Invasive Pneumococcal Disease in Haematologic Patients: Unmet Needs on Prevention and Immunization

Sung-Yeon Cho1, Dong-Gun Lee2, Chulmin Park3, Yeon-Joon Park4, Jae-Ki Choi5, Lee Hyo-Jin6, Si-Hyun Kim7, Sun Hee Park8, Su-MI Choi1, Jung-Hyun Choi9, Jin-Hong Yoo10

1Yeouido St. Mary’s Hospital, College of Medicine, The Catholic University of Korea; Infectious Diseases & Internal Medicine
2Seoul St. Mary’s Hospital, College of Medicine, The Catholic University of Korea; Division of Infectious Diseases, Department of Internal Medicine
3College of Medicine, The Catholic University of Korea
4Department of Laboratory Medicine, College of Medicine, The Catholic University of Korea, Seoul St. Mary’s Hospital
5The Catholic Univ of Korea; Division of Infectious Disease, Department of Internal Medicine
6College of Medicine, The Catholic University of Korea; Division of Infectious Diseases; Department of Internal Medicine
7Yeouido St. Mary’s Hospital, College of Medicine, The Catholic University of Korea; Internal Medicine
8Daejeon St. Mary’s Hospital, College of Medicine, The Catholic University of Korea
9Catholic Univ. of Korea
10Bucheon St. Mary’s Hospital, College of Medicine, The Catholic Univ. of Korea

Background: Immunocompromised patients, especially allogeneic haematopoietic stem cell transplantation (HSCT) recipients, have a high risk of invasive pneumococcal disease (IPD), and immunization is the main preventive strategy. However, there are limited data for the
epidemiology of IPD including serotype with vaccination status in patients with haematologic diseases. The aim of this study was to determine the characteristics of IPD in haematologic patients and evaluate the antimicrobial susceptibility and serotype distribution of Streptococcus pneumoniae bloodstream isolates.

Material/methods: All consecutive cases of IPD were reviewed retrospectively from March 2009 to February 2016 at the Catholic Blood and Marrow Transplantation Centre that performs over 500 HSCTs annually. The antimicrobial susceptibility of each isolate was tested using the Vitek-II system. Serotyping was analyzed according to the multiplex PCR-based method by using the standard capsular reaction test for available bloodstream isolates.

Results: During the seven years of the study period, a total of 38 IPD cases in 37 patients and 18 available S. pneumoniae bloodstream isolates were included in this analysis. Most common underlying haematologic disease was multiple myeloma (29.7%), followed by acute lymphoblastic leukemia (21.6%), acute myeloid leukemia (18.9%), lymphoma (13.5%), and others (16.2%). Of the 38 IPDs, 22 cases were developed in HSCT recipients, and 16 cases were developed in non-HSCT recipients. Pneumococcal vaccination rate before IPD diagnosis was 23.7% (9 of 38), and all of them were HSCT recipients. Only one patient had received 23-valent pneumococcal polysaccharide vaccine (PPV23), while 8 of 9 patients have received two or more shots of 13-valent pneumococcal conjugate vaccine (PCV13) due to the immunosuppressive agents for their chronic graft-versus-host diseases (GVHD). Serotypes showed various distribution including 23F, 19A, 19F, 10A, 34, 20, 6, 15A, and 35B. Of the 13 available isolates from HSCT recipients, PCV13 and PPV23 serotypes were 7.7% (1/13) and 30.8% (4/13), respectively. Of the 5 available isolates from non-HSCT recipients, both PCV13 and PPV23 serotypes were 60% (3/5), and 40% (2/5) were non-typable serotypes. Susceptibility rate to penicillin, cefotaxime, erythromycin, levofloxacin, trimethoprim-sulfamethoxazole, and vancomycin was 94.4%, 81.1%, 18.4%, 92.1%, 51.7%, and 100%, respectively. Penicillin susceptibility rate was 81.6% according to the meningitis criteria in IPD cases with CNS involvement. IPD-related mortality was 15.8%, with time from the diagnosis of IPD to death was median 9 days (range 1 – 17).

Conclusions: Clinicians should be aware that fatal IPD can be developed by non-vaccine type strain, even in a patient who received scheduled pneumococcal vaccination after HSCT. Unmet needs in current preventive strategies, such as vaccination in patients with haematologic diseases, and broadening serotype coverage in GVHD patients, should be considered.