

## A Case Of Pneumonia Caused By *Neisseria animaloris*

### *Neisseria animaloris*'in neden olduğu bir pnömoni olgusu

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#### ABSTRACT

*Neisseria animaloris* is a rare zoonotic pathogen, considered to be a commensal of the canine and feline oral cavities. It is able to cause infections in animals and rarely in humans, usually wound infections after a biting trauma. However, recently it has been reported that it is also a factor in many different human infections. This may be because of the increase in identification possibilities. In this report, we presented a 77-year-old male patient with *N. animaloris* pneumonia, hospitalized in the intensive care unit, without a history of an animal bite or contact. This is the first case of ventilator-associated pneumonia caused by *N. animaloris* in the available literature.

**Key words:** *Neisseria animaloris*, ventilatör ilişkili pnömoni, pnömoni.

#### ÖZET

*Neisseria animaloris*, köpek ve kedi ağız boşluklarının bir kommensali olarak kabul edilen, nadir görülen bir zoonotik patojendir. Hayvanlarda ve nadiren insanlarda enfeksiyonlara neden olabilir, genellikle ısırma travması sonrası yara enfeksiyonlarına neden olabilir. Ancak son zamanlarda birçok farklı insan enfeksiyonunda da etken olduğu bildirilmiştir. Bunun nedeni, tanımlama olanaklarının artması olabilir. Bu yazıda hayvan ısırığı ve teması olmayan, yoğun bakım ünitesinde yatırılan *N. animaloris* pnömonisi olan 77 yaşında erkek hasta sunuldu. Bu olgu, ulaşılabilen literatürde *N. animaloris*'e bağlı gelişen ventilatör ilişkili pnömoninin ilk olgudur.

**Anahtar Kelimeler:** *Neisseria animaloris*, ventilatör ilişkili pnömoni, pnömoni.

#### INTRODUCTION

*Neisseria animaloris* is a gram-negative coccobacillus, unlike other *Neisseria* species bacteria, which usually have diplococci morphology. It is non-motile and both catalase and oxidase positive. Unlike many other *Neisseria* species, they can grow on MacConkey agar and reduce nitrate like the members of the family *Enterobacteriaceae*. They are part of the normal oral flora of cats and dogs (1-3).

Almost all the human infections caused by *N. animaloris* are animal bite wound infections (1-3). Cases of pneumonia due to *N. animaloris* have been reported in cats (1), but there is no reported case of

pneumonia in humans yet, in the available literature.

In this report, we presented an *N. animaloris* pneumonia in a patient hospitalized in the intensive care unit (ICU), without a history of animal bite or contact. This is the first case of pneumonia due to *N. animaloris* in the accessible literature.

#### CASE REPORT

A 77-year-old male patient who was hospitalized in an external center for one week and was referred to our tertiary-care hospital was intubated in the intensive care unit (ICU) due to intracranial hemorrhage and

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nosocomial pneumonia. He had a past medical history of diabetes mellitus and hypertension and no history of animal-related trauma. Empirically imipenem treatment for pneumonia was continued. The treatment was stopped after 14 days due to the lack of growth in the endotracheal aspirate (ETA) culture requested on the day of admission to our hospital. On the 77th day of his hospitalization, he had a fever, purulent endotracheal secretion, and deterioration in oxygenation saturations. He was still intubated and not treated with any antibiotics. The carbapenem-resistant *Pseudomonas aeruginosa* and *Acinetobacter baumannii* growth in ETA culture. Meropenem + colistin + fosfomycin treatments were started for 14 days with the diagnosis of ventilatory-associated pneumonia (VAP), and after 14 days the patient had clinical improvement. On the 96th day of his hospitalization, the patient continued to be intubated without antibiotic therapy and fevers started up to 38.3°C degrees. FiO<sub>2</sub> was %30, SO<sub>2</sub> was %100 and there was no worsening in oxygenation. There was an increase in white blood cells (WBC) from 9800 <sup>3</sup>/μl to 16100 <sup>3</sup>/μl, in neutrophil count from 6500 <sup>3</sup>/μl to 12000 <sup>3</sup>/μl, in CRP from 9,7 mg/dL to 16,4 mg/dL (N: 0-0,5 mg/dL). Abundant purulent endotracheal secretions began. In his chest X-ray new lobar infiltrations were seen in the right upper lobe. Two bottles of blood cultures and ETA cultures were taken. There was no growth in the blood cultures. epithelial cells <10, leukocyte count >25, and plenty of intracellular gram-negative coccobacilli were seen in the ETA culture. As a result of the ETA culture, 10<sup>5</sup> gram-negative colony growth was detected. A single strain of gram-negative bacillus was isolated in passages taken on eosin-methylene blue (EMB) agar and %5 sheep blood agar. Bacterial identification was achieved in the BD Phoenix (Becton Dickinson, Sparks, MD, USA) automated system with the BD Phoenix NMIC/ID panel. ETA culture resulted as *N.animaloris*. Antibiogram test could

