

Pneumonia and Cardiovascular Disease: State of the Art

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Abstract

Researchers have reported the high incidence of cardiovascular disease as coronary syndrome acute and its atherogenesis; during the course of a pneumonia acquired in the community and to be able to understand the magnitude of the problem with this association and with this proceed to their corresponding intervention and prevention. During this process a risk stratification score was created that allows the patient to recognize within the first 24 hours of hospitalized yes present cardiovascular complications. As well as establishing the relationship between hospitalization for pneumonia and their risk of cardiovascular disease in the short term and long term.

Keywords: *Pneumonia; Cardiovascular Disease; Atherogenesis; Risk Stratification, Hospitalization*

Research Strategy and Selection Criterion

I proceeded to search for information only in the English language of the most quoted and permitted magazines. Collect more quoted and accessible articles, analyze them, synthesize them in order to make known: How much has been investigated?, who have investigated?, what gaps exist?, what achievements have been achieved?, from what dimensions has been treated? And what aspects are not addressed? All this in order to make known the state of art of pneumonia and cardiovascular disease [1].

Introduction

Pens Musher, Shachkina and Chirinos (2013) warned that pneumonia and heart disease lead to the causes of mortality and morbidity at the global level; Community-acquired pneumonia affects more than 5 million adults and causes more than 60 000 deaths each year in the U.S. On the other hand, cardiac disease affects more than 30 million Americans and more than 300,000 deaths each year and when both coexist in patients, they produce high incidence of cardiac complications during the course of pneumonia acquired in the community. In view of this partnership and the magnitude of this problem it is necessary to understand this process to take measures that will allow us to improve the statistical indicators to through of interventions through protocols established in the treatment of the context of this association [2]. The types of cardiovascular disease that are caused by community-acquired pneumonia are heart failure, primary arrhythmias, and coronary artery disease [6].

Detail some of the concepts of pneumonia acquired in the community, about its cause and with all the his intervention in syndrome acute coronary with regard to its atherogenesis. In addition resume three of the main and most important articles of Corrales., *et al.* of the last five years, making known their achievements, dimensions, limits, gaps and missing research. Starting with the title of each article

translated into Spanish, as follows: Cardiac complications in patients with community-acquired pneumonia [3]; risk stratification for cardiac complications in patients hospitalized by community-acquired pneumonia [4] and association between hospitalization for pneumonia and subsequent risk of cardiovascular disease [6]. Concluding with conclusions of this article: "Pneumonia and cardiovascular disease: State of art".

Pneumonia Adquirida in the community: cause and Aterogé Brought

Streptococcus pneumoniae it is the main causal agent of pneumonia acquired in the community, world-wide 27.3%; then *Haemophilus influenzae* 12%, atypical bacteria such as *Mycoplasma pneumoniae*, *Chlamydia Pneumoniae* and *Legionella* spp cause 22%; another percentage is caused by viruses such as influenza, Rhinovirus and coronavirus. That colonize Nasopharynx, oropharynx and by microaspiraciones can reach low respiratory tract and cause the disease also agree to its virulence and quantity of germs in the innocuous and the immune setting of each host [7].

In another series, it's still the cause more frequent *Streptococcus pneumoniae* with 10 - 15%, values that have decreased due to the introduction of vaccines for adults and children, In addition *Haemophilus Influenza*, *Staphylococcus aureus*, influenza and other viruses. Other less common germs are *Pseudomona aeruginosa*, other bacteria gram negative *Pneumocystis jirovecii*, *Moraxella catarrhalis*, oral anaerobic flora and mix of Microaerophiles germs and much less common mycobacteria not tuberculosis, fungi. Whose disease will depend on the immune status of the host, geographic region and normal flora of the patient [8].

This association between the cause of pneumonia acquired in the community and syndrome acute coronary artery has been widely studied. In a study that made in a hospital in Taiwan from 2004 to 2011 is compared 12152 patients with *Mycoplasma pneumoniae* with control group of 48600 patients without *Mycoplasma pneumoniae*; it was seen that the incidence of syndrome acute coronary artery was high in patients with *Mycoplasma pneumoniae* than in the control group after 12 months of infection with an increase of 37% of SCA risk. In Taiwan, *Mycoplasma pneumoniae* causes NAC in 10 to 30% of its population [9].

