as is the use of home-based therapies, including home mechanical ventilation, long-term oxygen therapy and nebulizers.

Spirometries are performed so far with a Masterlab Pneumatic Tachograph (Erich Jaeger GHBH, Würzburg, Germany). The spirometer is calibrated daily, and the results adjusted by the atmospheric conditions. Patients are instructed to withhold their inhaler medication on the day of the test, in order to record pre- and post-bronchodilator spirometry. If this is not the case, then the spirometry is considered post-bronchodilator. The bronchodilator test is performed after the administration of 400 μg of salbutamol via a pressured metered dose inhaler with a chamber. The spirometry is performed according to current standards assessing the quality of the results. Parameters recorded in absolute values and percentage predicted values are forced vistal capacity (FVC), FEV_1, FEV_1/FVC ratio, peak expiratory flow, and forced expiratory flow between 25% and 75% of the FVC. The main limitation is in relation to the non-use of advanced diagnostic techniques beyond those recommended for clinical practice.

TRACE is a prospective cohort study is an opportunity to identify specific patients who have a specific response to various treatments using tools available to any clinician. Their results may provide new information on how to make a more personalized medicine in real clinical practice.

Final declarations

Funding. TRACE is funded by an unrestricted grant from Gebro Pharma laboratories.

Conflicts of interest

JLLC has received honoraria during the last 3 years for lecturing, scientific advice, participation in clinical studies or writing for publications for (alphabetical order): AstraZeneca, Boehringer Ingelheim, Chiesi, CSL Behring, Esteve, Ferrer, Gebro, GlaxoSmithKline, Grifols, Menarini, Novartis, Rovi, and Teva.

Acknowledgment

The authors are thankful to Hispamed Servicios Biomedicos (https://www.hispamed.com/) for their assistance in improving the English in the original version.

References

1. Wacker ME, Kitzing K, Jorres RA, Leidl R, Schulz H, Karrasch S, et al. The contribution of symptoms and comorbidities to the economic impact of COPD: an analysis of the German COSYCONET cohort. Int J Chron Obstruct Pulmon Dis. 2017;12:3437–48.
2. Perez de Llano L, Cosio BG, Miravitlles M, Plaza V. Accuracy of a new algorithm to identify Asthma-COPD Overlap (ACO) patients in a cohort of patients with chronic obstructive airway disease. Arch Bronconeumol. 2017.
3. Vogelmeier CF, Criner GJ, Martinez FJ, Anzueto A, Barnes PJ, Bourbeau J, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 report: GOLD executive summary. Arch Bronconeumol. 2017;53:128–49.
4. Miravitlles M, Soler-Cataluna JJ, Calle M, Molina J, Almagro P, Quintano JA, et al. Spanish Guidelines for Management of Chronic Obstructive Pulmonary Disease (GesEPOC) 2017. Pharmacological treatment of stable phase. Arch Bronconeumol. 2017;53:324–35.
5. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987;40:373–83.
6. Divo M, Cote C, de Torres JP, Casanova C, Marin JM, Pinto-Plata V, et al. Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2012;186:155–61.
7. Frei A, Muggensturm P, Putcha N, Siebeling L, Zoller M, Boyd CM, et al. Five comorbidities reflected the health status in patients with chronic obstructive pulmonary disease: the newly developed COMCOLD index. J Clin Epidemiol. 2014;67:904–11.
8. Groll DL, To T, Bombardier C, Wright JG. The development of a comorbidity index with physical function as the outcome. J Clin Epidemiol. 2005;58:595–602.
9. Soler-Cataluna JJ, Rodriguez-Roisin R. Frequent chronic obstructive pulmonary disease exacerbators: how much real, how much fictitious? COPD. 2010;7:276–84.