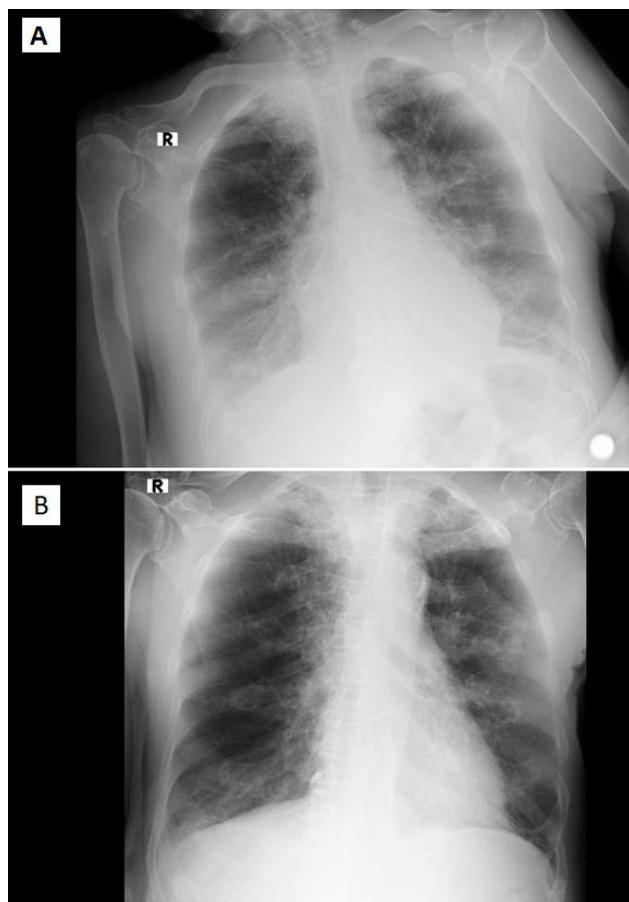
not be studied by the microbiology laboratory due to the lack of specific recommendations for *N. animaloris* in the current antibiotic susceptibility test guidelines (4,5). Thereupon, we reviewed studied antibiograms and articles on wound infections due to *N. animaloris* (2,3). According to the minimal inhibitory concentration (MIC) values, the agent was resistant to penicillin G, oxacillin, cefuroxime and gentamicin. It was found to be sensitive to ampicillin, imipenem, meropenem, and ciprofloxacin treatments. With these findings, we consider VAP due to *N. animaloris*. Since the patient was in the critically ill group, antibiotic therapy was desired to be extensive, so we started IV meropenem 3x1 gr + ciprofloxacin 2x400 mg. Fever heights regressed, and he was followed up intubated. WBC decreased to 9300 <sup>3</sup>/μl, neutrophil count decreased to 5900 <sup>3</sup>/μl, purulent secretions regressed, and right lung infiltrations regressed. There was no bacterial growth in the ETA culture sent after antibiotic therapy and after 14 days of the antibiotic therapy was stopped.

## DISCUSSION

Human infections involving *N. animaloris*, former CDC group EF-4a, usually present themselves as wound infections associated with cat or dog bites (1-3,6). However, it is a fact that many different factors have been reported in recent years, thanks to the developments in the identification of microorganisms. In this case report, it is aimed to contribute to the scientific literature by presenting *N. animaloris* pneumonia in a patient who has been hospitalized in the intensive care unit (ICU) for a long time without a history of animal contact.

In a study by Heydecke et al. (2), 13 patients with wound infections after an animal bite (cat or dog) were evaluated. In their microbiological cultures, *N.animaloris* was isolated in 11 patients and these growths were confirmed by molecular methods. Tüzümen et al. (7)

reported the first case of infective endocarditis due to *N. animaloris* from Turkey.



**Figure 1A.** Postero anterior lung graphy (before the treatment). **1B.** Postero anterior lung graphy (after the treatment).

In a case report, *N. animaloris* isolated in the culture of a specimen from the ear of a patient with chronic otitis media who had tinnitus and discharge for 9 months. It was reported that the patient had dogs and his dogs licked his ears (6).

While reported cases generally caused acquired infections, Prathap et al. (8) reported as a peritonitis agent in a peritoneal dialysis patient, and Dul et al. (9) also reported that *N. animaloris* was isolated as a bacteremia agent in a patient with metastatic liver cancer. Helmig et al. (10) reported a case with a hand

infection and associated nonhealing wound. The case we presented was a case that had been in the ICU or a long time and had no animal contact.

Most previously reported cases of *N. animaloris* in cats have involved fatal necrotizing pneumonia. Baral et al. (11) reported a localized infection of the retropharyngeal/mandibular tissues in a cat, which responded to surgical drainage and a 5-week course of amoxicillin-clavulanate. Another study reported granulomatous pneumonia in a tiger cup (12). Foster et al. (13) isolated *N. animaloris* in the lungs and internal organs of porpoises injured by grey seals.

