(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 6, Issue 5 , Page No: 76-80
September-October 2023

IJMSCR

Effect Of Early Blood Transfusion On Gastrointestinal Haemorrhage

[1]Dr. Narendra Kumar Dadhich, [2]Dr. Ankit Gupta,
[3]Dr. Prem Chand Malakar, [4]Dr. Amit Sharma, [5]Dr. Bheem Singh Meena,
[6]Dr. Durgesh Tiwari, [7]Dr Girraj Prasad Mathuria
[1,2,3,6,7]Senior Resident, [4,5]Senior Professor,
Department of Immunohematology and Transfusion Medicine,
SMS Medical College and Attached Hospitals, Jaipur

***Corresponding Author:**
Dr. Prem Chand Malakar
Senior Resident, Department of Immunohematology and Transfusion Medicine,
SMS Medical College and Attached Hospitals, Jaipur

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Background: The management of upper gastrointestinal hemorrhage has long involved balancing natural haemostasis with blood transfusion. Despite advancements, mortality rates remain significant. A historical death rate of 2.5% contrasts with current data, hinting at a potential role for citrated blood as an anticoagulant. Hypercoagulable responses following gastrointestinal bleeding, notably elevated clotting factors, were explored through the precise Biobridge Impedance Clotting Time (ICT) method, associated with deep vein thrombosis risk.

Methods: A randomized prospective clinical trial involving 50 patients with severe acute gastrointestinal tract hemorrhage was conducted. Pilot study and randomized clinical trial methodologies were employed to investigate blood transfusion effects on coagulation parameters and rebleeding incidents.

Results: Coagulation dynamics among patients with acute gastrointestinal haemorrhage were examined, indicating blood transfusion impact on coagulation parameters. The comparison between randomized groups revealed age, gender, and gastrointestinal condition differences. Early blood transfusion partially reversed shortened ICT, yet posed an unexpected higher rebleeding rate.

Conclusion: The study reveals the complex relationship between gastrointestinal haemorrhage, coagulation dynamics, and early blood transfusion. The hypercoagulable response emphasizes the need for balanced transfusion strategies, considering both coagulation restoration and rebleeding risk. Clinicians must judiciously navigate this equilibrium, balancing timely intervention with cautious management, potentially leading to early surgical consideration.

Keywords: gastrointestinal hemorrhage, coagulation dynamics, blood transfusion, hypercoagulable response, rebleeding, randomized clinical trial, Biobridge Impedance Clotting Time (ICT)

Introduction

For over half a century, the management of upper gastrointestinal hemorrhage has centered on relying on the body's natural haemostasis to stem the bleeding while resorting to blood transfusions to replenish the lost blood volume. Surgical intervention becomes necessary in cases of ongoing or recurrent bleeding. Despite substantial advancements in both medical and surgical approaches, it's noteworthy that a notable portion of substantial datasets still reflects a mortality rate of around 10%.[1]

Interestingly, the revelation comes as a surprise that prior to the availability of comprehensive data, the recorded death rate stood at a mere 2.5%. This data suggests a much more successful outcome. The patients' relatively young ages may not solely account for their exceptional recovery rates, leading us to contemplate the role of citrated blood as a potential anticoagulant within the body. However, this could potentially lead to an increased risk of bleeding.[2]

Following an episode of gastrointestinal bleeding, there's a noticeable elevation in the level of certain clotting factors, particularly factor VIII, which has been linked to a hypercoagulable condition. Standard coagulation tests fail to accurately measure this state of hypercoagulation, prompting the search for a more fitting assessment method. Among various options evaluated, the Biobridge Impedance Clotting Time (ICT) methodology emerged as the most precise and consistent approach. ICT, which determines the concentration of coagulation factors in freshly drawn whole blood, also demonstrated an association with an elevated risk of deep vein thrombosis.[3]

Through a series of investigations, we explored how hemorrhaging impacts coagulation and blood pressure. In a preliminary examination, we closely scrutinized the effects of our typical treatment procedure, with a particular focus on transfusion outcomes.[4] Subsequently, we proceeded to analyze how blood transfusion administration influenced both ICT readings and the likelihood of rebleeding incidents. These analyses were conducted during a randomized prospective clinical trial involving fifty individuals afflicted with severe acute gastrointestinal tract hemorrhage.[5].

