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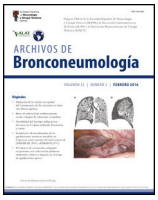

Editorial

Long-term Mortality in Community-acquired Pneumonia

Mortalidad a largo plazo de la neumonía adquirida en la comunidad

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Community acquired pneumonia (CAP) is considered a major problem of public health due to its high morbimortality.[1] To a large extent, mortality depends on the place where the patients are treated. In outpatients, the rate is less than 3%, in patients admitted to a conventional unit, the rate ranges from 5 to 10%, whereas in those patients who require admission to an intensive care unit amounts to 25% if they require orotracheal intubation and up to 50% if they require vasopressors.[2] Most studies published to date have studied the relationship between pneumonia and short-term mortality. However, there are data indicating that patients who survive a pneumonia episode have a high mortality rate, even in the medium and long term, with figures of 8, 21, and 36% after 90 days, one year, and five years, respectively.[3]

Often, an acute condition in older adults that requires hospitalization implies a subsequent clinical worsening. This issue seems to be particularly frequent in patients suffering from pneumonia. Kaplan et al.[4] assessed patients admitted for pneumonia and found that in-hospital mortality rate was the half in the control group compared with the CAP group. One-year mortality after hospital discharge and adjusted for comorbidities was 33.6% among those patients who had been discharged with a diagnosis of CAP *versus* 24.9% in the control group without CAP ($p = 0.001$).

There are several predictive factors of long-term mortality. Numerous articles highlight age as one of the main predictors of mortality. Indeed, inflammation among elderly people should be assessed independently as it probably has a distinctive role. What still remains to be clarified is the cut-off point at which age begins to be a risk factor. The number of individuals aged over 65 years has increased in recent years and that number is expected to rise from 12% in 2000 to 20% in 2030, and even reaching the double in 2050.[5] In general, the older adult population suffers from a greater number of comorbidities and the functional status is often poor. In addition, most studies point out that the male sex is associated with higher mortality rates.[4] Similarly, some authors found an alarming difference regarding race, with increased 2-year mortality rate in black individuals compared with white individuals[6]. Healthcare-associated-pneumonia has an increased risk of death, mostly due to poor functional status, advanced age, treatment restrictions and high number of comorbidities.[7] Pneumonia in these patients is usually caused by specific etiologies with a worse prognosis. Little is known about the impact of different etiologies on long-term prognosis, though.

Multiple comorbidities, such as cerebrovascular disease, cardiovascular disease, neoplasms, HIV, chronic obstructive respiratory disease, and deterioration of the functional state, have been associated with increased mortality in patients with CAP.[4,8] Moreover, cardiovascular diseases seem to have elicited greater interest. Several authors have suggested a higher incidence of cardiac complications after a CAP episode.[9] In this sense, in a recent review,[10] an increased incidence of cardiovascular events was found, such as myocardial infarction, arrhythmias, and heart failure, in patients suffering from pneumonia. Systemic inflammation, coronary artery inflammation, platelet activation and thrombosis, endothelial dysfunction, and effects of CAP on the heart have been suggested as possible mechanisms for increased cardiovascular events following respiratory infections.[10]

It seems that not only comorbidities have an impact on long-term mortality, but also disease severity *per se* may have a role in long-term prognosis. The majority of the scores created to date were intended to measure short-term complications but there are not specific tools to predict long-term mortality. Recently, CURB65 and PSI scores were assessed for long-term mortality in a six-year follow-up study and both showed excellent predictive accuracy.[11] However, several authors have demonstrated that PSI was better for predicting long-term mortality probably due to the inclusion of comorbidities.[8,11,12] On the other hand, severity prognostic scores are static clinical scores and lack information on the host inflammatory response. The concomitant use of certain biomarkers could provide objective criteria to make decisions with respect to these patients.

In the last years, studies have been conducted with biomarkers of more cardiovascular profiles and found that proADM started gaining greater relevance. Pro-ADM has demonstrated superiority over CRP and PCT to predict the mortality of these patients more accurately.[13] This fact could be due to the cardiovascular activity of this biomarker in addition to its immunomodulatory and

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antimicrobial effects. Cardiac conditions, malignancies or neurological conditions have been postulated as underlying causes of death among patients after an episode of CAP.[14] However, it is worth noting the transcendent role of cardiovascular diseases as main cause of medium- and long-term mortality in these patients. Biomarkers can be of great utility to identify a persistent chronic inflammation state initiated after a CAP episode, which can lead to the development of cardiovascular diseases. Several authors suggest that high long-term mortality rate in patients with CAP could be due to a persistent inflammatory response after hospital discharge or even cardiovascular diseases that were not previously known and emerged after the episode.[15,16]

In conclusion, it seems clear that patients with CAP have increased mortality rates, also in the long term. However, the influence that the interaction between acute episodes and the various comorbidities and conditions may exert should be assessed carefully. Future research should include new specific tools to predict long-term mortality among these patients at high risk of death. In this sense, it would be of special interest to evaluate cardiovascular biomarkers levels in the follow-up after hospitalization with CAP in order to demonstrate if patients with less significant decreases over time have higher mortality rates. This would support the idea that persistently elevated levels of biomarkers are associated with an increased risk of cardiovascular events. Therefore, close monitoring should be encouraged in order to optimize its management and, undoubtedly, improve its long-term prognosis.

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