature and sciatic nerve, suggesting the occurrence of a neurological injury. This type of complication can lead to paresis or paralysis of the limb, causing the

animal to exhibit claudication or remain in decubitus (RADOSTITS; GAY; HINCHCLIFF, 2007; ZHANG et al., 2013).

The inclusion of vitamin B1 and non-steady-state anti-inflammatory drugs in the therapy protocol was necessary, since when administered together, these drugs promote interactions with mediators in nociceptors, increasing the levels of noradrenaline and 5-hydroxytryptamine in the descending pathway for the inhibition of pain. These drugs also play a role in the regeneration of nerve fibers (MIBIELLI et al., 2009; ZHANG et al., 2013).

The prognosis of the disease varies depending on the occurrence of bacterial spread to more internal tissues and the immune status of the host (RADOSTITS; GAY; HINCHCLIFF, 2007; MEGID; RIBEIRO; PAES, 2016). In infections by *T. pyogenes* that culminate in arthritis, osteomyelitis, abortion, metritis, orchitis, omphalitis, bronchopneumonia and liver abscesses, the prognosis is established as reserved to poor (KONTTURI et al., 2019; PIERSANTI et al., 2019). However, resolution is simpler in cases of mastitis and subcutaneous abscess (ISHIYAMA et al., 2017). The prognosis in the present case was favorable, possibly due to the good nutritional status of the animal, the gateway through the cutaneous tissue with no systemic dissemination and the effectiveness of the therapy employed (GIUFFRIDA; BIGNARD, 2011; GALÁN-RELAÑO et al., 2019).

However, many animals die and significant economic losses can occur in cattle breeding activities. Studies indicate high losses calculated by treatment costs, a decrease in milk production, the loss of cuts due to lesions in muscles or fibrosis formed during the tissue repair process as well as the early discard of cattle affected with severe or systemic lesions (SANTOS; FONSECA, 2007; ASSIS et al., 2011; CHA et al., 2013).

Due to its zoonotic nature, *T. pyogenes* is related to public health cases, especially in immunosuppressed patients (JOST; BILLINGTON, 2005; IDE et al., 2006) and producers who maintain daily contact with production animals, as in the case of sepsis in a farmer in the rural Amazonia registered in 2006 (LEVY et al., 2009). In other countries, doctors and veterinarians have warned the public for many years about the transmission of *T. pyogenes* from cattle to cattle ranchers, including the possible fatal outcome (LYNCH et al., 1998; PLAMONDON et al., 2007; HOSHINA et al., 2017; NAGIB et al., 2017).

It is therefore essential to identify bacteria in clinical cases as well as counsel producers regarding the risks of handling infected animals and the biological material drained from abscesses. Moreover, veterinary technical assistance in cattle breeding for instruction in prophylactic measures against various infectious diseases is essential to maintaining the health status of herds (RADOSTITS; GAY; HINCHCLIFF, 2007; KAVITHA et al., 2010).

CONCLUSION

The present case report offers the first description of infection by *Trueperella pyogenes* in cattle in the Western Amazon and underscores the importance of adequate sanitary management in breeding activities, especially regarding the use of disposable needles and hygiene at the application site of parenteral drugs.

REFERENCES

ASSIS, D. R. et al. Perdas diretas ocasionadas por abscessos e hematomas em carcaças de bovinos. **Revista Portuguesa de Ciências Veterinárias**, v. 110, n. 577, p. 47-51, 2011.

CAFFARO, K. A. et al. Deforming mandibular osteomyelitis in a cow caused by *Trueperella pyogenes*. **Ciência Rural**, v. 44, n. 11, 2014.

ÇEÇEN, L. et al. Interdigital necrobacillosis associated with *Trueperella pyogenes* in goitered gazelles (*Gazella subgutturosa*). **Journal of Zoo and Wildlife Medicine**, v. 49, n. 2, p. 429-434, 2018.

CHA, E. et al. The effect of repeated episodes of bacteria-specific clinical mastitis on mortality and culling in Holstein dairy cows. **Journal of Dairy Science**, v. 96, p. 4993-5007, 2013.

ERTAŞ, H. B. Isolation of *Arcanobacterium* (*Actinomyces*) *pyogenes* from abscessed cattle kidney and identification by PCR. **Turkish Journal of Veterinary and Animal Sciences**, v. 29, n. 2, p. 455-459, 2005.

GALÁN-RELAÑO, Á. et al. Antimicrobial susceptibility and genetic characterization of *Trueperella pyogenes* isolates from pigs reared under intensive and extensive farming practices. **Veterinary Microbiology**, v. 232, p. 89-95, 2019.

GIUFFRIDA, R.; BIGNARDE, P. C. Perfil de sensibilidade microbiana *in vitro* de linhagens de *Arcanobacterium pyogenes* isoladas de diferentes afecções em bovinos. **Veterinária e Zootecnia**, v. 18, n. 2, p. 222-225, 2011.

JOST, B. H.; BILLINGTON, S. J. *Arcanobacterium pyogenes*: molecular pathogenesis of an animal opportunist. **Antonie Van Leeuwenhoek**, v. 88, p. 87-102, 2005.

JOST, B. H. et al. Isolation of *Arcanobacterium pyogenes* from the porcine gastric mucosa. **Veterinary Research Comunications**, v. 26, p. 419-425, 2002.

KAVITHA, K. et al. Three cases of *Arcanobacterium pyogenes*-associated soft tissue infection. **Journal of Medical Microbiology**, v. 59, n. 6, p. 736-739, 2010.