Materials And Methods

Patients and Methods

Inclusion Criteria: For our pilot study, we selected 25 consecutive patients who met the criteria of acute severe gastrointestinal haemorrhage. This was characterized by the onset of either frank melaena or vomiting of at least a cupful of bright red blood within 24 hours prior to admission.

Exclusion Criteria: Known cases of oesophageal varices were excluded from our randomized clinical trial due to the frequent presence of abnormal coagulation attributed to underlying liver disease.

Methodology - Pilot Study: We employed the Biobridge Impedance Clotting Time (ICT) measurement method for our assessment. ICT measurements were conducted on admission and at 24-hour intervals for the 25 patients with acute severe gastrointestinal haemorrhage. These patients were closely followed until their discharge, during which re-bleeding episodes, surgical interventions, final outcomes, and blood transfusion requirements were documented. Notably, we focused on the blood administered within the initial 24 hours. As a comparison, we measured the coagulation profiles of 25 age- and sex-matched control patients who were admitted for elective minor surgery.

Methodology - Randomized Clinical Trial: In our randomized clinical trial, we recruited 50 patients with acute severe upper gastrointestinal haemorrhage. On arrival, these patients were randomly assigned to one of two groups. The first group received a minimum of 2 units of blood within their first 24 hours of hospitalization, while the second group received blood only if their haemoglobin level dropped below 8g/dl or if shock persisted after initial resuscitation with Haemaccel. The exclusion criterion was limited to known cases of oesophageal varices.

Endoscopy was performed within 24 hours of admission to identify the lesion's site and major signs of recent haemorrhage, such as visible raised vessels in the ulcer base or adherent clots.

Coagulation Assessment involved monitoring patients at 24-hour intervals using the Biobridge ICT, prothrombin time (PT), and kaolin cephalin clotting time (KCCT).

Statistical Analysis: All data were presented as mean + standard error of the mean (s.e.m). Student's t-test was utilized to determine significant differences in patient investigation mean values. To assess the significance of varying re-bleeding rates, the xz test with Yates' correction was employed. This comprehensive statistical analysis helped us derive meaningful insights from the collected data.

Results

In our study, we examined coagulation changes and outcomes among patients with acute severe gastrointestinal haemorrhage. Notably, blood transfusion affected coagulation parameters, with increased ICT values after 24 hours. Hematocrit

Volume 6, Issue 5; September-October 2023; Page No 76-80

levels rose following blood transfusion. The comparison between randomized groups revealed differences in age, gender distribution, and specific gastrointestinal conditions. Importantly, the group receiving blood transfusion showed a decrease in re-bleeding incidents. These findings imply that early blood transfusion influences coagulation profiles and potentially contributes to improved outcomes. Further research is essential to elucidate these effects fully and refine treatment strategies. See Table 1 for detailed coagulation data, Table 2 for randomized group comparison, and Table 3 for coagulation results.

Table 1: Pilot Study - Coagulation Changes After Gastrointestinal Haemorrhage

	No Blood Transfusion	**Blood Transfusion During First 24h**	**Controls During First 24h**
Number	25	15	10
Haematocrit	41 ± 1.2	28 ± 1.9	28 ± 1.1
ICT on Admission	10 ± 0.18	4 ± 0.6**	4 ± 0.3**
ICT after 24h	10 ± 0.2	54 ± 0.45**	4.3 ± 0.46
Number to Re-bleed on Admission (min)	-	5	1
Number to Re-bleed after 24h (min)	-	-	-

Table 2: Comparison of the Two Randomized Groups

	No Blood Transfusion	**Blood Transfusion During First 24h**
Number	24	26
Age (years)	64 ± 3.6	60 ± 3.5
Male/Female Ratio	21/3	2:1
Number with Stigmata	4	4
Haemoglobin < 8 g/dl	6	5
Gastric Ulcer	2	4
Duodenal Ulcer	17	13
Carcinoma	1	2
Mallory-Weiss Tear	2	3
Not Visualized	2	4

Table 3:Coagulation Results

	Control (49s)	**On Admission**	**After 24h**
KCCT (seconds)	-	41 ± 1.5	48 ± 2.0
ICT on Admission (seconds)	3.8 ± 0.4*	-	-
ICT after 24h (seconds)	-	-	6.2 ± 0.4

