

THE EXPERIENCE OF TOTAL BODY IRRADIATION IN BONE MARROW TRANSPLANTATION PATIENTS REFERRED TO THE CHAI-YI CHRISTIAN HOSPITAL—A PRELIMINARY REPORT

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Purpose : The objective of this study is to evaluate the initial treatment outcome of total body irradiation (TBI) in patients with bone marrow transplantation (BMT) who were referred to the Chai-Yi Christian Hospital (CYCH).

Materials and Methods : From August 2002 to August 2004, 12 patients of leukemia or lymphoma were referred to the Chai-Yi Christian Hospital for TBI before BMT. Ten received TBI, and the other two received the simulation procedure only. For TBI, nine received 1200 cGy in 6 fractions over three days, and a child received 1320 cGy in 6 fractions over three days. The distance from focus of linear accelerator (LA) to middle abdomen of patients was 600 cm. We used 6 MeV photon at the dose rates of 300 and 400 monitor unit (MU) per minute with a Varian LA, but without a compensator. All patients were admitted to the BMT ward under partial aseptic environment. We placed a 1 cm lung partial block over thermoplastic shell on the patient's chest and applied the APPA projection technique with a 2 cm-thick acrylic sheet around 10 cm ahead of the patient.

Results : Of the ten patients who received TBI, five survived till January 2005. Only one patient experienced chronic graft versus host disease with oral mucositis, and the others had no relapse or complications, including a patient with T-anaplastic cell lymphoma who had only partial remission after the chemotherapy. Of the five expired patients, four failed to achieve complete remission and died within two months due to graft failure, secondary infections not related to TBI, or early relapse. Two of them also had venous occlusive liver disease. The patient who had complete remission was a case of acute lymphoblastic leukemia who acquired fungal infection three months after the BMT followed by the relapse and died 1.5 years later. The two patients who went through simulation alone had persistent relapse, and infection episodes hindered them from receiving TBI.

Conclusion : Our results suggest that infections related to the transportation of patients did not appear to be a key prognostic factor in TBI of BMT patients referred from other hospitals. Although the follow-up time is short and patient number is small, we consider the initial outcome satisfactory. Selection of patients is essential for better

result, but partial remission from initial chemotherapy may not necessarily destine to failure.

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Key words: Total body irradiation, Bone marrow transplantation, Linear accelerator

INTRODUCTION

Total body irradiation (TBI) plays an important role in the conventional management of allogenic hematopoietic stem cell transplantation. It can not only reduce the number of cancer cells but also suppress the immune system of the recipient to facilitate the growth of transplanted bone marrow through prevent rejection. Carrying out TBI requires medical physicists to perform careful dose calibration and measurement; otherwise, error rates over 30% in the dose range of source to patient's axis distance (SPAD) 300-600 cm are likely to occur [2, 4]. Because of the limitation of manpower and equipment, some hospitals need to transfer patients to another facility for TBI. We were concerned about the possibility of infection during the long distance travel back to the medical centers. The objective of this study is to evaluate the initial treatment outcome of TBI in patients with (BMT) who were referred to the Chai-Yi Christian Hospital (Chai-Yi Christian H).

MATERIALS AND MEDTHODS

Due to the limitation of manpower and equipment, another medical center in southern Taiwan needs to transfer their patients to Chai-Yi Christian H for TBI. While some hospitals place TBI patients in aseptic environment, the Chai-Yi Christian H can only provide partial aseptic condition and therefore need to transfer the referred patients back to their BMT center. We include all patients who were referred to the Chai-Yi Christian H for TBI

before BMT from August 2002 to August 2004. The distance from focus of linear accelerator (LA) to middle abdomen of patients was 600 cm. We used 6 MeV photon at the dose rates of 300 and 400 monitor unit (MU) per minute with a Varian LA, but without a compensator. All patients were admitted to the BMT ward under partial aseptic environment. We placed a 1 cm lung partial block over thermoplastic orthosis on the patient's chest and applied the APPA projection technique with a 2 cm-thick acrylic sheet around 10 cm ahead of the patient.

After fabricating the anterior and posterior shells (the orthosis), we took a simulation film for patient. We maximized the FFD (focus to films distance) and let the patient stand as still as possible, facing the image intensifier of the machine. For indicating the center of the field, we put a small steel ball on the back shell and then another on the anterior shell; through the X ray, we aligned the two balls. After fabricating the Cerrobend alloy, we mounted it to the shells and put it to the right position through aligning the two balls with the center of the field. Each piece of alloy was fixed tightly with two screws. When we took portal films, the patient sat over the saddle inside the frame, which put the patient at the same height as the linear accelerator's iso-center. We fastened each shell to the patient with a restraining belt and then added one more belt each over patient's upper and lower chest. Through placing sponge pillows, bed sheets, and Styliform, we fixed the patient and the shell set tightly to the supporting rod of the frame to minimize the rotate of the patient and shell set in all directions. Portals