Short Report

Acute transfusion reactions encountered in patients at a tertiary care centre in Punjab

MANVI GUPTA, RAJESH KUMAR, SONIA GUPTA, AMARJIT KAUR

ABSTRACT

Background. Blood transfusion is a life-saving procedure, which can occasionally be unsafe and result in a spectrum of adverse events. We aimed to determine the characteristics and type of acute transfusion reactions occurring in patients at a tertiary care centre.

Methods. A retrospective study was conducted at the Department of Immunohaematology and Blood Transfusion, Dayanand Medical College and Hospital, Ludhiana, Punjab. All acute transfusion reactions reported to the department from 1 Jan 2012 to 31 March 2013 were evaluated. All the adverse reactions were recorded, analysed and classified on the basis of their clinical features and laboratory tests.

Results. During the study period, 45 092 blood components were issued from the department and 190 transfusion reactions (0.42%) were reported. The most frequent were febrile non-haemolytic transfusion reactions (54.2%) followed by allergic reactions (36.3%), haemolytic reactions (1%) and non-specific reactions (8.5%).

Conclusion. Each transfusion has to be monitored carefully with prompt recognition and treatment of acute transfusion reactions to decrease transfusion-related morbidity and mortality. Data from a well-functioning haemovigilance system can be used as a quality indicator for monitoring blood transfusion safety and contribute to evidence-based transfusion medicine.

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INTRODUCTION

Blood transfusion has certain risks and any unfavourable event occurring in a patient during or after transfusion, for which no other reason can be found, is called a transfusion reaction. These untoward effects vary from being relatively mild to severe and require rapid recognition and management.

Acute transfusion reactions (ATRs) occur during or within 24 hours of transfusion. Depending on their severity and clinical response they can be mild, moderate, and severe or life-threatening reactions.[1] Aetiologically, they are classified as immunological and non-immunological reactions. Acute immunological reactions are associated with an immune response to antigens on red blood cells, leucocytes, platelets or plasma proteins and include acute haemolytic transfusion reaction (AHTR), febrile non-haemolytic transfusion reactions (FNHTR), allergic, anaphylactic and transfusion-related acute lung injury (TRALI), while non-immunological reactions include transfusion-related sepsis, circulatory overload, non-immune haemolysis, hypocalcaemia and hypothermia.[1] Around 0.5%–3% of all transfusions result in some adverse events, but most are minor without any consequence.[2,3]

Haemovigilance consists of reporting all complications related to transfusion. The aim is to have a system of surveillance so that the risks associated with transfusion can be identified along with the causes and these can be avoided in future.[4] Various haemo-vigilance programmes have been developed and implemented in Canada, UK and France, and annual reports of the adverse events encountered are published. In India, the haemo-vigilance programme has been started under the aegis of the Indian Pharmacopoeia Commission and our centre is reporting transfusion reactions. We aimed to determine the characteristics and type of ATRs occurring in patients at our centre.

METHODS

This retrospective study was conducted in the Department of Immunohaematology and Blood Transfusion, Dayanand Medical College and Hospital, Ludhiana, Punjab. We reviewed all the ATRs that were reported to the department from 1 January 2012 to 31 March 2013. A transfusion reaction form containing written guidelines and information regarding the patient and blood unit was issued along with all the blood products. The algorithm used for investigating a transfusion reaction is shown in Fig. 1. The definitions for diagnosing various ATRs were:

FNJTE: Rise in temperature >1 °C and/or chills or rigors associated with transfusion.

Allergic: Urticaria, rashes, pruritis without fever responding to antihistaminic therapy.

Haemolytic reactions: Clinical and/or laboratory evidence of haemoloysis and positive direct antiglobulin test.

Non-immune haemolysis: Haemolysis but a negative direct antiglobulin test.

Bacterial sepsis: Identical culture growth and antibiotic sensitivity of the patient and component bag.

Anaphylaxis: Hypotension, bronchospasm, loss of consciousness and shock.

TRALI: Acute respiratory insufficiency, fever and/or diffuse bilateral pulmonary infiltrates on chest X-ray in the absence of cardic failure.

Non-specific: Signs and symptoms with no direct relationship to the transfusion.