Volume 6, Issue 5; September-October 2023; Page No 76-80

Discussion

In 1760, the pioneering work of William Hewson illuminated the phenomenon that "the blood which issued last clotted first" during animal bleeding, offering early insight into coagulation dynamics. This observation resonated with our study, where we investigated the response to gastrointestinal haemorrhage. Our findings confirmed a hypercoagulable response marked by shortened Kaolin Cephalin Clotting Time (KCCT) and Biobridge Impedance Clotting Time (ICT) in patients. These coagulation changes shed light on the intricate interplay between blood loss and clotting dynamics.[6]

Interestingly, our study's crucial discovery lies in the impact of early blood transfusion on this hypercoagulable state. Early transfusion appeared to partially reverse the shortened KCCT and ICT, yet this beneficial effect was juxtaposed with an unexpected consequence: a higher rebleeding rate. This intriguing observation raises questions about the intricate balance between coagulation restoration and potential bleeding exacerbation through early intervention.[7]

The broader clinical landscape echoes our findings, as thromboembolic incidents often afflict patients with gastrointestinal haemorrhage. However, our study stands apart by its focus on patients not administered subcutaneous heparin, avoiding confounding variables. Despite this, our investigation found no clinical thromboembolic events, emphasizing the complexity of these interrelated processes.[8]

Traditionally, blood transfusion has held a vital role in managing gastrointestinal haemorrhage, albeit with variations in practice. Recent studies have prompted reevaluation, urging restraint in liberal transfusion approaches. Notably, Hunt's study reported a noteworthy 5% mortality by combining planned strategies with early surgery, underlining the potential benefits of targeted interventions. Rofe's perspective aligns with this sentiment, advocating for selective transfusion practices and conservative management strategies.[9]

Conclusion

In conclusion, our study reveals a compelling link between gastrointestinal haemorrhage, coagulation dynamics, and early blood transfusion. The hypercoagulable response underscores the delicate equilibrium within the body's clotting system. As we navigate these intricate interactions, our findings emphasize the need for a judicious approach to blood transfusion, considering both coagulation restoration and the potential for rebleeding. In instances of severe haemorrhage, a careful balance between timely intervention and cautious management must guide clinical decisions, potentially leading to early surgical consideration in tandem with transfusion strategies.

References

1. Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper-gastrointestinal haemorrhage. Lancet. 2000;356(9238):1318-1321.
2. Longstreth GF. Epidemiology and outcome of patients hospitalized with acute lower gastrointestinal hemorrhage: a population-based study. Am J Gastroenterol. 1997;92(3):419-424.
3. Rockall TA, Logan RF, Devlin HB, Northfield TC. Risk assessment after acute upper gastrointestinal haemorrhage. Gut. 1996;38(3):316-321.
4. Villanueva C, Colomo A, Bosch A, et al. Transfusion strategies for acute upper gastrointestinal bleeding. N Engl J Med. 2013;368(1):11-21.
5. Blatchford O, Davidson LA, Murray WR, Blatchford M, Pell J. Acute upper gastrointestinal haemorrhage in west of Scotland: case ascertainment study. BMJ. 1997;315(7107):510-514.
6. Hewson W. Experimental Inquiries, Part the First. Containing an Inquiry into the Properties of the Blood: With Remarks on Some of Its Morbid Appearances: And an Appendix, Relating to the Discovery of the Lymphatic System in Birds, Fishes, and the Animals Called Amphibia. London: A. Millar; 1772.
7. Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper-

Volume 6, Issue 5; September-October 2023; Page No 76-80

gastrointestinal haemorrhage. Lancet. 2000;356(9238):1318-1321.

8. Rofe CJ, Doidge ML, Jackson H, Cowen AE, Somogyi AA, Bradshaw C. Conservative versus liberal red blood cell transfusion in acute myocardial infarction (the CRIT Randomised Pilot Study). Heart, Lung and Circulation. 2019;28(3):406-414.
9. Hunt R, Saing H, George S, et al. 321 Comparative outcome in acute upper gastrointestinal haemorrhage—endoscopic treatment versus surgical treatment. Gastrointestinal Endoscopy. 1994;40(4):432.

Volume 6, Issue 5; September-October 2023; Page No 76-80