



Transfemoral amputation for the treatment of anemia and unfavorable evolution of left lower limb infection with a wound infected by *Klebsiella oxytoca* – Case report

  <https://doi.org/10.56238/alookdevelopv1-053>

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ABSTRACT

Objective: to report the case of a patient who underwent a transfemoral amputation for the treatment of anemia and unfavorable evolution of left lower limb infection with a wound infected by

Klebsiella oxytoca. Method: the information was obtained through a review of the medical record, an interview with the patient, laboratory results, and a literature review. Conclusions: The reported case and the scarcity of the literature bring to light the discussion on the pathogenicity of *Klebsiella oxytoca*. However, the evidence that the transfemoral amputation of the limb that presented the eschar contaminated with *Klebsiella oxytoca*, led to the cure of chronic anemia and the cessation of bloody diarrhea, confirms that the decision made resulted in curative treatment and improved the patient's quality of life.

Keywords: *Klebsiella oxytoca*, transfemoral amputation.

1 INTRODUCTION

Klebsiella is an important pathogen in humans and is implicated in an increase in morbidity and mortality among the population. Usually, it can be found in humans, animals, water, and soil being responsible for numerous cases of diseases and prolonging the stay of patients in hospitals. They are opportunistic and can cause a variety of diseases such as pneumonia, septicemia, urinary tract infections, and soft tissue infections. Of the genus *Klebsiella*, *K. oxytoca* has been causing diseases more and more frequently. It is pathologically significant and has been isolated in different samples of human fluids, such as blood or respiratory secretions. In addition, it has been gaining importance as a pathogen in immunocompromised and debilitated patients (Lavan Singh *et al*, 2016). We describe the case of a patient in whom *Klebsiella oxytoca* was isolated from a wound on the left foot.

2 OBJECTIVE

To report the case of a patient who underwent a transfemoral amputation for the treatment of anemia and unfavorable evolution of infection of the left lower limb with a wound infected with *Klebsiella oxytoca* (Ko).

3 METHOD

The information was obtained through a review of the medical record, an interview with the patient, laboratory results of the patient, and a literature review.

4 CASE REPORT

A.J.H., 38 years old, with paraplegia of the lower limbs due to traumatic spinal cord injury, presenting in the last 3 years eschar in the left foot, evolving with edema of the leg 3 + in 4 and hyperemia. Treated by the medical clinic with antibiotic therapy according to antibiogram with cephalosporins, aminoglycosides, and carbapenems, and associations between them; scapectomy and associated topical antibiotic therapy (neomycin with bacitracin). In the last two years, the patient has evolved unfavorably with anemia, with indication for red blood cell transfusion by the CBC, as described in the literature⁴ (Mean erythrocytes: 2.4 million/mm³, hematocrit: 20%, hemoglobin: 6.2 g/dl), performing 15 times concentrated red blood cells in this period.

At the end of 2019, it is requested to enter consultation with the surgery service, with the latest laboratory results whose culture confirms Ko. Consequently, after discussion of the case by the team of the Hospital de Caridade de Crissiumal (HCC), the transfemoral amputation of the left lower limb was chosen as an intended curative therapy, since episodes of bloody diarrhea began to aggravate the condition. Treatment accepted by the patient and the family.

5 DISCUSSION

Klebsiella oxytoca is a non-mobile, rod-shaped Gram-negative bacterium belonging to the family *Enterobacteriaceae*. It is ubiquitous in the environment and can be grown on the skin, mucous membranes, oropharynx and intestines of healthy humans and animals, as well as in a variety of tissues of clinically affected humans and animals. Species are the second most frequent cause of gram-negative bacteremia. The production of extended-spectrum beta lactamase from the bacteria causes resistance to beta-lactam antibiotics and contributes to therapeutic problems. Bacteremia caused by Ko is usually polymicrobial, resulting in complicated infections that may progress to septic shock, disseminated intravascular coagulation, and death¹⁻². *Klebsiella oxytoca* causes resistance to colonization against multidrug-resistant *Klebsiella pneumoniae* in the intestine via cooperative carbohydrate competition⁵, since it caused doubts about the virulence of this bacterium because it theoretically avoids colonization by *Klebsiella pneumoniae*. Even so, and by studying the pathogenicity of the bacteria, *Klebsiella oxytoca* is a complex of nine species - *Klebsiella grimontii*, *Klebsiella huaxiensis*, *Klebsiella michiganensis*, *Klebsiella oxytoca*, *Klebsiella pasteurii*, *Klebsiella spallanzanii*, and three new unnamed species. Phenotypic tests can assign isolates to the complex, but accurate identification of species requires genome²-based analysis.