Laura Carrasco Hernández [a] Candela Caballero Eraso [a,b]
María Abad Arranz [a] Eduardo Márquez Martín [a]
Carmen Calero Acuña [a,b] Jose Luis Lopez-Campos [a,b,*]

[a] *Unidad Médico-Quirúrgica de Enfermedades Respiratorias. Instituto de Biomedicina de Sevilla (IBiS), Hospital Universitario Virgen del Rocio/Universidad de Sevilla, Spain*
[b] *CIBER de Enfermedades Respiratorias (CIBERES), Instituto de Salud Carlos III, Madrid, Spain*

* Corresponding author.
E-mail address: lopezcampos@separ.es (J.L. Lopez-Campos).

https://doi.org/10.1016/j.arbres.2020.10.022

Lung infection caused by *Lophomonas blattarum*☆

Infección pulmonar por Lophomonas blattarum

To the Editor:

We report a series of 6 cases, 4 women and 2 men, with a median age of 57 years, all of whom had comorbidities involving immunosuppression. They were admitted with respiratory symptoms and a chest X-ray with pulmonary infiltrates consistent with bacterial pneumonia. Empirical antibiotic treatment was administered in all cases. No response was obtained, patients deteriorated progressively, and cultures were negative.

Case 1: An 18-year-old female patient was referred from an urban area with a diagnosis of left pleural empyema. A simple chest CT scan revealed infected pulmonary sequestration in the left lower lobe. A left lower lobectomy was performed by lateral thoracotomy, without complications. An examination of the surgical piece detected *Lophomonas blattarum* infection (Fig. 1), so treatment began with metronidazole. The patient's postoperative progress was favorable and she was discharged on the fifth day with complete resolution of her respiratory symptoms.

Case 2: A 52-year-old male patient from a rural area with a history of chronic renal failure was admitted with severe acute respiratory failure. Complete blood count and chest X-ray were performed, and were consistent with community-acquired pneumonia (CAP). He received empirical antibiotic treatment and oxygen therapy but showed no improvement. In view of the lack of response, bronchoscopy was performed and samples were collected. A direct study showed flagellated parasites and intravenous metronidazole began, with great improvement. The patient completed 20 days of home treatment, with complete resolution.

Case 3: A 55-year-old male patient from an urban area with a history of pulmonary tuberculosis treated with isoniazid and

☆ Please cite this article as: Pinos Vélez N, Ordoñez Vintimilla R, Agreda Orellana S. Infección pulmonar por *Lophomonas blattarum*. Arch Bronconeumol. 2021;57:594–596.

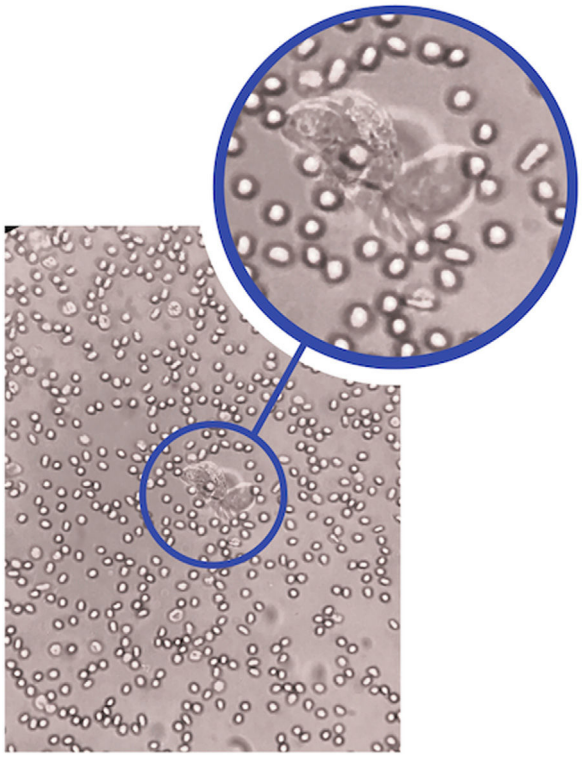

Figure 1. A microscopic view of *Lophomonas blattarum*.

rifampicin was admitted for severe respiratory failure requiring orotracheal intubation. Due to a high suspicion of superinfection, empirical antibiotic therapy began, but given the lack of response, bronchoscopy was performed and direct examination of the sample showed a flagellated protozoan (*Lophomonas blattarum*). Treatment began with intravenous metronidazole, and the patient improved progressively. He remained in hospital until 7 days of intravenous treatment were completed and was discharged with oral metronidazole. He remains in good condition.