RESULTS

A total of 45 092 blood components were transfused to patients admitted to various clinical specialties during the study period. One hundred and ninety reactions were reported (Table I), in patients aged 6 to 60 years. There were 133 (70%) men and 57 (30%) women who had a transfusion reaction. Among the women, a history of parity was available in only 11, all of whom were admitted to the obstetrics and gynaecology ward, while the data for the rest were not available. The majority of reactions recorded

Dayanand Medical College and Hospital, Ludhiana, Punjab 141001, India
MANVI GUPTA, RAJESH KUMAR, SONIA GUPTA, AMARJIT KAUR
Department of Immunohaematology and Blood Transfusion
Correspondence to MANVI GUPTA; *guptamanvi81@yahoo.com*

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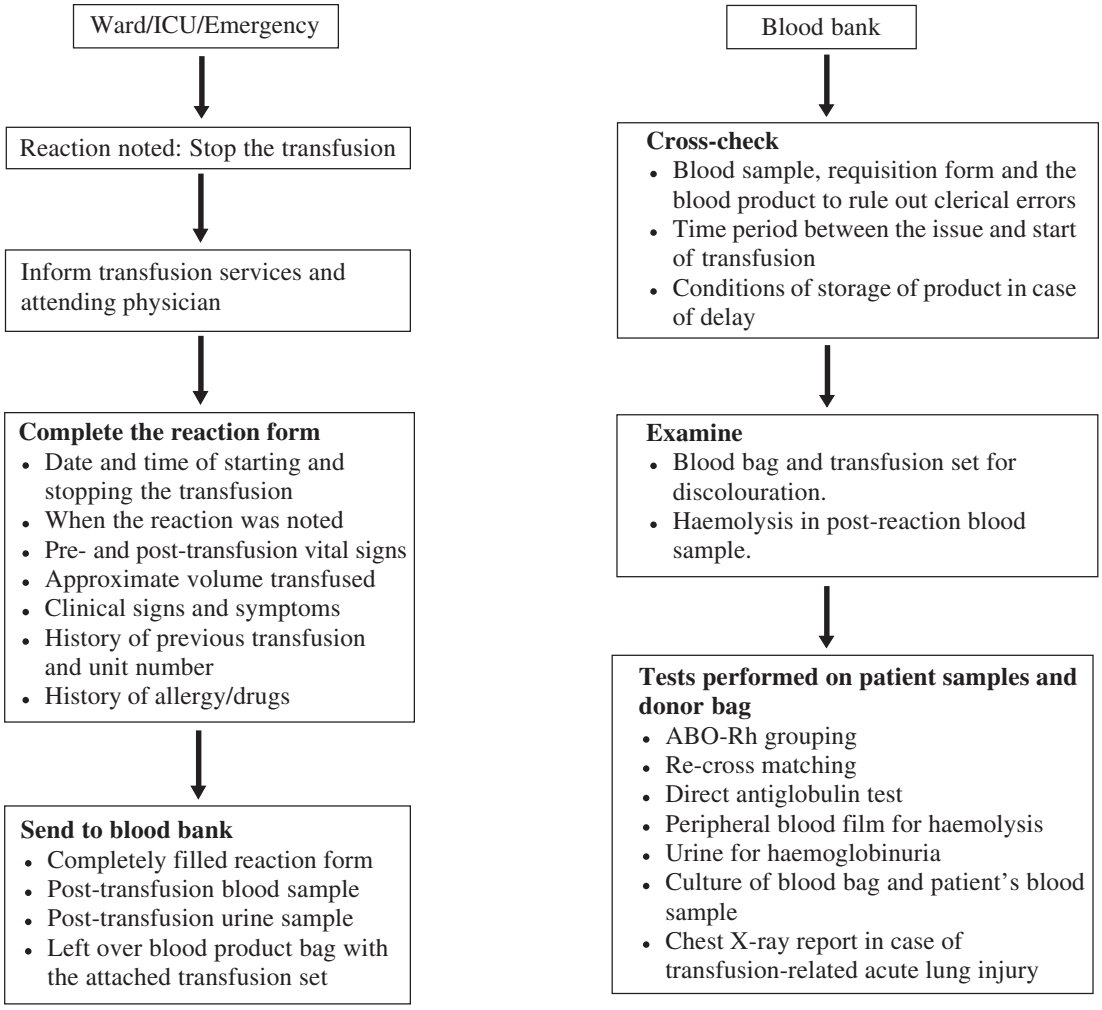

FIG 1. Algorithm for investigation of acute transfusion reactions

were from packed red cell transfusion followed by fresh frozen plasma and platelet concentrates (Table I).

