HLA immunization of haemodialysed patients in the transfusion and the erythropoietin eras

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Abstract—The frequency of transfusions and the development of HLA alloimmunization in the years 1986 and 1995, representing the ‘transfusion era’ and the ‘erythropoietin era’, have been compared. The introduction of erythropoietin was found to reduce the need for transfusion in haemodialysed patients on the waiting list from 65.2% to 5.7%. The elimination of transfusions resulted in a decrease in HLA immunization from 56.5% to 35%. In those patients who were still immunized, antibody production was probably caused either by immunomodulation or by transfusions given to treat complications. Erythropoietin could be used instead of transfusions in almost all cases, except for complications involving severe bleeding.

Key words: Erythropoietin; haemodialysed patients; HLA immunization; transfusion.

INTRODUCTION

Until 1990, the only effective treatment for severe anaemia associated with chronic renal insufficiency was transfusion. As a result of transfusions, the immune system of the patient often forms antibodies in response to the presence of foreign structures in the body. Alloimmunization develops especially frequently and rapidly against HLA antigen [1]. As a consequence of the immune response, the antibodies have a harmful influence on the patient’s chances for transplantation and graft survival [2].

Following the therapeutic introduction of human recombinant erythropoietin [3], the treatment of anaemia in uraemic patients waiting for transplantation has become possible without transfusions. Since 1990, haemodialysed patients in Hungary have received erythropoietin treatment and this has reduced the transfusion needs considerably.

The aim of the present study was to compare changes in the HLA immunization of patients awaiting transplantation in the transfusion and the erythropoietin eras.

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MATERIALS AND METHODS

Since 1972, our department has examined the HLA immunization of haemodialysed patients awaiting kidney transplantation in the southern Hungarian region (≈2.0 million inhabitants). Complement-dependent cytotoxicity tests for antibody screening were performed monthly with the use of approximately 20 known HLA-ABC phenotype panel cells [4]. The results were assessed as a percentage of the panel reactivity (PRA). Each positive reaction with a panel cell was recorded as 5% of the PRA. If the findings of antibody screening with all 20 panel cells were negative, the patient was assessed as non-immunized against HLA antigens. The 5% PRA sample findings were considered to be of doubtful value regarding HLA immunization, whereas PRA sample findings of 10% or above were considered positive.

We chose the year 1986 to characterize ‘the transfusion era’; the year 1995 was chosen to represent ‘the erythropoietin era’ because our surveys showed that 85% of dialysed patients had regularly received erythropoietin treatment in this region by then.

With regard to the frequency and quantity of transfusions in 1986 and 1995, we examined the proportion of HLA-immunized patients on the waiting list and the PRA of the immunized patients.

Statistical analyses were based on the $p$ values calculated by means of the Student $t$-test.

RESULTS

Tables 1 and 2 present the results of our investigation.

In 1986 (transfusion era), on average 65.2% of the patients received monthly transfusions. Most patients needed a transfusion in January (74.4%), while fewer patients received a transfusion in December (52.2%). On average, 3 units of buffy coat-free erythrocytes was administered. The frequency of patients with 10% or higher PRA ranged from 46% to 68.9%. On average, 56.5% of the patients were HLA-immunized. There was a proportionate distribution of antibody-producing patients in both the low and the high PRA patients. 53.8% of the immunized patients exhibited a PRA lower than 50 (Figs 1–3).

In 1995 (erythropoietin era), 5.7% of the patients needed a transfusion. Most patients received a blood transfusion in August (9.35%), and fewer in September (2.8%). On average, 2 units of buffy coat-free erythrocytes was administered. The level of HLA immunization ranged from 32% to 41.9%. 35% of the patients on the waiting list were immunized. 19.3% of them demonstrated a low PRA and 15.7% of them higher levels (Figs 1–3).

Our results prove that the administration of erythropoietin effectively reduced the need for transfusion in haemodialysed patients. There was a significant decrease of more than 90% in the need for transfusion between 1986 and 1995 ($p < 0.01$). HLA immunization decreased by 21.5%, a statistically significantly change ($p < 0.01$). However, one-third of the patients were still immunized.