The pathophysiology of aterogenesis has been thoroughly reviewed with *Chlamydia pneumoniae*, during its local infection, the vasculature can be accessed. TCD3 lymphocytes and monocytes, ranging from peripheral blood containing *Chlamydia pneumoniae* DNA, taking it from the Lung to the coronary arteries. *Chlamydia pneumoniae* has been found in atheromas, endothelial cells, macrophages and smooth muscle cells of the wall of the aorta artery. In addition *Chlamydia pneumoniae* not only does it infect, it has been shown to influence the atheroma; modulating the interaction macrophage-lipoprotein, infected macrophages enter a large amount of low-density lipoproteins to become foam cells, which initiates atherosclerosis. This is mediated by its lipopolysaccharides above all; CHsp60 that causes inflammatory changes, secretion immunomodulatory and modulator receptors, they act by initiating antibody-mediated endothelial cytotoxicity through of a cross-reaction between this and autoantibodies. Also cHsp60 has a proinflammatory role for aterogenesis; induces adhesion molecules of ICAM-1 leukocytes; molecules of adhesion to muscle cells VCAM-1 and inflammatory cytokines such as IL1, IL6 and tumor necrosis factor A [10].

Cardiac complications in patients with pneumonia Acquired in the community

Corrales., *et al.* (2012) through its research work recruited patients from October 1991 to March 1994 from five different medical institutions between the United States and Canada, a total of 1343 hospitalized patients and 944 patients with ambulatory care by diagnosis of Community-acquired pneumonia were followed in a prospective study during the 30 days. Where the incidence of cardiac complications was found (acute or chronic heart failure, new or chronic cardiac arrhythmia, and myocardial infarction) that were diagnosed in 358 hospitalized patients (26.7%) and 20 outpatient patients (2.1%); this incidence was diagnosed during the first week after admission and more than half was recognized the first 24 hours after admission to the hospital and the associated factors were older, nursing home residency, history of cardiac failure, primary arrhythmia, coronary artery disease, arterial hypertension, respiratory rate equal to or more than 30 per minute, PH < 7.35, blood Urea nitrogen greater than 30 mg/dl, serum sodium less than 130 mml/L, hematocrit less than 30%,

pleural effusion in hospitalized patient and this incidence of cardiac complications was associated with increased risk of death to 30 days after admission adjusted to the score of the severity rate of pneumonia. All this in a meaningful way according to their statistical analysis [3].

With it Corrales, *et al.* (2012) have demonstrated incidence of cardiac complications affecting more than a quarter of patients hospitalized for community-acquired pneumonia (NAC). In addition, more than 50% of these complications occurred the first 7 days after the diagnosis of NAC. The NAC Sobreestimo Stratification Irrigation Tool cardiac complications and the development of cardiac complications is independently associated with the 60% risk of short-term mortality in patients with NAC.

These findings have implications due to the high incidence of NAC, according to the aforementioned the first 7 days are important to be alert of possible cardiac complications and even more during the first 24 hours. It is necessary to increase the vaccination process against Influenza and Pneumococcus in high risk groups and it is important to prevent and manage these events to reduce the mortality associated with this infection.

The study has limitations, due to the transposition of signs in cardiac failure with signs of pneumonia would be necessary studies of a prospective order where cardiac failure diagnosis with cardiac biomarkers such as peptide natriuretic cerebral or echocardiography or other evidence imagological, as well as the diagnosis of myocardial infarction also with biomarker measurement and finally the time of antibiotic administration and appropriate empirical antibiotic therapy are recognized factors that affect the evolution of a patient with NAC who was not analyzed in this study.

Risk stratification for cardiac complications in patients hospitalized for community-acquired pneumonia