KONTTURI, M. et al. Bacterial species associated with interdigital phlegmon outbreaks in finnish dairy herds. **BMC Veterinary Research**, v. 15, n. 44, p. 2-12, 2019.

HARIHARAN, H.; BHAIYAT, M. I.; TIWARI, K. P.; CHIKWETO, A. Multifocal pulmonary abscesses due to *Trueperella pyogenes* in a sheep. **Veterinary Science**, v. 2, n. 2, p. 98-102, 2015.

HOSHINA, D.; TSUJIWAKI, M.; FURUYA, K.; KAWAMURA, T. Erythema multiforme associated with *Trueperella pyogenes* bacteremia. **Journal of Dermatology**, v. 44, n. 5, p. 84-85, 2017.

IDE, A. et al. *Arcanobacterium pyogenes* spondylodiscitis in a veterinary surgeon: plea for cooperationbetween medical and veterinary microbiologists in identification of causal agentes of zoonotic infections. **Clinical Microbiology Newslette**, v. 28, p. 163-7, 2006.

ISHIYAMA, D. et al. Factors affecting the incidence and outcome of *Trueperella pyogenes* mastitis in cows. **Journal of Veterinary Medical Science**, v. 79, n. 3, p. 626-631, 2017.

LARA, G. H. B. et al. Occurrence of *Mycobaterium spp*. and other pathogens in lymph nodes of slaughtereds wine and wild boars (*Sus scrofa).* **Research Veterinary Science**, v. 90, n. 2, p. 185-188, 2011.

LEVY, C. E. et al. *Arcanobacterium pyogenes* Sepsis in Farmer, Brazil. **Emerging Infectious Diseases**, v. 15, n. 7, p. 1131-1132, 2009.

LIU, M. et al. Determination of the expression of three fimbrial subunit proteins in cultured *Trueperella pyogenes*. **Acta Veterinaria Scandinavica**, v. 60, n. 53, p. 1-10, 2018.

LYNCH, M. et al. *Actinomyces pyogenes* septic arthritis in a diabetic farmer. **Journal of Infection**, v. 37, n. 1, p. 71-3, 1998.

MIBIELLI, M. A. et al. Diclofenac plus B vitamins versus diclofenac monotherapy in lumbago: the dolor study. **Current Medical Research and Opinion**, v. 25, n. 11, p. 2589-2599, 2009.

MOTTA, R. G. et al. Surto de mastite bovina causada por *Arcanobacterium pyogenes.* **Arquivo Brasileiro de Medicina Veterinária e Zootecnia**, v. 63, n. 3, p. 736-740, 2011.

MEGID, J.; RIBEIRO, M. G.; PAES, A. C. **Doenças infecciosas em animais de produção e de companhia**. Roca: Rio de Janeiro, 2016.

NAGIB, S. et al. Fatal infection in three grey slender Lorises (*Loris lydekkerianus nordicus*) caused by clonally related *Trueperella pyogenes*. **BMC Veterinary Research**, v. 13, n. 273, p. 1-9, 2017.

PIERSANTI, R. L. et al. A model of clinical endometritis in Holstein heifers using pathogenic *Escherichia coli* and *Trueperella pyogenes*. **Journal of Dairy Science**, v. 102, n.3, p. 2686–2697, 2019.

PLAMONDON, M. et al. A fatal case of *Arcanobacterium pyogenes* end ocarditis in a man with no identified animal contact: case reportand review of the literature. **European Journal of Clinical Microbiology and Infectious Diseases**, v. 26, n. 9, p. 663-666, 2007.

RADOSTITS, O. M.; GAY, C. C.; HINCHCLIFF, K. W. **Veterinary medicine: a text book of the diseases of cattle, horses, sheep, pigs, andgoats**. 10.ed. Philadelphia: Saunders, 2007, 1770p.

RISSETI, R. M. et al. Virulence markers associated with *Trueperella pyogenes* infections in livestock and companion animals. **Letters in Applied Microbiology**, v. 65, n. 2, p. 125-132, 2017.

RODRÍGUEZ, V.; LEIVA, G. A. A.; GARCÍA, N. V. *Trueperella pyogenes* (*Arcanobacterium pyogenes*), un patógeno oportunista: Una revisión. **Revista Colombiana de Ciencia Animal**, v. 8, n. 1, p. 86-95, 2015.

ROGOVSKYY, A. S. et al. Phenotypic and genotypic characteristics of *Trueperella pyogenes* isolated from ruminants. **Journal of Veterinary Diagnostic Investigation**, v. 30, n. 3, p. 348-353, 2018.

SANTOS, M. V.; FONSECA, L. F. L. **Estratégias para controle de mastite e melhoria da qualidade do leite**. São Paulo: Manole, 2007, 314p.

TAMAI, I. A.; MOHAMMADZADEH, U. M.; SALEHI, T. Z.; MAHMOODI, P. Genomic characterisation, detection of genes encoding virulence factors and evaluation of antibiotic resistance of *Trueperella pyogenes* isolated from cattle with clinical metritis. **Antonie Van Leeuwenhoek**, v. 111, n. 12, p. 2441-2453, 2018.

WARETH, G. et al. *Trueperella pyogenes* and *Brucella abortus* coinfection in a dog and a cat on a dairy farm in Egypt with recurrent cases of mastitis and abortion. **Veterinary Medicine International**, p. 1-4; 2018.

ZHANG, M. et al. Methylcobalamin: a potential vitamin of pain killer. **Neural plasticity**, v. 2013, p. 1-6, 2013.