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Issues Pertaining to Blood Transfusion in Immunocompromised Patients

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Editorial

Every blood transfusion interferes with the immune system of the recipient. However, patients who are already immunocompromised often require frequent blood transfusions and pose special challenges for blood transfusion service. Some additional issues which need to be considered in patients with congenital or acquired deficiencies of the immune system are blood grouping discrepancy, transfusion associated graft versus host disease (TA-GvHD), CMV transmission, increased risk of bacterial and other infections from blood components and anaphylactic reactions in IgA deficient patients.

ABO Grouping Discrepancy

Grouping discrepancy occurs when the results of cell grouping are not in agreement with serum grouping. Weak or missing antibodies may give rise to false negative reactions on serum grouping of patient's blood sample [1]. Several case reports have been published where patient's primary disease came into light only when no or weak reaction was seen on serum grouping, warranting investigations of immunoglobulin levels [2,3].

TA-GvHD

It is a rare complication of blood transfusion caused due to presence of viable T lymphocytes in blood components. Normally, they remain detectable in the circulation for few days and thereafter removed by immune system of the recipient. However, if the recipient is immunocompromised, recognition and elimination of donor lymphocytes remains inadequate. Eventually they engraft and proliferate leading to deleterious effect on the host. Clinical features include fever, rash, diarrhea, hepatitis and pancytopenia. Overall mortality is >90% [4]. The documentation of the presence ofdonor-derived cells or DNA in the blood oraffected tissues of the recipient is required for a definitive diagnosis of TA-GvHD [5]. Modalities for treatment include methylprednisolone [6], cyclosporine in combination with OKT3 [7], and with cyclophosphamide and anti thymocyte globulin combined with autologous peripheral blood progenitor cell infusion [8], as well as allogeneic BMT or stem cell transplantation [9]. For prevention, gamma irradiation of blood components is recommended for patients receiving HLA matched transfusion, granulocyte transfusion, intrauterine transfusion, exchange transfusion, BMT and stem cell transplantation, therapy with purine analogue drugs, as well as those with lymphoma and congenital immunodeficiency.

CMV Transmission

Transfusion-transmitted CMV is of particular concern in immunocompromised patients as both primary infection and reactivation disease can be overwhelming and even fatal [10]. CMV is transmitted primarily through leukocytes contained in cellular blood components. The sites of CMV latency are thought to include CD34+ progenitor cells and CD13+ and CD14+ monocytes [11]. Patients who are at highest risk include foetuses receiving intrauterine transfusions, low birth weight premature infants born to CMV seronegative mothers and CMV seronegative recipients of solid organ or hematopoetic stem cell transplants from seronegative donors [12]. The risk of transmission depends on the immunosuppressed state of the patient, viral load transmitted by the blood component, and preventive measures taken against CMV [13]. Strategies to reduce the risk of transfusion transmitted CMV include use of blood from CMV seronegative donors, reduction of leukocytes in the blood components, and postdonation treatment of the blood components to inactivate the virus. It may be difficult to provide CMV negative blood components from donor populations where prevalence of CMV is high. A residual leucocyte level of $5X10^6$ is said to mitigate the risk of CMV transmission [1]. A landmark study had compared CMV negative blood components with leucocyte-depleted blood components for preventing transfusion transmitted CMV in hematopoietic stem cell recipients and found identical results with both methods [14]. However, both have their limitations and neither is 100% efficacious in preventing CMV transmission. Newer strategies for pathogen inactivation by post donation treatment of blood components are currently being developed [15].

Bacterial and Other Infections

Blood transfusion is a potential source of transmission of viruses, bacteria and parasites. The severity of reaction to bacterial contamination of blood components is dependent on immune status of the patient. While immune-competent recipients may present with only mild to moderate reaction, this may lead to life threatening sepsis in immunocompromised patients [16]. Approaches for prevention include donor screening, skin disinfection, initial aliquot diversion, and pretransfusion bacterial detection [17].

Post-transfusion EBV infection may lead to EBV associated lymphomas if patient is immunocompromised [18]. Coagulation factor concentrates may transmit parvovirus B19 which may lead to pure red cell aplasia in some immunocompromised patients [19]. Morbidity and mortality due to transfusion transmitted malaria is particularly severe in immunocompromised and splenectomised patients because of high parasitemia in these groups. Some centres

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in malaria endemic areas practice premedication of vulnerable recipients with chloroquine, routinely before transfusion [20].

Anaphylaxis Reactions in IgA Deficient

IgA deficiency has been recognised as most frequent immunodeficiency in humans [21]. The individuals with IgA deficiency are mostly asymptomatic and no further investigation is warranted unless blood transfusion is required. They may develop class specific alloantibodies to IgA and anaphylactic reactions occur when blood components containing IgA are transfused. If anaphylaxis related to blood transfusion is suspected, administration of any additional plasma-containing blood component should be avoided, and an appropriate diagnostic evaluation should be performed. Further investigations include nephelometry for detection of IgA levels and passive hem agglutination assays utilizing IgA-coated red blood cells to detect anti-IgA [22]. If further blood transfusions are required, cellular components can be washed to remove the residual plasma containing IgA, or blood may be collected from donors who are known to be IgA deficient. When packed red cell transfusion is required, autologous donation and frozen blood may be feasible options.

To conclude, blood transfusion in immunocompromised patients should be done under strict vigilance and special additional demands should be considered while selecting the components for transfusion.

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