

Prevention of Community-Acquired Pneumonia in Special Situations – Cardiology

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Community-acquired Pneumonia and Chronic Cardiac Diseases

The cardiovascular and respiratory systems are interdependent such that a bout of pneumonia can sometimes aggravate heart failure and, conversely, a reduction in cardiac output accompanying cardiogenic shock can cause hypoperfusion, which may lead to alveolar hypoventilation and, ultimately, respiratory arrest.¹

While acute respiratory tract infection can precipitate heart failure, heart failure itself is a risk factor for pneumonia. Mortality rates related to pneumonia in general patient populations remain high, increasing with advanced age. It is likely that pre-existing heart failure may worsen outcomes. Studies examining the role of heart failure as a predictor of pneumonia outcome show mortality increases by up to 50% in association with heart failure. In this regard, the elderly are particularly prone to be hospitalized for heart failure and pneumonia.²

In an earlier population-based study, Thomsen *et al.*² evaluated the association between presence and severity of heart failure and mortality among patients hospitalized for pneumonia. The study recruited 33,736 adults with a first-time hospitalization for pneumonia. The 30-day mortality was found to be 24.4% among heart-failure patients against 14.4% among other patients. Thus, heart failure was found to be an important prognostic indicator of increased 30-day mortality in patients hospitalized for pneumonia. Besides heart failure, pre-existing valvular heart disease, and atrial fibrillation are also associated with increased mortality.

Effects of Pneumonia on the Heart

Musher *et al.*³ observed that of 170 patients hospitalized for pneumococcal pneumonia during a 5-year period, 33 (19.4%) had one or more major cardiac events. Twelve had a myocardial infarction (MI),

eight had new-onset atrial fibrillation (AF), and five had worsening of congestive heart failure (CHF). Significantly higher mortality was observed in patients with concurrent pneumococcal pneumonia and cardiac events than those with pneumonia alone.

This study showed that patients with pneumococcal pneumonia are at substantial risk of a concurrent acute cardiac event, including new or worsening CHF. Their mortality figures are higher too.

Pathogenesis of arrhythmia and congestive heart failure in pneumonia

Multiple factors are involved in the pathogenesis of arrhythmia and CHF in pneumonia (Figure 1). They include an increased myocardial demand for oxygen, lowered blood oxygen levels, and raised cytokine levels, leading to both thrombogenesis and suppression of ventricular function. Tachycardia and AF with fast ventricular rates,

in particular, contribute to CHF and pulmonary congestion. Taken together, these mechanisms explain the occurrence of new or worsening CHF in patients with pneumonia.³

Prevention

Pneumococcal vaccine

The highest mortality with pneumococcal disease occurs among the elderly and patients who have underlying medical conditions. It is for this reason that experts at the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention (CDC) recommend pneumococcal vaccination for all people aged 65 years and above and also for those aged 2–64 years with cardiovascular disease and certain other medical conditions.⁴

The Advisory Committee on Immunization Practices (ACIP) of the CDC recommends that⁵

