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## Case report

# *Lophomonas* sp. in the upper and lower respiratory tract of patients from a hospital in Lambayeque, Peru: clinical case studies

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## ABSTRACT

Infections with protozoans, mainly due to immunodeficiency, are common all over the world. However, pulmonary infections with protozoans are less frequent. *Lophomonas* sp. is a flagellated protozoan that lives in the gastrointestinal tract of some species of cockroaches. Some cases, that show the presence of *Lophomonas* in populations whose lungs are affected, have been reported. **Case report:** The medical records of nine patients were studied: seven adult patients and two pediatric patients who were in the Intensive Care Unit (ICU) and in the Neonatal Intensive Care Unit (NICU), respectively. The samples were taken from tracheal aspirations and bronchoalveolar lavages. The patients' ages were between 9 and 95 years, and 60% of them were male. Some of the patients were healthy, a priori, and others were immunosuppressed. There were found three patients with neoplasia, two patients with diabetes mellitus and four patients with no systemic pathologies. It is concluded that *Lophomonas* sp. is a protozoa parasite which emerges from the upper and lower respiratory tract of hospitalized patients. However, its pathogenic role is still controversial in all cases, that's why it merits further study for its understanding and possible treatment.

## 1. Introduction

Infections with protozoans are common all over the world, due to the increase of immunosuppressed patients, mainly, caused by neoplasms, autoimmune diseases, and the human immunodeficiency virus (HIV) [1]. Pulmonary infections with protozoans are rare; however, the possible infection with *Lophomonas* sp. is being emphasized nowadays [2]. Recently, it is more common, to observe protozoans as emerging pathogens.

*Lophomonas* sp is a flagellated protozoan that resides, naturally, in the gastrointestinal tract of nymphs and adults of some species of cockroaches such as *Blatta orientalis*, *Periplaneta americana* and *Blattella germanica* [2,3]. Inside the intestines of these insects, *Lophomonas* sp. facilitates the digestion of cellulose [4]. Vectors remove *Lophomonas* sp. through the feces, *Lophomonas* remains as cysts in the environment that would be mean to come into the human airways. This is a rare but important pathogen in bronchopulmonary infections and infections in the upper respiratory tract. Even though there are a series of cases published, there is not an active search yet, mainly because the

personnel of the health system is not well-trained when identifying it and do not know its pathogenic function. Six cases have been reported in Peru [5] and after that, some isolated cases have been reported in populations with pulmonary affections [6].

*Lophomonas* is ovoid, round, or has pear shape (when stained with Wright-Giemsa). It is 20–60 μm long and 12–20 μm wide. It has a calyx, perinuclear tubules, and an axial filament. The cytoplasm looks granulated and there is the presence of particles of engulfed feed [4]. In one of the apical poles, the protozoa have a tuft of flagella with not regular orientation. The external flagella are smaller, is separated, and vibrate freely, in the fluid environment [7].

The cases were identified in the registers of the Hospital Regional Lambayeque's Bacteriological Laboratory. After the Institutional Ethics Committee approved it, we got access to the medical records.

This study is aimed to make an active search of clinical cases with *Lophomonas*' presence in the Hospital Regional Lambayeque in the period from 2015 until 2017 and to describe the patients' clinical characteristics.

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## 2. Cases report

During the years of 2015, 2016, and 2017, after making a microscopic examination of tracheal aspirations and bronchoalveolar lavages, nine patients with confirmed presence of *Lophomonas* were found.

To carry the study we took samples, from tracheal aspirations of patients who had tracheal intubation and from bronchoalveolar lavages, via bronchoscopy, (sterilization directions were followed). Five of the cases were male, between the ages of 11 and 74 years, including two pediatric patients. All the adult patients were in the ICU. Six of the patients had respiratory issues. Fever and dyspnea were the most common symptoms. Also, in six cases the presence of leukocytes in the sample was significant (more than 25 cells per microscope field of view with 400 magnifications) Table N° 01.

All patients have treated with metronidazole 500 mg every 12 hours for 15 days, added to the conventional treatment according to the medical condition of the patient. It was impossible to make a follow-up of the patients.

## 3. Discussion

The results of this study proved the presence of *Lophomonas sp.* in adults and pediatric patients from Lambayeque, most of them, hospitalized in the ICU, some of them with lung problems.

This protozoan was identified by optical microscopy. It was distinguished from the pulmonary ciliated cells because of the movement and the type of cilium in fresh samples. The Giemsa method of staining was performed, also the Wheatley's trichrome staining method was performed with the sample that includes sputum; bronchoalveolar lavage, bronchial brushing, and tracheal aspirations were also performed. Only the samples taken from bronchoalveolar lavages and tracheal aspirations were used in this study, the same those were used to diagnose the protozoa, according to Xue's revision (2014) [8]. Nowadays, it is impossible to use an appropriate culture media or a gene probe for *L. blattarum*, it was only possible to recognize it by using optic and electronic microscopy. It is hard to differentiate *L. blattarum* and bronchial ciliated cells, the microscopist expert can found the differences. In Leifson's stain, the bronchial ciliated cell can be differentiated from *Lophomonas*, also bronchial ciliated presented with columnar shape, red nuclei, bluish cytoplasm, and inserted cilia, which is like waving flagella [9].

