RCSI

DOES PROLONGED CHEMOTHERAPY RESULT IN LOSS OF IMMUNITY IN
PREVIOUSLY VACCINATED CHILDREN WITH ACUTE LYMPHOBLASTIC
LEUKEMIA” A RETROSPECTIVE ANALYSIS OF PATIENTS TREATED AT OLC HC
2006 - 2016

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Background

Currently the cure rate for children diagnosed with acute lymphoblastic leukaemia (ALL) in Ireland is over 90%¹. Advances in chemotherapy treatment protocols have resulted in a large cohort of long term survivors. However, despite this progress, one of the well-established side effects of chemotherapy for treatment of ALL is impaired humoral and cellular immunity, leading to significant immunodeficiency.

Objective

To assess the presence of protective antibodies to measles, mumps and rubella virus pre- and post- chemotherapy in Irish children treated for ALL and to identify possible factors that might predict loss of immunity such as intensity of chemotherapy regimen, age, and the gender.

Method

A descriptive, cross sectional, retrospective analysis, single centred national study was conducted which included all patients diagnosed with ALL, at Our Ladies Children’s Hospital Crumlin (OLCHC), Dublin, between the ages of 1 and 16, from April 2006 to April 2016. The study included all patients who received first line treatment as per the UKALL protocol and received the Irish national immunization vaccine protocol.

Table 1: Presence of protective titres against measles and age at diagnosis

Age group (years old)	Total number of patients in age group.	Positive-positive patients (54)	Positive-negative patients (70)
1-5	82	36 (44%)	46(56%)
6-10	27	10 (37%)	17(63%)
11-16	15	8 (53.3%)	7 (46.7%)
TOTAL	124	54 (44%)	70 (56%)

Results

- Of the 249 children with pre-chemotherapy serology for measles, the rate of protective antibodies was 91% (n=227). Out of the 227 patients recorded as being positive pre-treatment, 24 % retained their protective antibodies post chemotherapy, 30% (95% CI 24-36) lost their immunity to measles. The remaining 46% did not have post chemotherapy follow up data recorded.
- Pre-chemotherapy serology for mumps was recorded in 64 children and 89% (95% CI 81-97) were found to be immune to mumps. Post treatment 16% (95% CI 6-26) remained immune and 32% (CI 95% 20-44) were negative for protective antibodies. No post treatment data recorded for mumps in the remaining 30 children.
- Of the 53 patients with serology for measles, all were found to have protective antibodies to rubella. Of the 53 children, 23 % (95% CI 12-34) retained immunity to rubella, 9% (95% CI 1.3-17) had no protective antibodies. There was no post treatment rubella results recorded in 36 patients.
- There was no correlation found between measles immunity pre and post treatment and age. However when male patients are looked at individually it was found that more male patients converted from positive to negative measles antibodies post chemotherapy irrespective of their age (figure 1). This trend almost reached statistical significance when Chi Squared cross tabulation was used P (0.054).

Figure 1: Percentage of patients converted from positive to negative post chemotherapy by age and gender.

Discussion

An overall decrease in vaccine induced immunity to measles, mumps and rubella protective antibodies post-chemotherapy was observed. Both Zengin et al² and Lehrnbecher T³ et al recommend revaccination 3 months after completion of maintenance chemotherapy. In this study, post-therapy antibody titres were obtained 9 months after cessation of maintenance chemotherapy as this is currently the standard best practice for serology follow up in OLCHC. There is little evidence in the literature regarding the effect of gender, however our results suggest that the increased duration of chemotherapy that males receive may have a negative effect on their protective antibodies against measles virus leading to a greater loss of immunity. This study was limited by small numbers and incomplete follow up, Further studies are needed to investigate these findings.

References
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