Case 4: A 59-year-old female patient from a rural area, with a history of renal cell carcinoma in remission, was admitted with a severe respiratory process. Chest CT was consistent with CAP, so empirical antibiotic therapy began, with partial improvement. Direct examination of sputum revealed flagellated parasites (*Lophomonas blattarum*), so treatment was supplemented with oral metronidazole. The patient improved quickly and was discharged to complete the regimen at home.

Case 5: A 69-year-old female patient from a rural area, with a history of chronic renal failure receiving dialysis, was admitted for respiratory symptoms. Chest CT and complete blood count were consistent with severe pneumonia, so she started empirical antibiotic therapy, without improvement. Samples were obtained by bronchoscopy and direct examination showed *Lophomonas blattarum*. Treatment started with intravenous metronidazole, and the patient showed gradual improvement.

Case 6: A 79-year-old female patient from a rural area, with a history of diabetes mellitus receiving treatment with insulin, was admitted for severe respiratory failure requiring orotracheal intubation. Results of the additional examinations including complete blood count and chest CT led to a diagnosis of severe pneumonia. Management began with empirical antibiotic therapy, with no response and gradual deterioration. A bronchoscopy was performed in which infection with *Lophomonas blattarum* was detected, so treatment with intravenous metronidazole started without improvement. The patient deteriorated progressively and died on day 10.

The species *Lophomonas blattarum* is a round, oval, or pyriform protozoan, 20–60 mm long and 12–20 mm wide. It has a granular cytoplasm, and its apical pole has irregular flagellae which vibrate to help it move. These parasites are found in the intestinal tract of some termites and cockroaches, while infection in humans is rare and closely related to states of chronic immunosuppression. The form of transmission is by direct ingestion of the feces of an infected termite or cockroach. The symptoms mimic a respiratory infection and can include cough with or without expectoration, chest pain, respiratory failure, etc., and bilateral pulmonary infiltrates on chest X-ray, so it is commonly confused with pneumonia. Diagnosis is confirmed by the identification of the parasite in respiratory secretions[1–3].

Few cases of lung infection with *Lophomonas blattarum* have been reported in the literature: most are from China, where 137 cases have been reported to date, while 6, 2, 1, and 1 cases have been reported in Peru, Spain, Mexico and the Arab Emirates, respectively. In previous series, most patients are male, while women predominate in ours. Almost all are adults (3 children in Peru and 1 in Mexico) and are immunocompromised (69.1% in the literature vs. 100% in our study) or have previous or concomitant lung infections, similar to the situation presented in our series[4–13].

In all patients, both in the existing literature and in our series, the symptoms presented are typical of a respiratory infection (cough, expectoration, fever, chest pain), with a chest X-ray suggestive of pneumonia, so it is often confused with this disease. Diagnosis is based on the direct live observation of the parasite in sputum, bronchoalveolar lavage, bronchial brushing or tracheal aspirate. Care should be taken not to confuse the parasite with ciliated bronchial epithelial cells that resemble *Lophomonas* morphology in form and characteristics, the main difference being the constant mobility of the parasite — the vibration of its apical flagellae that it uses to move around can be clearly observed under the microscope[4–13].

Treatment is based on oral or intravenous metronidazole administration for patients weighing over 40 kg. The dose is 500 mg every 8 h for 20–30 days, depending on the severity of the infection, and for children the dose is calculated at 30–40 mg/kg/day divided into 3 doses. No resistance to this treatment has been reported to date[4–13].

In conclusion, this is a rare parasitic infection, which should be suspected in individuals with comorbidities that predispose to immunosuppression, who after being in an endemic place develop a lung infection that responds poorly to antibiotic treatment.

