Antimicrobial susceptibility and genotypes of invasive staphylococcal isolates

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ABSTRACT

Background Staphylococcus aureus is an important causative agent for a wide variety of clinical infections. The aim of this study was to analyze antimicrobial susceptibilities and genotypes of methicillin-resistant S. aureus (MRSA), methicillin-sensitive S. aureus (MSSA) and coagulase-negative Staphylococcus (CoNS) that caused invasive infections. Methods A total of 198 clinical MRSA strains, 51 clinical MSSA strains and 48 clinical CoNS strains isolated from blood and their clinical presentations in Chang Gang Memorial Hospital in 2010 were collected. E-test strips were applied to determine minimum inhibitory concentration (MIC), and polymerase chain reaction (PCR) was used to detect staphylococcal cassette chromosome mec (SCCmec) types and the presence of Panton-Valentine leukocidin (PVL) gene and multilocus sequencing typing (MLST). Antimicrobial MIC of MRSA was tested for the correlation with SCCmec types, PVL and MLST. Results The MIC ranges of vancomycin, teicoplanin, linezoid and daptomycin among all MRSA were 0.75-6, 0.38-12, 0.5-3, and 0.09-2 μg/L respectively, whereas those among heterogeneous vancomycin-intermediate S. aureus (hVISA) were 2-6, 2-6, 1-1.5, and 0.5-1.5 μg/L respectively. The MIC ranges of vancomycin and daptomycin among MSSA and CoNS were 1-1.5,0.125-0.5 and 0.75-3,0.125-2 μg/L respectively. Among MRSA isolates, 114 belonged to the types of SCCmec I, II ,III, and 84 to the types of SCCmec IV and V. Our studies indicated that SCCmec III was present in the HA-MRSA and SCCmec IV in the CA-MRSA in Taiwan, as revealed in previous studies that the SCCmec I , II ,III commonly found in hospital-acquired MRSA (HA-MRSA), and SCCmec IV, V conversely in community-acquired MRSA (CA-MRSA). We found that only 24 CA-MRSA isolates (8.78%) contained PVL genes. In addition, the major MLST types among HA-MRSA and CA-MRSA were ST239 and ST59, respectively. Noteworthily, cprofloxacin resistance was found among all MRSA with ST45 but not ST59; however, the pattern of antimicrobial resistance among them was not correlated to SCCmec type and PVL gene. Conclusions PVL-negative MRSA isolates were resistant to more antimicrobial drug classes than PVL-positive. Daptomycin still has effective activity against the current S. aureus clinical isolates, include MRSA. Ciprofloxacin-resistant isolates found in Taiwan all belonged to ST45. HA-MRSA showed higher antimicrobial resistance than CA-MRSA; however, CA-MRSA caused higher morbidity rates than HA-MRSA. Thus, MRSA is still a growing concern to public health.

Keywords : MRSA、MSSA、CoNS、SCCmec、PVL、MLST、MIC、vancomycin、teicoplanin、linezolid、daptomycin、ST45

Table of Contents

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