In a revision made in 2013, 61 cases were found: 53 (86%) in China, 6 (9.8%) in Lima, Peru, and 2 cases (3.3%) in Spain. 70.9% were male [2]. In 2014 a new revision was conducted, and 136 cases were found. The patients' ages were from 9 to 95 years, 60% were male some of them were healthy, a priori, and others immunosuppressed. Again, most of the

cases were found In China, followed by Peru and then Spain [8]. These findings are similar to ours: a wide range of ages, similar percentages of gender and both, health and immunosuppressed patients. It indicates that *Lophomonas* enters the host regardless of the age, the sex, and the immune status. The reviewed publications show that there are new findings in countries like Turkey [3], Iran [10], India [11], and Chile [12]. Our study has shown that there are also cases in Peru; it may indicate that *Lophomonas* could be found in any country in it is being identified more frequently [2,4,8,13].

According to the case reports, the most common pre-existing condition is immunosuppression (approximately 70% of the patients), other conditions are, patients during the post-transplant periods (approximately, 30%) [2,10] or patients with acute myeloid leukemia (AML) [12]. In our study 3 of the patients had neoplasia, two had diabetes mellitus and 4 had non-systemic pathologies. Other symptoms of infections by *Lophomonas* are pneumonia, pleural effusion, bronchiectasis, and pulmonary abscess [1]. Possible infection by *Lophomonas* in the respiratory tract could complicate other pre-existing respiratory conditions in hospitalized patients, worsening their clinical condition. Doctors should pay attention to the laboratory exams to avoid complications.

*Lophomonas* has a non-specific clinical manifestation but it is always accompanied by immunosuppression. In adult patients, the most common symptoms are similar to other conditions like bronchial asthma, pneumonia, bronchiectasis, or lung abscesses and there is almost always coughing [2], frequently found in patients in ICU and hospitalized by a long time. These findings were present in our case reports. It is worth mentioning that *Lophomonas* has been identified not only in patients with respiratory conditions but also in cases with sinusitis and cases with urinary conditions [8,10].

It is thought that in hospitals the environment contaminated by cockroach causes the respiratory parasite, *Lophomonas*, to be the reason for high respiratory and broncho-pulmonary infections. It has an air mean of entry, but it is still unknown how it gets into the respiratory tract and airborne infection [14]. The increase of clinical cases will alert the health system's services and more studies should be carried to identify it and know its infectivity and pathogenesis in humans as well as an effective treatment. The patients can be treated receiving metronidazole, tinidazole, or ornidazole [15]. The prevention of the infection can be reduced by improving the hospital's hygiene level and control of insects' infestation, these may eradicate parasitic infection [16].

This multiflagellated protozoan needs to be differentiated from the bronchial epithelial hair ciliated and Creola bodies to be identified. However, a well-trained microbiologist can identify it by considering some morphological criteria. In this study, it was impossible to determine how the patients ended up, neither if the treatment was effective because the presence of *Lophomonas* was an incidental finding in

**Table 1**  
Characteristics of the patients diagnosed with *Lophomonas* in Lambayeque Perú.

Case	Age (sex)	Clinic	Service	Sample	Comorbidity	Observation
1	24 (M)	Fever, vomit.	ICU	Tracheal aspiration	Brain tumor	Hospitalized for a month.
2	61 (M)	Headache.	ICU	Tracheal aspiration	Meningioma Brain	Hospitalized for a month.
3	50 (M)	Fever, coughing, dyspnea	ICU	Bronchoalveolar lavage	Sepsis, IRA, DM2, Tuberculosis	Presented pleural effusion in the base. Hospitalized for a month.
4	26 (M)	Dyspnea, fever.	ICU	Bronchoalveolar lavage	ARI, Liver failure, IHP. Leptospirosis.	<i>Pseudomona aeruginosa</i> was isolated
5	12 (F)	Hemoptisis, cervical lymphadenopathy	Pediatric	Bronchoalveolar lavage	Apparently healthy	None
6	74 (F)	Cronic coughing.	ICU	Tracheal aspiration	Cervical trauma	Other pathologies discarded, no tuberculosis.
7	64 (F)	Dyspnea and chest pain.	ICU	Bronchoalveolar lavage	Massive pleural effusion. Pulmonary malignant neoplasm	None
8	65 (M)	Coma	ICU	Tracheal aspiration	HBP, DM2.	
9	11 (F)	Hemoptisis, coughing.	Pediatric	Bronchoalveolar lavage	Apparently healthy	Tuberculosis discarded

M: male. F: female IUC: Intensive Unit Care DM2: Diabetes Mellitus 2 HBP: High blood pressure ARI: Acute Respiratory Infection IHP: Intra-hospital pneumonia.

bronchoalveolar lavages' liquid and tracheal aspirations and it was not considered relevant at the time. Therefore, the appearance of *Lophomonas* sp. in hospitalized patients could be underestimated because there is not an active and deliberate search in the correct samples. The personnel of the health system is not well-trained to identify the protozoa, there are not commercial culture media and there is not too much scientific information about it.

It is recommended to identify this protozoan during the differential diagnosis of patients with pulmonary infection and upper and lower airways without any known etiology. Also, clinical laboratories should consider the active search of this protozoan in bronchoalveolar and tracheal, aspirations' liquid, mainly in samples of immunosuppressed patients who are hospitalized in the ICU; also it is recommended to conduct epidemiological monitoring in areas of the hospitals.

It is concluded that *Lophomonas* sp. is a protozoa parasite that emerges from the upper and lower respiratory tract of hospitalized patients. Its pathogenic role is still controversial in all cases, that's why it merits further study for its understanding and possible treatment.

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### Author contribution

All authors should have made substantial contributions to all of the following [1]: the conception and design of the study, or acquisition of data, or analysis and interpretation of data [2], drafting the article or revising it critically for important intellectual content [3] final approval of the version to be submitted.

### Declaration of competing interest

Authors do not have any conflict of interests.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rmcr.2020.101142>.

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