Blood components were issued and adverse reactions observed in various specialties (Table II). The highest number of reactions was recorded in the thalassaemia unit followed by the intensive care unit (ICU) and oncology. All the reactions reported from the thalassaemia and oncology departments were from patients receiving multiple transfusions. The percentage of reactions reported after repeat transfusions was 66%, 31%, 21%, 18%, and 12% for ICU, emergency, medicine, obstetrics and gynaecology, and surgery, respectively. There were 11 reactions from obstetrics and gynaecology of which 7 occurred in multiparous women.

The common symptoms reported were fever, chills, urticaria, rashes, pruritis, nausea, vomiting, headache, dyspnoea/tachypnoea and anxiety/sweating. All the reported ATRs were categorized according to investigations and the criteria. More than half (54.2%) the reactions were febrile non-haemolytic transfusion reactions (Table III). Haemolytic reactions were observed in 2 (1%) patients as a result of ABO incompatibility due to wrong patient sampling and labelling in the emergency.

TABLE I. Characteristics of transfusion and transfusion reactions

Component	Units transfused (%)	Number of reactions (%)
Packed red cells	29 130 (64.6)	140 (73.7)
Fresh frozen plasma	8360 (18.6)	37 (19.5)
Platelet concentrate	7602 (16.8)	13 (6.8)
Total	45 092	190

TABLE II. Distribution of acute transfusion reactions according to specialty under which the patient received the transfusion

Department/Unit	Units transfused	Number of reactions (%)
Thalassaemia	3712	44 (23.2)
Intensive care unit	9964	38 (20)
Oncology	4842	32 (16.8)
Emergency	6588	29 (15.3)
Medicine	7550	19 (10)
Surgery	8828	17 (8.9)
Obstetrics and Gynaecology	3608	11 (5.8)
Total	45 092	190

DISCUSSION

This study analysed the spectrum of adverse effects of transfusion. Unfortunately, clinical case reporting has several limitations as a source of comprehensive information about the incidence of transfusion reactions. The most important concern is the dependence on the awareness of the clinician and paramedical staff for determining whether the observed symptoms are indicators of a transfusion reaction or exacerbation of a patient's underlying condition. Transfusion reactions are less likely to be reported if

TABLE III. Distribution and frequency of acute transfusion reactions according to the type of blood component

Type of reaction	Packed red blood cells	Fresh frozen plasma	Platelet concentrate	Total (%)
Febrile non-haemolytic transfusion reaction	85 (1 in 342)	12 (1 in 696)	6 (1 in 1267)	103 (54.2)
Allergic	42 (1 in 693)	25 (1 in 334)	2 (1 in 3801)	69 (36.3)
Haemolytic reactions	2 (1 in 14565)	0	0	2 (1)
Non-specific reactions	11 (1 in 2648)	0	5 (1 in 1520)	16 (8.5)
Total	140	37	13	190

* Transfusion-related sepsis and transfusion-related acute lung injury were not seen in any patient

TABLE IV. Comparison of acute transfusion reactions reported in different studies

Study	Febrile non-haemolytic transfusion reaction (%)	Allergic (%)	Haemolytic (%)	Others (%)	Non-specific (%)
Shil *et al*. (2005)[14]	89.5	6.5	0.8	3.3	0
Chowdhury *et al*. (2008)[10]	62.5	25	0	0	12.5
Khalid *et al*. (2010)[15]	41.9	34.4	1.8	16.8	5.1
Bhattacharya *et al*. (2011)[7]	41	34	8.6	15.5	0.95
Grujic *et al*. (2012)[8]	54.4	38.3	1.1	6.2	0
Present study, 2013	54.2	36.3	1	0	8.5

they are mild and non-specific. Thus, it was difficult to obtain an accurate number. The incidence of ATRs in our study was 0.42%, which was similar to that reported by the University of Puerto Rico, Auckland Regional Blood Centre and Postgraduate Institute of Medical Education and Research, Chandigarh, who reported incidences of 0.2%, 0.34% and 0.35%, respectively.[5–7] Packed red cell transfusion was most commonly associated with ATRs (73.7%) followed by fresh frozen plasma (19.5%) and platelet concentrates (6.8%), and similar findings were reported by Grujic *et al*.[8] and Payandeh *et al*.[9]

