What More Do We Have Left? Ceftaroline: A New Agent For Methicillin-Resistant Staphylococcus Aureus (MRSA)

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Objective

To explore the use of ceftaroline, a novel agent for the treatment of MRSA[1], as demonstrated through a case study.

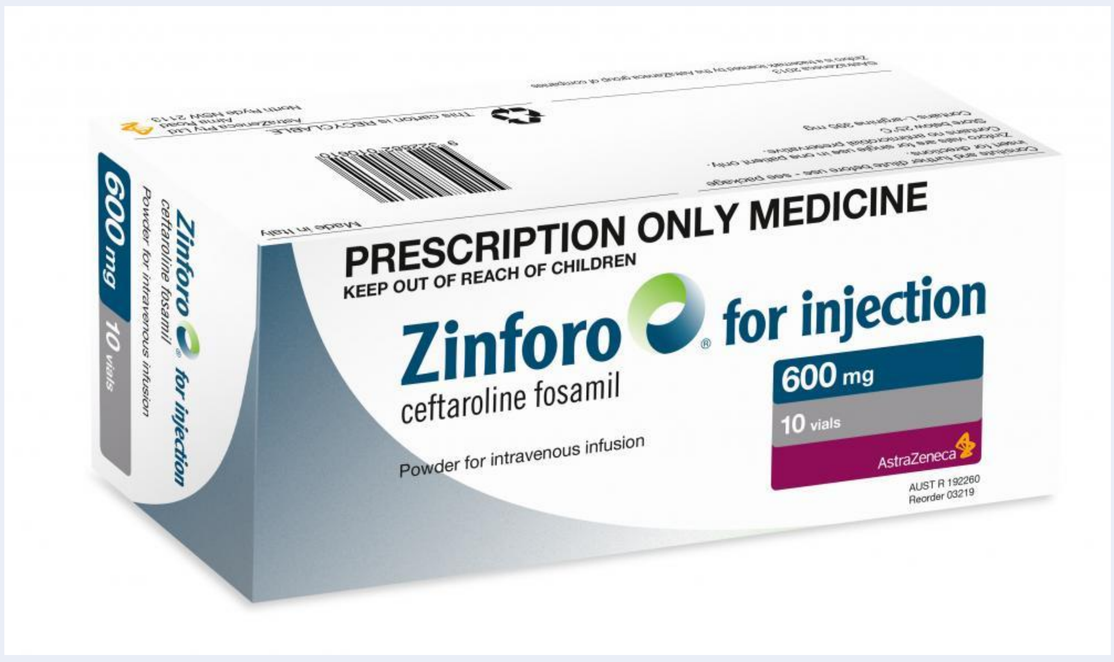
Clinical Features

Patient MM is a 70 year-old, Caucasian female presenting to ED with suspected pneumonia based on a 1 day history of fevers, productive cough and confusion. MM had bilateral lung transplantation in 1998 for idiopathic pulmonary fibrosis and has chronic transplant rejection on continuous home oxygen. MM has had two previous admissions with pneumonia and her recent admission 6 weeks ago diagnosed MRSA bacteraemia which was undertreated with only 2 weeks of vancomycin. Patient MM takes a variety of immunosuppressant medications and her other medication of relevance to the case is fluoxetine 20mg mane.

Interventions and Outcomes

MM underwent a septic screen before being initially treated with azithromycin IV 500mg stat, piperacillin/tazobactam 4.5g TDS and vancomycin 2g stat then 1g BD. In ED she was observed to be hypertensive (151/76), tachycardic (PR 130) and tachypnoeic (RR 34). She had oxygen saturations of 89% on room air, a temperature of 38^{o}C and her chest x-ray showed blunting of the costophrenic angles and patchy opacification. Her blood culture grew MRSA which was sensitive to vancomycin, daptomycin and linezolid. Her vancomycin minimum inhibitory concentration (MIC) was 2mcg/mL (which was an increase from 1.5mcg/mL last admission) and therefore vancomycin, the gold standard treatment for MRSA[2], was not the preferred agent. See Figure 1 for the other agents considered.

Figure 1: Treatment Options



Interventions and Outcomes (cont.)

Based on the reasoning in Figure 1, ceftaroline was the antimicrobial of choice for Patient MM. Ceftaroline is an advanced or fifth generation cephalosporin. It binds to penicillin binding proteins (PBP) inhibiting cell-wall synthesis and has a high infinity for PBP2a which is associated with methicillin resistance. It is an inactive pro-drug which undergoes biotransformation in the plasma and is primarily renally excreted. It has a half-life of 3 hours and dose-linear pharmacokinetics. It has excellent lung penetration and nil significant drug interactions[1].

Patient MMs transthoracic echocardiogram showed no evidence of vegetation ruling out endocarditis and, whilst her bone scan did have increased uptake in her thoracic spine, her gallium scan ruled out osteomyelitis.

MM was able to be discharged with home nursing to administer her ceftaroline twice daily for 4 more weeks and achieved both clinical and microbiological cure.

Conclusion

Ceftaroline is available as an option for MRSA treatment when other first-line options are unsuitable[3]. Clinical trials (CANVAS 1 and 2, FOCUS 1 and 2)[4] show it to be non-inferior to vancomycin and have a similar safety profile to other agents in the treatment of complicated skin and soft tissue infections and community acquired pneumonia. This case study provides evidence of the use of ceftaroline in salvage therapy. Potential for MRSA to develop resistance to ceftaroline will be determined over time[4].

References:
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