Journal of Clinical and Experimental Transplantation

Perspective Open Access

A Short Note on Allogeneic Stem Cell Transplantation

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Introduction

The protracted neutropenia generated by myeloablative and immunosuppressive conditioning regimens, allogeneic hematopoietic stem cell transplant (HSCT) patients are at a high risk for infection. Prophylaxis with antibiotics should be explored in patients at high risk for neutropenia, including those getting stem cell transplants, according to the National Comprehensive Cancer Network and the American Society of Blood and Marrow Transplantation. Antibacterial prophylaxis with fluoroquinolones should be considered for high-risk patients who are expected to have prolonged and profound neutropenia duration and/or at the time of transplant, according to guidelines from the American Society of Clinical Oncology, Infectious Diseases Society of America, and American Society of Blood and Marrow Transplantation. Fluoroquinolones are the most extensively utilised antibacterial medication to prevent infection in neutropenic or likely to be neutropenic patients after myelosuppressive chemotherapy because of their broad spectrum of activity against gram-positive and gram-negative pathogens.

Several studies have shown that fluoroquinolones can effectively reduce neutropenic fever and other infectious-related complications in individuals following conventional chemotherapy. Fluoroquinolone prophylaxis reduced the incidence of fever, infection, and all-cause mortality in patients at high risk for febrile neutropenia, according to a meta-analysis. Concerns over the rise in fluoroquinolone-resistant organisms, as well as a growing awareness of fluoroquinolone-related rare side effects, have caused some to question the efficacy of fluoroquinolone prophylaxis. Furthermore, patient-level contraindications such as hypersensitivity or QT prolongation may prevent fluoroquinolone use. As a result, there is growing interest in effective alternatives to fluoroquinolones as a prophylactic in patients at high risk for febrile neutropenia, although there is insufficient evidence to support any alternative approach. Fluoroquinolone prophylaxis has been given to HSCT patients at MD Anderson Cancer Center for over a decade [1].

Description

Cefpodoxime, an oral third-generation cephalosporin, has been utilised as an alternative to levofloxacin at our hospital for several years in patients with levofloxacin allergies, intolerances, or other contraindications. Cefpodoxime is generally well tolerated and has antibacterial action against both gram-positive and gram-negative bacteria; however, it is ineffective against Pseudomonas aeruginosa. Only one single-center case series evaluating the use of cefpodoxime for antimicrobial prophylaxis in patients with hematologic malignancies has been published to our knowledge. We conducted a retrospective research comparing rates of prophylactic failure and outcomes between cefpodoxime and levofloxacin to more specifically explain the use of cefpodoxime as a viable alternative drug in HSCT patients. From January 1, 2011, to October 1, 2014, patients who underwent an allogeneic HSCT from matched related or unrelated donors and were given levofloxacin or cefpodoxime for antibacterial prophylaxis during transplant were included in this single-center retrospective cohort analysis. Patients who got a second allogeneic HSCT or a haploidentical or cord blood HSCT were excluded. Patients who had current illnesses or were receiving intravenous antimicrobials before the transplant were also ruled out. Patients were found using our institutional HSCT and pharmacy databases after receiving approval from the MD Anderson Cancer Center's Investigational Review Board [2].

Adult patients who had HSCT from a matched related donor, matched unrelated donor, or 1-antigen mismatched unrelated donor at MD Anderson Cancer Center and were given levofloxacin or cefpodoxime for antibacterial prophylaxis for at least 3 months. This research looked at days. Antibacterial prophylaxis was begun when ANC reached 1000 cells/mm3 or on day 1, the day before stem cell infusion, and continued until neutrophil engraftment. Patients who received cefpodoxime were matched 1:1 to levofloxacin patients to adjust for important confounding variables associated to infection risk. The following were among the matching criteria: underlying disease, age 10 years, stem cell source, transplant type, and conditioning regimen the study's main goal was to assess the rates of antibiotic prophylactic failure between levofloxacin and cefpodoxime in allogeneic HSCT recipients, as measured by the incidence and time to neutropenic fever onset. A fever workup was conducted when patients met the criteria for neutropenic fever, antibiotics were raised, and the preventive drug was withdrawn. In addition to neutropenic fever, the frequency of episodes of neutropenic fever and the necessity for antibiotic escalation in the absence of neutropenic fever were recorded. The number and type of microorganisms causing bloodstream infections, Clostridioides difficile infections, hospitalizations for infectious reasons, antibiotic use, and mortality within the first 100 days after HSCT were also secondary goals [3].

To account for the paired structure of the data, the McNemar chisquare test for matched pairs was used to examine demographic categorical variables. Because all continuous variables were non-normally distributed, the Wilcoxon matched pairs signed-rank test was used to compare their distributions. The outcome analyses were compared using the same analysis method. The primary outcome, time to neutropenic fever onset, was assessed visually using Kaplan-Meier curves and an unadjusted Cox proportional hazards model with shared frailty to account for the paired nature of the data.At the time of neutrophil engraftment, patients were right-censored. To account for matched pairs, other outcomes were analysed using univariate conditional logistic regression analysis. 71 patients who got

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Received: 03-May-2022, Manuscript No: jcet-22-64130; **Editor assigned:** 06-May-2022, PreQC No: jcet-22-64130 (PQ); **Reviewed:** 20-May-2022, QC No. jcet-22-664130; **Revised:** 23-May-2022, Manuscript No: jcet-22-64130 (R); **Published:** 30-May-2022, DOI: 10.4172/2475-7640.1000133

Citation: Eli U (2022) A Short Note on Allogeneic Stem Cell Transplantation. J Clin Exp Transplant 7: 133.

cefpodoxime for antimicrobial prophylaxis after HSCT and 71 patients who received levofloxacin were matched for further analysis over the study period [4].

Conclusion

The trial population in both the levofloxacin and cefpodoxime arms was similar in age, sex, underlying disease, conditioning regimen severity, stem cell type, and stem cell source, as expected based on matching criteria. The underlying condition in the majority of patients was acute myeloid leukaemia and/or myelodysplastic syndrome. The majority of patients had myeloablative conditioning. A 1-antigen mismatched matched unrelated donor was given to five patients in the cefpodoxime group and two patients in the levofloxacin group. Donor stem cells were primarily obtained from peripheral blood stem cells. The median number of antibiotic prophylactic days for both levofloxacin and cefpodoxime was 11 days [5].

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