The highest proportion of ATRs was observed in the thalassaemia unit followed by the oncology department. This could be due to alloimmunization against red cell antigen due to multiple transfusions in these patients.[9] Based on this observation, we can surmise that with an increase in number of transfusions, the chances of a transfusion reaction also increase. A study from Dhaka, Bangladesh reported a strong positive relation between transfusion reactions and the number of units transfused.[10] So extra care should be taken in case of repeat transfusions with close monitoring of the patient during and after the transfusion.

Pregnancy poses a special challenge as the immune response in pregnancy is different from that in the non-pregnant state, which may affect the nature or onset of complications.[11] Repeated inapparent or overt foeto-maternal haemorrhage in multiparous women increases the formation of allo-antibodies and their risk to develop ATRs as compared to that in primiparous women.[12]

Most of the symptoms reported in our study were mild and transient. The commonest ATRs observed were FNHTR (54.2%) which subsided after taking paracetamol, followed by allergic reactions (36.3%) that were treated by antihistaminics. Non-specific symptoms occurred in 8.5% of the reactions, which on laboratory investigations could not be placed in any category. Haemolytic reactions were rare. Incidents of incorrect blood component transfusion have also been reported in the literature, with the most common cause being collection of sample from the wrong patient followed by clerical errors during patient registration or identification.[11,13] We did not come across any patient with TRALI, anaphylaxis and transfusion-related sepsis, possibly due to the rarity of these complications, lack of awareness among healthcare personnel and also due to confusion with other conditions leading to a similar clinical picture. Table IV shows a comparison of our study with other reported studies.

Red cell and platelet concentrates were most commonly associated with FNHTR. These reactions have been estimated to occur in ~1% of red cell and 18%–23% of platelet transfusions.[16–18] Febrile reactions result from interaction of recipient antibodies with the antigens on donor leucocytes causing stimulation and release of endogenous pyrogens.[19–21] Leucocyte reduced products, with leucocyte reduction to a level of 5×10^8 can be used to prevent further recurrences of FNHTR.[16,22] An association has also been suggested between FNHTR and the component age.[23] Certain biological mediators are released within the blood components during the storage period. Once infused, these mediators initiate a febrile reaction. The association between the component age and FNHTR was found to be much stronger for platelet concentrates than packed red cells, which could be attributed to the difference in storage temperatures of the two components.[24] High levels of inflammatory cytokines are released from stored platelets.[25] So transfusion of platelets stored for 3 days or less is also an effective way to reduce FNHTR. Another reason for reactions is the time delay between the issue of the product and its infusion, during this time the storage of the product may not be appropriate. The commonest reaction noted with fresh frozen plasma was allergic. Blood components containing larger amounts of plasma are associated with more severe allergic reactions.[26]

Patient safety as well as medical and ethical issues related to transfusion reactions demand an organized system of haemovigilance for tracking these adverse events, by emphasizing preventive steps and eliminating errors in transfusion medicine. Data collection using standardized tools at the hospital level and coordination at the national level can be the basis of an effective haemovigilance system.[27] A centralized and structured haemovigilance programme was launched in India in December 2012 as a collaborative venture by the Indian Pharmacopoeia Commission and the National Institute of Biologicals. This programme will provide a comprehensive view of the incidence of adverse events related to blood transfusions in India, create awareness among healthcare professionals and generate evidence-based recommendations for blood safety. So far, we have reported 105 cases of ATRs under this programme.

Transfusion although necessary and life-saving can cause complications. Strict vigilance has to be observed from the time

of collection to component preparation, storage, cross-match and release of the blood component. Each transfusion has to be monitored carefully with prompt recognition and treatment of the adverse event. A rational use of these products considering their deleterious effects can decrease transfusion-related morbidity and mortality. The potential of a national haemovigilance system to provide accurate and generalizable data has to be recognized by all stakeholders.

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