Short Communication

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Adverse Blood Transfusion Reactions in Patients on Haemodialysis

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Blood transfusions are a critical aspect of managing patients undergoing haemodialysis, especially for those with chronic kidney disease (CKD).[1] CKD patients often suffer from anaemia due to reduced erythropoietin production by the kidneys. When erythropoiesis-stimulating agents and iron supplements fail to adequately increase haemoglobin levels, blood transfusions become necessary to prevent severe anaemia and associated complications. Although effective, transfusions come with risks such as iron overload, immune sensitization, and transmission of infections.[2] Careful consideration of the indications, close monitoring, and the judicious use of transfusions are essential to optimize patient outcomes while minimizing potential adverse effects in haemodialysis settings.

Haemodialysis patients often experience anaemia as a result of chronic kidney disease (CKD), leading to a frequent need for blood transfusions.[3] Despite the efficacy of blood transfusions in managing anaemia, they are associated with several adverse reactions, some of which can pose significant risks to the already vulnerable population of dialysis patients.[4] Adverse transfusion reactions, including both immunologic and non-immunological complications, can intensify existing health issues, potentially leading to outcomes like acute kidney injury (AKI) and other major adverse kidney events (MAKE).[5]

The physiological strain from managing immune or inflammatory responses associated with transfusion reactions can impair renal function. In a recent study, transfusion reactions increased the likelihood of developing AKI by twofold, especially among patients with comorbid conditions such as diabetes and cardiovascular disease.[6] In addition, MAKE, including a decline in glomerular filtration rate (GFR) and increased mortality, was more common in patients who experienced transfusion reactions, underscoring the long-term renal risks associated with these reactions.

As stated above, haemodialysis patients often require transfusions due to inadequate erythropoietin production by the diseased kidneys, which leads to chronic anaemia. While erythropoiesis-stimulating agents (ESAs) have reduced the frequency of transfusions, some patients still require red blood cell (RBC) transfusions, particularly those who exhibit ESA resistance or have contraindications to ESA therapy.[7] Additionally, certain clinical situations, such as severe symptomatic anaemia, demand rapid intervention through transfusions.

Despite the benefits, blood transfusions present a unique set of risks for dialysis patients, including increased risk of alloimmunization, which complicates future kidney transplant eligibility.[8] Alloimmunization occurs when the patient develops antibodies against foreign antigens in transfused blood, potentially leading to future transfusion complications and limiting the patient's compatibility with donor organs. Adverse transfusion reactions can be categorized into infectious and non-infectious complications. These include febrile non-haemolytic transfusion reactions (FNHTR), allergic reactions, transfusion-associated circulatory overload (TACO),

transfusion-related acute lung injury (TRALI), and haemolytic transfusion reactions. Studies have shown that FNHTR and allergic reactions are the most common. FNHTR is characterized by a mild fever and chills during or shortly after transfusion, resulting from an immune response to leukocytes or cytokines in transfused blood.[9] TACO and TRALI, though less common, are critical complications that require immediate medical attention, as they can lead to respiratory distress and life-threatening pulmonary complications.[10] TACO occurs when rapid transfusion leads to fluid overload, overwhelming the patient's cardiovascular system, and is especially risky in dialysis patients who already struggle with fluid management. TRALI, on the other hand, is a rare but severe reaction characterized by non-cardiogenic pulmonary edema, often resulting from an immune response to antibodies in the donor blood that interact with the recipient's white blood cells.[11]

Infectious risks, though minimized through rigorous screening and haemovigilance programmes, are still present, particularly bacterial and parasitic infections. The risk of infection is higher in patients receiving multiple transfusions due to increased exposure to blood components.[12] This risk is magnified in dialysis patients, as vascular access used during haemodialysis can serve as an entry point for pathogens, increasing the likelihood of bacteremia and subsequent complications.[13]

To minimize the risk of adverse transfusion reactions, several strategies can be employed. Preventive measures include using leukoreduced blood products, which help reduce the risk of FNHTR and alloimmunization by removing leukocytes from the blood product.[14] The use of leukoreduced PRBCs is particularly beneficial for haemodialysis patients, who are often immunocompromised and more susceptible to transfusion reactions.

Transfusion decisions in dialysis patients should be based on a careful risk-benefit assessment, considering factors such as symptom severity, haemoglobin levels, and the potential risks associated with ESA therapy.[15] For patients who are eligible for kidney transplantation, transfusions are often avoided, if possible, to minimize alloimmunization risk, as developing antibodies against donor antigens can significantly reduce transplant compatibility.[16]

Another critical aspect of managing transfusion reactions is close monitoring during and after transfusion. Vital signs should be continuously monitored, and any signs of adverse reactions, such as fever, dyspnoea, or hypotension, should prompt immediate intervention. For patients with a history of severe transfusion reactions, premedication with antihistamines or corticosteroids may reduce the likelihood of future reactions.[17]

Adverse blood transfusion reactions in haemodialysis patients are a significant clinical concern, necessitating a careful approach to blood transfusion management. Enhanced haemovigilance programmes and preventive measures, including leukoreduction and judicious transfusion practices, play a pivotal role in minimizing these risks.

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