Corrales, *et al.* (2014) in this work whose objective is to derive and validate a clinical rule to stratification the risk of cardiac complications in patients hospitalized by NAC and compare their development with the score severity index of pneumonia. His method was to use two cohorts of NAC hospitalized patients, regression techniques were used in the shunt of a cohort (1343 patients enrolled in the research team of patients with pneumonia, study between October 1991 and March 1994) to generate a predictive rule that Validated in the validation of the cohort (608 patients enrolled in the determination of guialinea of the study of permanence by longitude between February 1998 and March 1999) discriminated and reclassified, analyzed by compared their development against index score of pneumonia severity. The results: the prediction model for cardiac complications including age, 3 pre-existing conditions: heart failure, coronary artery disease, cardiac arrhythmia; 2 Vital Signs: pulse less than 80 LPM or greater than 120 LPM, blood pressure, systolic 140 mmhg or more, diastolic 90 mmhg or less and 7 laboratory tests or X-ray image: Hematocrit less than 30%, white cell count less than 12,000/mL, platelets less than 150,000/mL or more than 400,000/mL, serum urea nitrogen of 20 to 40 mg/dl or more than 40 mg/dl, serum glucose greater than 160 mg/dl, arterial pH less than 7.35, bilateral infiltrates on chest X-ray. All of them were assigned a score scoring system and based on these scores, 4 categories of risk increase were defined, which were: I less equal to 77 points, II from 78 to 134, III from 135 to 170 and IV greater equal to 171 points. validated by statistical tests; This new score derived from the score severity index of pneumonia was validated in a clinical rule that allowed to stratification the risk of cardiac complications in patients hospitalized by pneumonia, as well as being able to be used in populations with varied Epidemiology and Clinical History [4]; their items are readily obtained from the patient's admission to the hospital, which we know is of paramount importance as the higher risk during the first 24 hours after admission of patients with pneumonia acquired in the community in contrast with what was reported by Viasus and Collar [5]. Which include more microbiological elements limiting their use as an early test of risk of stratification; this analysis confirms that the use of the severity index score for pneumonia to predict cardiac complications is suboptimal; and invites researchers to use this score to recognize higher-risk populations in order to allow optimal treatment and to conceive a short-term prognosis of that population. The limitations are the overestimation of the absolute rate in the validation cohort, especially if it is applied in populations with characteristics and a similar risk history of where the score was originally derived. On the other hand the increase in new software similar estimates it should help with the application of this novel score and invites a more contemporary study of prospective validation of this score and be widely adopted [4].

Association between hospitalization by pneumonia and subsequent Riesgo of cardiovascular disease

Corrales, *et al.* (2015) in this article they want to determine whether hospitalization proper for pneumonia is associated with a short-term and long-term increase in cardiovascular disease. They examined two cohorts, the study of the group with cardiovascular health (n = 5888, age equal of 65 years between the period of 1989 - 1994) and the study of the group with cardiovascular risk in the community

(n = 15792 of age between 45 and 64 years for the period of 1987 - 1989). Participants were followed until December 31, 2010. And they matched each hospitalized participant with 2-control pneumonia. These cases of pneumonia and its controls were followed pending the occurrence of cardiovascular disease such as myocardial infarction or brain-vascular accident or coronary heart disease; an average of 10 years. The results were in the study cohort of the group with cardiovascular health of 591 cases of pneumonia, 206 had cardiovascular disease about 10 years, compared with the controls, the risk was higher the first year after hospitalization. In the study cohort of the cardiovascular risk group in the community; Of 680 cases of pneumonia, 112 had cardiovascular events after 10 years of being hospitalized. The implications of the study are: first as patients without primary cardiovascular disease were included, the findings suggest that hospitalization for pneumonia would be considered as an independent cardiovascular risk factor. Second because previous studies showed that hospitalized patients with pneumonia had increased long-term mortality not explained by their high burden of comorbidities, before infection and that cardiovascular disease is the main cause of death in these cases, strategies should be promoted in this population with these results. Third this association of pneumonia at risk of cardiovascular disease should be considered when costs and benefits are estimated in the intervention or prevention of pneumonia. The limitations: First although it was taken into account A Fatal and non-fatal cardiovascular event The risk of death due to non-cardiovascular reasons was not taken into account. Second it was not included patients with pneumonia that did not require hospitalization, so our results cannot be generalized to this population. Third, only the first hospitalization for pneumonia was taken into account and the potential effect of recurrent episodes of pneumonia was not taken into account. Fourth the role of pneumococcal vaccine was not taken into account in the research work. Fifth, interventions that could affect the course of pneumonia as the type of antibiotic therapy were not adjusted in the investigation.

Conclusions

1. The incidence of cardiac complications is common in the course of community-acquired pneumonia and has an independent impact on short-term mortality [3].
2. Using data from 2 well-characterized cohorts of patients hospitalized for community-acquired pneumonia, a score was developed and validated that stratified the short-term risk of much better cardiac complications from the severity rate of pneumonia [4].
3. Hospitalization for pneumonia is associated with a short-term and long-term increase in cardiovascular disease risk, suggesting that Pneumonia may be an important risk factor for cardiovascular disease [6].
4. Chlamydia pneumoniae, as a cause of pneumonia acquired in to community has proven to be a risk factor for aterogenesis [10].

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