References

1. Martínez-Girón R, Martínez C, Van Woerden H. The prevalence of protozoa in the gut of German cockroaches with special reference to *Lophomona blattarum*. Parasitol Res. 2017;116:3205–10.
2. Martínez-Girón R, Van Woerden H. *Lophomonas blattarum* and bronchopulmonary disease. J Med Microbiol. 2013;62:1641–8.
3. Martínez-Girón R, Esteban J, Ribas A, Doganci L. Protozoa in respiratory pathology: a review. Eur Respir J. 2008;32:1354–70.
4. Gonzalez N, Otero F, Rivas F. Bronchopulmonary infection by *Lophomonas blattarum* in a pediatric patient after hematopoietic progenitor cell transplantation: first report in Mexico. J Thorac Dis. 2017;9:899–902.
5. Mu X, Shang Y, Zheng S, Zhou B, Yu B, Dong XS, et al. A study on the differential diagnosis of ciliated epithelial cells from *Lophomonas blattarum* in bronchoalveolar lavage fluid. Zhonghua Jie He He Hu Xi Za Zhi. 2013;36:646–50.
6. Zhang X, Xu L, Wang L, Liu S, Li J, Wang X. Bronchopulmonary infection with *Lophomonas blattarum*: a case report and literature review. J Int Med Res. 2011;39:944–9.
7. Yao G, Zhou B, Zeng L. Imaging characteristics of bronchopulmonary *Lophomonas blattarum* infection: case report and literature review. J Thorac Imaging. 2009;24:49–51.
8. Shi YL, Li LH, Liao Y, Li XN, Huang XY, Liu J, et al. Diagnosis and treatment of *Lophomonas blattarum* infection in 26 patients with bacterial pneumonia. Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi. 2007;25:430–1.

9. Wang Y, Tang Z, Ji S. Lung *Lophomonas blattarum* infection after renal transplant-attached 4 reports. Chin J Nephrol Dial Transpl. 2006;15:130–5.
10. Wang Y, Tang Z, Ji S, Zhang Z, Chen J, Cheng Z, et al. Pulmonary *Lophomonas blattarum* infection in patients with kidney allograft transplantation. Transpl Int. 2006;19:1006–13.
11. Yang Y, Dong H, Wang R. One case of *Lophomonas blattarum* in sputum. Shanghai YiXue Jian Yan Za Zhi. 2000;15:35.
12. Yao G, Cheng S, Chang Z. One case of bronchopulmonary infection with *Lophomonas blattarum*. Zhonghua Jie He He Hu Xi Za Zhi. 1999;22:507.
13. Chen S, Meng Z. Report on one case of *Lophomonas blattarum* in respiratory tract. Zhongguo Ji Sheng Chong Xue Yu Ji Sheng ChongBing Za Zhi. 1993;11:28.

Nathalie Pinos Vélez,[a,b,*] Ricardo Ordoñez Vintimilla,[b] Solmayra Agreda Orellana[c]

[a] *Unidad de Pulmonar, Hospital José Carrasco Arteaga, Cuenca, Ecuador*
[b] *Unidad de Cirugía de Tórax, Hospital Universitario del Río, Cuenca, Ecuador*
[c] *Laboratorio, Hospital Universitario del Río, Cuenca, Ecuador*

Corresponding author.
E-mail address: nathaliepinos@hotmail.com (N. Pinos Vélez).

https://doi.org/10.1016/j.arbr.2021.06.005

Forum COPD working group consensus on the diagnosis, treatment and follow-up of COPD☆

Consenso sobre el diagnóstico, tratamiento y seguimiento de la EPOC: Grupo de trabajo EPOC Forum

Corresponding author.
E-mail address: lcampos@separ.es (J.L. López-Campos).
To the Editor:

Despite the numerous strategic plans for the prevention and management of chronic obstructive pulmonary disease (COPD) that have been implemented to date, high prevalence, underdiagnosis, and burden of care all remain a challenge in clinical practice[1–4]. Some of the main difficulties in COPD management include the prioritization and degree of control of treatable traits, and problems with inhaled therapy, such as device selection and patient adherence to prescribed maintenance treatment[3,5–8]. Moreover, new care strategies and, above all, new therapeutic strategies are scene-changers in the clinical management of COPD. The aim of this study was to reach a consensus among COPD experts on controversial issues in the evaluation and treatment of the disease, using Delphi methodology[9].