However, no case with *N. animaloris* infection isolated from human respiratory system infection was found in the available literature.

Although there are authors reporting that *N. animaloris* can be transmitted by skin contamination (14), the clinical picture of the presented case and the fact that the same agent was isolated in the culture taken twice, prevented us from the possibility of contamination.

Although very few human infections have been reported in the literature, there are also researchers who argue that the reason why *N. animaloris* is a rare cause of infection may be related to misdiagnosis (2-10). Heydecke et al. (2) showed growth of *N. animaloris* on both blood and chocolate agar after 2 days of incubation in ambient air. Therefore, they suggested that sometimes the pathogen is not recognized, which is a result of difficulties with the identification and not of poor growth.

Akhremenko et al. (15) in their studies investigating the factors in children with gingivitis reported that *N. animaloris* growth was also present in addition to many microorganisms. In this case, it can be thought that VAP has developed with microaspiration of microorganisms in the oral flora of the patient with the diagnosis of VAP. However, no sample was taken from

the patient's gingiva in order to investigate *N. animaloris*.

In conclusion, it is important to keep in mind that these bacteria, which are generally associated with wound infection in humans and are found in the oral flora of cats and dogs, can also be found in the human respiratory system and may lead to clinical pictures such as aspiration pneumonia and VAP, especially in patients in the ICU. Standardization is needed in terms of both clinical approach and antibiotic susceptibility tests for optimal treatment of pneumonia cases due to this agent.

**Informed Consent:** Informed consent was obtained from the patient's first-degree relatives.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

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## REFERENCES

1. Ceyskens K, Devriese LA, Maenhout T. Necrotizing pneumonia in cats associated with infection by EF-4a bacteria. *Zentralbl Veterinarmed B*. 1989;36(4):314-316.
2. Heydecke A, Andersson B, Holmdahl T, Melhus A. Human wound infections caused by *Neisseria animaloris* and *Neisseria zoodegmatis*, former CDC Group EF-4a and EF-4b. *Infect Ecol Epidemiol*. 2013;3.
3. Suárez-López A, Ruiz-Garbajosa P, Sánchez-Díaz AM. Infección de herida por mordedura de gato. *Enferm Infecc Microbiol Clin*. 2018; 36:194–195.
4. CLSI. Performance Standards for Antimicrobial Susceptibility Testing. 31st ed. CLSI supplement M100. Clinical and Laboratory Standards Institute; 2021
5. EUCAST: Clinical breakpoints and dosing of antibiotics. [https://www.eucast.org/clinical\\_breakpoints/](https://www.eucast.org/clinical_breakpoints/), Accessed: 2021-07-18
6. Roebuck JD, Morris JT. Chronic otitis media due to EF-4 bacteria. *Clin Infect Dis*. 1999; 29(5): 1343-1344.
7. Tuzemen NU, Hemiş RB, Yiğit M, Kapsız M, Efe K, Tuncel T, et al. First case of infective endocarditis associated with *Neisseria animaloris*. *Klimik Derg*. 2018; 31(2): 161-164.
8. Prathap S, Ahuja S, Pellegrino B. Novel description of *Neisseria animaloris* peritonitis in a peritoneal dialysis patient [Abstract]. *Am J Kidney Dis*. 2013; 61(4): B90.
9. Dul MJ, Shlaes DM, Lerner PI. EF-4 bacteremia in a patient with hepatic carcinoid. *J Clin Microbiol*. 1983; 18(5): 1260-1261.
10. Helmig KC, Anderson MS, Byrd TF, Lemay CA, Moneim MS. A Rare Case of *Neisseria animaloris* Hand Infection and Associated Nonhealing Wound. *Journal of Hand Surgery Global Online*. 2020;2(2): 113-115.
11. Baral RM, Catt MJ, Soon L, Martin P, Bosward KL, Chen SC, et al. Successful treatment of a localised CDC Group EF-4a infection in a cat. *J Feline Med Surg*. 2007;9(1):67-71.
12. Lloyd J, Allen JG. The isolation of group EF-4 bacteria from a case of granulomatous pneumonia in a tiger cub. *Aust Vet J*. 1980;56(8):399-400.
13. Foster G, Whatmore AM, Dagleish MP, Malnick H, Gilbert MJ, Begeman L, et al. Forensic microbiology reveals that *Neisseria animaloris* infections in harbour porpoises follow traumatic injuries by grey seals. *Sci Rep*. 2019;9(1):14338.
14. Peel MM, Holmes B. Isolation of group EF-4 bacteria in Australia. *Aust N Z J Med*. 1980;10(4):435-437.
15. Akhremenko YA, Cheremkina AS, Tarasova LA, Ushnitsky ID. Microbiocenosis in inflammatory processes of marginal gum among children. *Wiad Lek*. 2015;68(4):493-495.

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