Long-term Survival Following Pneumococcal Pneumonia

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We studied the long-term survival of patients who recovered from pneumococcal pneumonia. Mortality was increased for up to 10 years after documented pneumococcal pneumonia and was greater in proportion to the PORT score at admission and among persons who had bacteremic disease.

Keywords. pneumococcus; pneumonia; mortality; survival.

Previous investigators have reported the short-term mortality from community-acquired pneumonia (CAP) and, specifically, that from pneumococcal pneumonia [1–3]. Relatively few studies have examined the long-term mortality associated with CAP [4, 5], and, to our knowledge, there has been no report of long-term outcome following pneumococcal pneumonia.

METHODS

Under protocols approved by the institutional review board of the Baylor College of Medicine and the Research and Development Committee at Michael E. DeBakey VA Medical Center (MEDVAMC), we have studied all patients diagnosed with pneumococcal pneumonia at MEDVAMC since 2001. As veterans of the US Armed Forces, MEDVAMC patients have certain lifetime rights and privileges; their dates of death are reliably noted in the automated medical records.

Patients were stratified into bacteremic and nonbacteremic pneumococcal pneumonia using previously described criteria [6]. Bacteremic pneumococcal pneumonia was defined as a clinical syndrome consistent with pneumonia, a chest radiograph showing a newly recognized pulmonary infiltrate, and ≥1 blood culture(s) positive for Streptococcus pneumoniae. A definition of nonbacteremic pneumococcal pneumonia required clinical findings consistent with pneumonia, radiologic evidence of a newly recognized pulmonary infiltrate, a Gram stain of sputum documenting a ratio of ≥10:1 inflammatory: epithelial cells with gram-positive cocci predominating, and a sputum culture showing S. pneumoniae with no other likely pathogenic bacteria being detected. For analyses comparing bacteremic with nonbacteremic patients, patients whose blood was not cultured were omitted. PORT score severity index (PSI) was calculated as previously described [7].

Survival times were analyzed using the method of Kaplan and Meier [8] with patients grouped by bacteremic vs nonbacteremic infection and by risk class (PSI) [7]. Differences in long-term mortality were determined using the log-rank test, with \( P < .05 \) considered to be statistically significant.

RESULTS

Among 392 patients with pneumococcal pneumonia seen between 1 January 2001 and 30 June 2011, the average age at the time of diagnosis was 63; 98% of patients were male. Forty-eight (12.2%) patients died within 1 month of admission. To determine the long-term consequences of pneumococcal pneumonia, we excluded those patients who died in the first month. Over the ensuing 10 years, the rate of death appeared to be far greater among 1-month survivors of pneumococcal pneumonia than among all 63-year-old American men [9], with 32.2% of the 1-month survivors dying within 10 years (Figure 1).

When patients were stratified based on the severity of illness at the time of admission, the death rate increased proportionally with the height of the admitting PORT score (Figure 1; \( P < .001 \), log-rank test). Patients who had bacteremic pneumococcal pneumonia also had a slightly but significantly increased long-term mortality compared to those whose blood cultures were negative at admission (data not shown; \( P < .05 \)). As noted above, for these analyses, we excluded patients who died in the first month after diagnosis; when we excluded patients who died within the first 3 months of diagnosis, the results were similar (data not shown).

DISCUSSION

This study demonstrates a substantially decreased long-term survival among patients who have survived a bout of
pneumococcal pneumonia. The famous 1964 paper by Austrian and Gold [1] underscored the important observation that antibiotic therapy by no means eliminated mortality during the 20 days following the diagnosis of pneumococcal pneumonia, and we confirmed these results in a much more recent study [6]. Although later work by Mortensen and others [4, 5] showed that pneumonia conveyed a prolonged risk for mortality from CAP, no study has examined the question of long-term survival following pneumococcal pneumonia. We now document a greater risk for death for up to 10 years after a bout of pneumococcal pneumonia. The greater the severity of the initial episode, as determined by the presence of bacteremia or by the PSI, the higher is risk of death.

These observations suggest that pneumococcal pneumonia is a surrogate marker for an imminent decline in overall state of health. Although observations on patients with high PORT scores might be confounded by the contribution of age, we observed an increased risk of death at all PORT scores and also in bacteremic, when compared to nonbacteremic, pneumococcal pneumonia. The mechanism(s) underlying the association between pneumococcal pneumonia and increased mortality is/are unknown. Comorbid diseases that predispose to infection, chronic sequelae of acute coronary events during the pneumonia [10], and an underlying inflammatory state [11] may contribute.

In summary, the ill effects of pneumococcal pneumonia are seen far beyond the acute episode. It is unclear whether these long-term sequelae might be preventable by use of pneumococcal vaccination.

Note

Potential conflicts of interest. All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

References


Figure 1. Kaplan-Meier plots show the cumulative 10-year survival of 344 patients who survived pneumococcal pneumonia (line 3) compared to the expected 10-year survival of an average 63-year-old American male (line 1). Patients who survived past 1 month were also stratified based on PORT score severity index (PSI) at the time of admission. PSI < 90, line 2; PSI ≥ 90 to <120, line 4; PSI ≥ 120, line 5. Increasing PSI risk class was significantly associated with decreased long-term survival (P < .001, log-rank test).