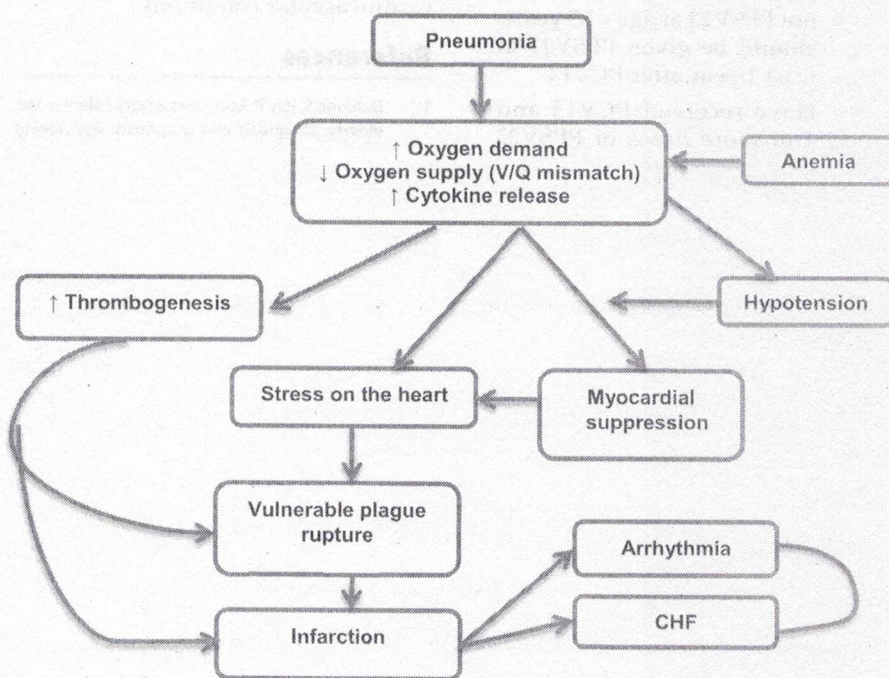


Fig. 1: Pathogenesis of cardiac events in pneumococcal pneumonia

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- Adults aged 19–64 years with chronic heart disease (including congestive heart failure and cardiomyopathies, excluding hypertension) should be given PPSV23
- Adults aged ≥ 65 years with chronic heart disease who:
 - Have not previously received pneumococcal vaccine, should be given PCV13 first, followed by PPSV23 a year later
 - Have not received PCV13 but have received a dose of PPSV23 at age ≥ 65 years, should be given PCV13 at least 1 year after PPSV23
 - Have not received PCV13 but have received one or more doses of PPSV23 at age < 65 years, should be given PCV13 at least 1 year after the most recent dose of PPSV23 and another dose of PPSV23 at least one year after PCV13 and at least 5 years after the last PPSV23 dose
 - Have received PCV13 but not PPSV23 at age < 65 years, should be given PPSV23 at least 1 year after PCV13
 - Have received PCV13 and 1 or more doses of PPSV23

at age < 65 years, should be given PPSV23 at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23

PCV 13 has been approved by US FDA in 2011 for use in adults 50 years of age and above to prevent pneumococcal disease.⁶

In India, use of the pneumococcal vaccine has been recommended for people aged 50 and above by the Geriatric Society of India.⁷

Influenza vaccine

Immunization against seasonal influenza has a crucial role in the prevention of morbidity and mortality in patients with CVD. The American Heart Association and American College of Cardiology recommend intramuscular administration of inactivated influenza vaccine annually for comprehensive secondary prevention in persons with coronary and other atherosclerotic vascular disease. However, use of live, attenuated vaccine (administered intranasal) is not currently recommended for persons with cardiovascular conditions.⁸

References

1. Delorme S, Ray P. Acute respiratory failure in the elderly: Diagnosis and prognosis. *Age Ageing*

2008; 37:251–7.

2. Thomsen RW, Kasatpibal N, Riis A, Nørgaard M, Sørensen HT. The impact of pre-existing heart failure on pneumonia prognosis: Population-based cohort study. *J Gen Intern Med* 2008; 23:1407–13.
3. Musher DM, Rueda AM, Kaka AS, Mapara SM. The association between pneumococcal pneumonia and acute cardiac events. *Clin Infect Dis* 2007; 45:158–65.
4. Pneumococcal vaccines: CDC answers your questions [Internet]. Available at: <http://www.immunize.org/catg.d/p2015.pdf>. Accessed on 18 Oct, 2016.
5. Kim DK, Bridges CB, Harriman KH; Advisory Committee on Immunization Practices. Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older: United States, 2016. *Ann Intern Med* 2016; 164:184–94.
6. Centers for Disease Control and Prevention (CDC). Licensure of 13-valent pneumococcal conjugate vaccine for adults aged 50 years and older. *Morb Mortal Wkly Rep* 2012; 61:394–5.
7. Sharma OP; expert committee. Indian recommendations for vaccination in older adults 2015 [Internet]. Geriatric Society of India. Available at: <http://www.geriaticindia.com/publications.html>. Accessed on 18 Oct, 2016.
8. Davis MM, Taubert K, Benin AL, Brown DW, Mensah GA, Baddour LM, et al.; American Heart Association; American College of Cardiology. Influenza vaccination as secondary prevention for cardiovascular disease: A science advisory from the American Heart Association/American College of Cardiology. *Circulation* 2006; 114:1549–53.