Ceftobiprole Activity against Gram-Positive Pathogens Causing Bone and Joint Infections in the United States from 2016 through 2019

Introduction

Bone and joint infections (BJI) cause serious morbidity and mortality and present significant treatment challenges (Colston and Atkins [2018]). Bone and joint infections (BJIs) cause serious morbidity and mortality and present significant treatment challenges (Colston and Atkins [2018]).

Materials and Methods

Bacterial isolates

- Staphylococci (216), comprised the majority (67%) of the Gram-positive BJI isolate set, including: Staphylococcus aureus (190), Staphylococcus epidermidis (26), Enterococcus faecalis (21), Staphylococcus simulans (20), Staphylococcus hominis (17), and Streptococcus mitis/oralis (17), Staphylococcus pneumoniae (3), Enterococcus faecium (2), Streptococcus pyogenes (11), and Staphylococcus agalactiae (24). The “other” group included Staphylococcus haemolyticus, Enterococcus faecalis, Enterococcus faecium, Enterococcus gallinarum, and Enterococcus pseudotabaci (Table 1).

Susceptibility Testing

- Susceptibility to ceftobiprole and comparator agents was tested using current Clinical and Laboratory Standards Institute (CLSI) methods for Staphylococcus aureus (2018) and Enterococcus faecalis (2017). The major Gram-positive BJI isolate set and pathogen groups, which included Enterococcus faecalis (21), Enterococcus faecium (2), and Staphylococcus aureus (2018), were tested for susceptibility to ceftobiprole (MIC) and compared to comparator agents (Table 2).

Results

- The wide activity of ceftobiprole against Gram-positive pathogens, including multi- resistant Staphylococcus aureus (MRSA) and coagulase-negative staphylococci, is shown in Table 1. The MIC50/90 values for ceftobiprole were identical to those previously reported for methicillin-resistant S. aureus (MRSA) isolates from the United States (2018) and for a broader set of MRSA isolates, which is the EUCAST PK-PD non-species-related breakpoint (Table 1). In contrast, the MIC50/90 values for comparator agents such as vancomycin and teicoplanin were 4-fold higher than ceftobiprole.

- In addition to MRSA, the MIC50/90 values were also evaluated against recent Gram-positive clinical isolates collected from BJIs in vitro, and the results were nearly identical to those previously reported for a broader set of MRSA isolates, which is the EUCAST PK-PD non-species-related breakpoint.

- The MIC50/90 values for ceftobiprole were highly active against the BJI isolate set from the major Gram-positive pathogen groups collected at US medical centers between 2016 and 2019. The MIC50/90 values for ceftobiprole were 0.5 mg/L, 0.5 mg/L, and 0.5 mg/L, respectively, for MRSA, MSSA, and methicillin-resistant coagulase-negative staphylococci, compared to 4 mg/L, 2 mg/L, and >4 mg/L, respectively, for comparator agents such as vancomycin and teicoplanin.

Conclusions

- Ceftobiprole was highly active against clinical BJI isolates from the major Gram-positive pathogen groups collected at US medical centers during 2016–2019.

Acknowledgements

This project has been funded in part with federal funds from the Department of Health and Human Services; Office of the Assistant Secretary for Preparedness and Response; Biomedical Advanced Research and Development Authority, under Contract No. HHS0102001600002C.

References


Table 1 Cumulative distributions of MIC values for ceftobiprole against the main Gram-positive species and groups from bone and joint infections

Table 2 Activity of ceftobiprole and comparator agents when tested against 123 methicillin-resistant Staphylococcus aureus isolates from bone and joint infections

Table 3 Activity of ceftobiprole and comparator agents when tested against 72 methicillin-sensitive Staphylococcus aureus isolates from bone and joint infections