Low Ionic Strength Solution - Antihuman Globulin Crossmatch: A Safer Approach To Request For Uncrossmatched Blood

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Abstract

Background:
Low-ionic strength solution (LISS) enhances antigen-antibody reaction thereby reducing two hours necessary for standard crossmatch test to ten minutes. However, the use LISS is becoming unpopular nowadays for unknown reason.

Objectives:
To perform ten-minutes low-ionic strength solution (LISS) antihuman globulin (AHG) crossmatch and compare the results to that of two-hour full antihuman globulin crossmatch.

Methods:
Ten minute LISS-AHG and two-hour full AHG crossmatch test were performed using standard techniques.

Results:
The pattern of compatibility and incompatibility reactions with the two techniques were comparable.

Conclusions:
Ten-minute LISS-AHG crossmatch was as effective and safe as two hour full AHG crossmatch.

INTRODUCTION

The primary purpose of compatibility test which comprises an ABO and Rh (D) grouping on the donor and patient samples, screening of the donor and patient sera for unexpected antibodies, and a crossmatch, is to ensure the best possible result of blood transfusion for the patients[1].Sezama[2] stated that historically, the major cause of transfusion associated fatalities have been clerical errors, resulting in incorrect ABO groupings and that the situation remains virtually unchanged till today;48 percent of transfusion deaths are due to such errors.

The crossmatch test has two main function; it acts as a final check of ABO incompatibility between the donor and the patient, secondly it may detect the presence of an antibody in the patient's serum that will react with antigens on the donor red cells but that was not detected in antibody screening because the corresponding antigen was lacking from the screening cells[2].

Morten[3] proposed immediate spin (I.S.) crossmatch also known as abbreviated crossmatch in order to reduce hour usually spent on patient specimen, control reagent and supply expenses, cut patient costs and at the same time provide the patient with the best available blood components. The method involves screening of the donor and patient sera for clinically significant antibodies, if the screening is negative; it is followed by simply mixing patient's serum with donor cells and centrifuging immediately (i.e. immediate spin). Absence of haemolysis or agglutination indicates compatibility. Studies [4,5,6,7,8,9,10,11,12] have show that it is a safe and effective method of pre-transfusion testing, calculated to be 99.9 percent effective in preventing the occurrence of an incompatible transfusion and that the frequency with an incompatible antihuman globulin crossmatch follows a negative screen is very low

0.06 percent.

Immediate Spin (I.S) crossmatch is only a safe method in centers where sera of donor and patient are screened for clinically significant antibodies and the screening is negative. The antihuman globulin part of the crossmatch test was dropped in those centers.

In centers like our own and many other blood transfusion centers in Nigeria where we don't have antibody screening cell panel, it is a risk to rely absolutely on I.S. crossmatch for blood transfusion without a follow-up of full AHG crossmatch as was shown in an unpublished work carried out in our department.

Low-ionic strength solutions (LISS) have been known to shorten incubation period in antigen-antibody reaction.

LISS-AHG crossmatch was a common practice in most Nigerian blood transfusion centers including our own in the eighties but it was dropped for unknown reason in the nineties till the present moment despite increased workload and reduced personnel.

The request for uncrossmatched blood is on the increase in our hospital due to increased number of emergencies that come to the hospital. Our practice is to urgently repeat both patient and donor ABO and Rh (D) typing, I.S. technique (without antibody screening as recommended), release the blood in the absence of lyses or agglutination and a follow-up of full AHG crossmatch which takes between 1-2 hours. Before the end of crossmatch, the patient might have been transfused. The findings of our unpublished work showed that out of 2820 ABO and RhD compatible donors and recipients, 28 (1%) and 40 (1.4%) showed agglutination at I.S. and full AHG crossmatch. The agglutinations at I.S. were all due to ABO misgroup and those of AHG were due to antigen-antibody reaction of other groups between the donor and patient which we could not identify due to lack of facilities. The aim of the present study was to reassess LISS-AHG method and compare it to full AHG crossmatch with a view to have a standard operating procedure in our blood bank as well as recommending it to other centers.

MATERIALS AND METHODS

A simple crossmatch of one tube per unit blood was employed.

LISS-AHG CROSSMATCH METHOD

The LISS-AHG Crossmatch procedure was performed by washing the donor cells three times with normal saline and washed with LISS the fourth time, 5% donor's cell suspension was then made in LISS. Two drops of 5% cell suspension were added to four drops of patient's serum in a khan tube, mixed and incubated at 37° C in water bath for 10 minutes. At the end of the incubation, the mixture was washed four times in LISS and two drops of AHG added, the mixture was spun at 1500 rpm for 30seconds, gently re-suspended and read while viewing over a light source.

FULL AHG CROSSMATCH METHOD

The full AHG crossmatch was carried out washing the donor cells four times in normal saline. Five percent donor's cell suspension was made in normal saline, two drops of the suspension were added to four drops of patient's serum in a Khan tube, spun at 1500 rpm for 30 seconds, gently re-suspended and read while viewing over a light source. This eliminates ABO incompatibility. The mixture was incubated in water bath at 370 c for 1½ hour, a drop of 30% bovine albumin was added and incubated for another 30 minutes. At the end of two-hour incubation, the mixture was washed four times in saline, 2 drop of AHG added, spun at 1500 rpm for 30 seconds, gently re-suspended and read while viewing over a light source. Positive and negative controls were included in both cases.

RESULTS

Low-ionic strength solution (LISS) – AHG Crossmatch and full AHG crossmatch were performed on a total of 500 ABO and Rh (D) compatible donors and patients.

Of this figure, incompatible reaction was observed in six cases (1.2%) in both LISS-AHG and full AHG. Two of the cases (0.4%) were group A mislabeled as group O, three (0.6%) were due to misgrouping, two were group B and one group A misgrouped as O. the last one (0.2%) was from a patient who had warm autoimmune heamolytic anaemia.

Both positive and negative controls showed agglutination and no agglutination reactions respectively.

DISCUSSION

The findings of our study showed that LISS – AHG Crossmatch was as effective as full AHG crossmatch. The numbers of compatible and incompatible pints of blood were the same with the two methods. In emergency that warrants request for uncrossmatch blood, the medical laboratory scientist must quickly ascertain ABO and Rh0 (D) blood group of donors and patients samples, the blood can be

released if these are compatible while the LISS -AHG crossmatch continues which ought to have been completed before the commencement of blood transfusion. If at the end of crossmatch, incompatibility is detected, the doctor must be immediately notified to stop or not to commence the transfusion, if otherwise, the transfusion should continue.

Under no circumstances should blood be picked and release to the ward by mere reliance on the label on the blood bag because of technical or clerical error, which might have been committed during the pre-bleeding screening of the donor. This was revealed in our result.

We have found LISS-AHG to be time conserving, effective and a safe approach to request for uncrossmatched blood frequently encountered in our centre.

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