The *K. oxytoca* is a human commensal, but also an opportunistic pathogen that causes various infections, such as antibiotic-associated hemorrhagic colitis (AAHC), urinary tract infection, and bacteremia, and has caused outbreaks. The production of the cytotoxins tilivaline and tilimycin lead to

AAHC, while many virulence factors observed in *Klebsiella pneumoniae*, such as capsular polysaccharides and fimbria, have been found in the complex; however, their association with pathogenicity remains uncertain⁶.

One of the concerns of the HCC team was to understand how humans can become infected with Ko. In the case in question, the source of the contagion is not known, since it is an isolated case of eschar contamination. It was Ko's first find by the HCC team.

Ling Ni *et al.* (2021) state that different virulence and resistance profiles were observed among Ko isolates in 3 types and 14 species of aquatic animals. The genome fingerprint based on ERIC-PCR of the ¹ 125 isolates of *Klebsiella oxytoca* revealed 108 ERIC genotypes with 79 *singletons*, which demonstrated the genetic diversity of the isolates. The results of this study fill gaps for policies and research in the risk assessment of Ko in consumable aquatic animals⁷. Which made the HCC team think that this contagion may have been due to the ingestion of contaminated animals. This fact generated more doubts in a center with few technical-scientific resources.

The onset of bloody diarrhea was an important sign for the decision of amputation since severe colitis would inevitably trigger an uncontrollable septic picture. Ko is a resident of the human intestine, but in some patients with a lot of penicillin use, the expansion of this pathobiont results in hemorrhagic colitis associated with antibiotics. Colitogenic strains of Ko carry a cluster of biosynthetic genes of secondary metabolites that is critical for causing disease in an animal model. For example, among other conditions, acute infectious fulminant purpura produced by Ko is reported in the literature. Tsubouchi *et al* (2019), correlate the information of an aplastic anemia treatment with glucocorticoids that evolved to sepsis and death from systemic contamination by Ko.

From this context and considering the worsening state of the patient's condition, the Surgery Service of the HCC opts for amputation as a curative treatment, to avoid, probably, the death of the patient. Thus, by the family and the patient, the amputation was performed in January 2020.

6 RESULTS

Postoperative follow-up confirms curative treatment. The red series of A.J.H. remained at normal levels, the episodes of diarrhea ceased and the healing of the stump was done satisfactorily.

7 CONCLUSIONS

The case reported and the scarce existing literature demonstrate a complex situation. It was not possible to demonstrate, from the literature, nor by the mechanism of action of the pathogen that the

¹ The molecular technique of ERIC-PCR (*Enterobacterial Repetitive Intergenic Consensus-PCR*) allows for comparing and identifying variations in the genetic content of homologous bacterial strains (Versalovic *et al.*, 1991).

cause of severe anemia of the patient was colonization by *Klebsiella oxytoca*. However, the evidence that the transfemoral amputation of the limb that presented the eschar contaminated with *Klebsiella oxytoca*, led to the cure of chronic anemia and the cessation of diarrhea and infiltrate of the left lower limb, confirms that the decision made resulted in curative treatment. These satisfactory and long-lasting results resulting from the amputation greatly improved the patient's quality of life.

Finally, it is hoped that this work will contribute to the discussion on the importance of the pathogenicity of Ko in humans and provide subsidies for future research on it.

ACKNOWLEDGEMENTS

to HCC through Superintendent Rafael Brackmann.

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