A scientific committee of 17 COPD experts participated in the project. The project coordinators selected a committee of SEPAR members whose profile demonstrated a consolidated background in COPD supported by publications, while ensuring that the whole of Spain was represented by regions. The committee analyzed the scientific evidence in four areas: therapeutic adherence, COPD control, COPD treatable traits, and inhalation devices. This evidence was then examined in 15 discussion sessions, to which 5 attending pulmonologists from each area were invited, selected by the expert committee. Using the information obtained at these meetings, a questionnaire of 43 statements (Table 1) was developed and sent to a panel of 95 experienced COPD pulmonologists who were asked to grade them on a Likert scale of 1–9. Statements that were scored 1–3 (disagreement, median $\leq$3) or 7–9 (agreement, median $\geq$7) by more than two-thirds of the panelists, were considered to have achieved consensus. When more than two-thirds scored a statement in the range of 4–6, it was considered inconclusive. After two consecutive rounds, consensus was reached on 37 statements: 36 in agreement (83.7%) and one in disagreement (2.3%). Only six statements (14%) failed to achieve consensus. Table 1 shows the scores and the degree of agreement for each statement.

Seven of the nine statements on therapeutic adherence reached a consensus of agreement. The panelists believed that trust between the physician and the patient was important but noted that the information provided by the latter is not always reliable. Although there was no consensus on whether adherence to 12- and 24-h regimens differed significantly, panelists agreed (68.82%) that the 12-h regimen is preferable in patients with more symptomatic COPD. It was agreed that in order to increase adherence, the number of inhalers should be reduced and the patient's preferences must be taken into account.

Consensus agreement was achieved in 12 of the 14 statements on COPD control. A high percentage (>72%) agreed that control targets should be established on the basis of severity, symptoms, exacerbations, lung function, and smoking habit. Only 36.57% considered that disease impact and stability were sufficient to assess COPD control. However, there was broad agreement (93.76%) that a patient with controlled COPD shows few symptoms and no exacerbations and remains stable over time. This suggests that, in the participants' view, a patient with a persistent absence of symptoms or exacerbations over time would probably be well controlled, but it is unclear whether, as a general rule, control can be established solely on the basis of these 2 variables. This becomes clear in statement 18, in which panelists value the importance of lung function in disease control. According to the agreement reached (69.8%), a low-risk patient must be clinically stable for 1 year to be considered controlled. However, in high-risk patients, agreement was not reached (27.96%) on the statement that stability should be maintained for 3 months for a patient to be considered controlled. Most panelists (>92%) indicated their agreement with the following criteria for adjusting treatment: adherence, physical activity, comorbidities, and patient preferences.

All statements on COPD treatable traits achieved consensus agreement. Those with the greatest degree of agreement (>91%) were those that stated that these traits should be prioritized because of their impact on prognosis, symptoms and exacerbations. It was also agreed (>75%) that the definition of treatable traits should include individual, quantifiable, and prognostic traits.

Finally, of the 14 statements on inhalation devices, 11 achieved consensus agreement and 1 consensus disagreement. Nearly 74% of panelists agreed that if the inhaler is being used properly in stable COPD, treatment outcomes depend on the lung deposition achieved by the device. However, there was consensus disagreement that if the inhalation device is used properly, there are no differences in clinical outcomes, regardless of the type of device used. Nonetheless, panelists agreed that outcomes depend on the type of inhaler, lung deposition, and the characteristics of the drug. The criterion that achieved the highest degree of consensus regarding inhaler choice was inspiratory flow (92.70%). There was no consensus with the statement that there are no differences in the outcomes

☆ Please cite this article as: López-Campos JL, Calle Rubio M, Izquierdo Alonso JL, Fernández-Villar A, Abascal-Bolado B, Alcázar B, et al. Consenso sobre el diagnóstico, tratamiento y seguimiento de la EPOC: Grupo de trabajo EPOC Forum. Arch Bronconeumol. 2021;57:596–599.