

CASE REPORT

Role of Fibrinogen Concentrate and Its Effect on Blood Loss in on Pump Cardiac Surgeries: A Case Series

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ABSTRACT

Background: Excessive bleeding is a common complication of cardiac surgery requiring cardiopulmonary bypass (CPB), often leading to increased transfusion requirements and postoperative morbidity. Fibrinogen plays a central role in coagulation, and Human Fibrinogen Concentrate (HFC) offers a targeted method to restore clot firmness

Objective: To evaluate the effect of HFC administration on perioperative blood loss in patients undergoing cardiac surgery with CPB

Methods: A case series of 12 patients undergoing cardiac surgery was analyzed. Patients were divided into two groups: Group A (n=6) received fibrinogen concentrate (40 mg/kg) after CPB and before protamine administration, while Group B (n=6) did not. Blood loss and transfusion requirements were compared

Results: Mean blood loss in patients receiving fibrinogen concentrate (Group A) was significantly reduced compared to controls (Group B). Statistical analysis demonstrated a highly significant difference ($p < 0.001$). Patients in Group A also required fewer transfusions of blood and blood products

Conclusion: Administration of fibrinogen concentrate in cardiac surgery patients on CPB effectively reduced perioperative bleeding and the need for transfusion. This supports its use as a safe and effective adjunct in perioperative hemostatic management.

KEYWORDS:

• Fibrinogen Concentrate • Cardiac Surgery • Cardiopulmonary Bypass
• Bleeding Management • Blood Loss • Hemostasis

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INTRODUCTION

Blood loss is a common and significant challenge during cardiac surgery requiring cardiopulmonary bypass (CPB). Excessive bleeding contributes to increased morbidity, prolonged hospital stay, and greater utilisation of blood and blood products. Fibrinogen, a hepatically synthesised glycoprotein, plays a central role in hemostasis by bridging activated platelets via glycoprotein IIb/IIIa receptors to promote platelet aggregation.

Human Fibrinogen Concentrate (HFC) has emerged as a potential therapeutic option for perioperative bleeding management. Unlike traditional transfusion therapies (fresh frozen plasma, cryoprecipitate), HFC offers rapid availability, standardised dosing, and reduced risk of volume overload or transfusion-transmitted infections. We present a case series evaluating the role of fibrinogen concentrate in reducing perioperative blood loss in patients undergoing cardiac surgery on pump.

CASE SERIES



Figure 1: Vial of fibrinogen concentrate.

RESULTS AND OBSERVATIONS

PATIENTS ADMINISTERED HUMAN FIBRINOGEN CONCENTRATE

- 42 years old male operated for MVR
 - -Hb:10.7
 - -PTINR: 17.8/1.2
 - -Blood loss: 300 ML
- 67 years old male operated for CABG
 - -Hb: 12.5
 - -PTINR: 14.3/1.04
 - -Blood loss:250 ML
- 52 Years old male operated for CABG
 - -Hb:12..3
 - -PTINR: 17.1/1.2
 - -Blood loss: 400 ML
- 70 Years old female operated for AVR
 - -Hb:10.5
 - -PTINR: 12.8/0.93
 - -Blood loss 350 ML
- 64 Years old male operated for MVR
 - -Hb: 12.3
 - -PTINR:14.8/1.08
 - -Blood loss: 150 ML
- 50 Years old male operated for CABG
 - -Hb; 13
 - -PTINR:12.8/0.93
 - -Blood loss: 350 ML

PATIENTS NOT ADMINISTERED HUMAN FIBRINOGEN CONCENTRATE

- 55 years old male operated for MVR
 - -Hb: 11.4
 - -PTINR:14.8/1.08
 - -Blood loss: 600 ML
- 52 years old male operated for CABG
 - -Hb:11.9
 - -PTINR:14/1.31
 - -Blood loss: 650ML
- 68 Years old male operated for CABG
 - -Hb:11.8
 - -PTINR:14.2/1.04
 - -Blood loss: 650ML
- 65 Years old female operated for AVR
 - -Hb:10.8
 - -PTINR: 12.7/0.93
 - -Blood loss:600ML
- 66 Years old female operated for CABG
 - -Hb:13.4
 - -PTINR:12.9/0.94
 - -Blood loss: 500ML
- 51 Years old male operated for CABG
 - -Hb:12.7
 - -PTINR:12.7/0.93
 - -Blood loss: 600ML

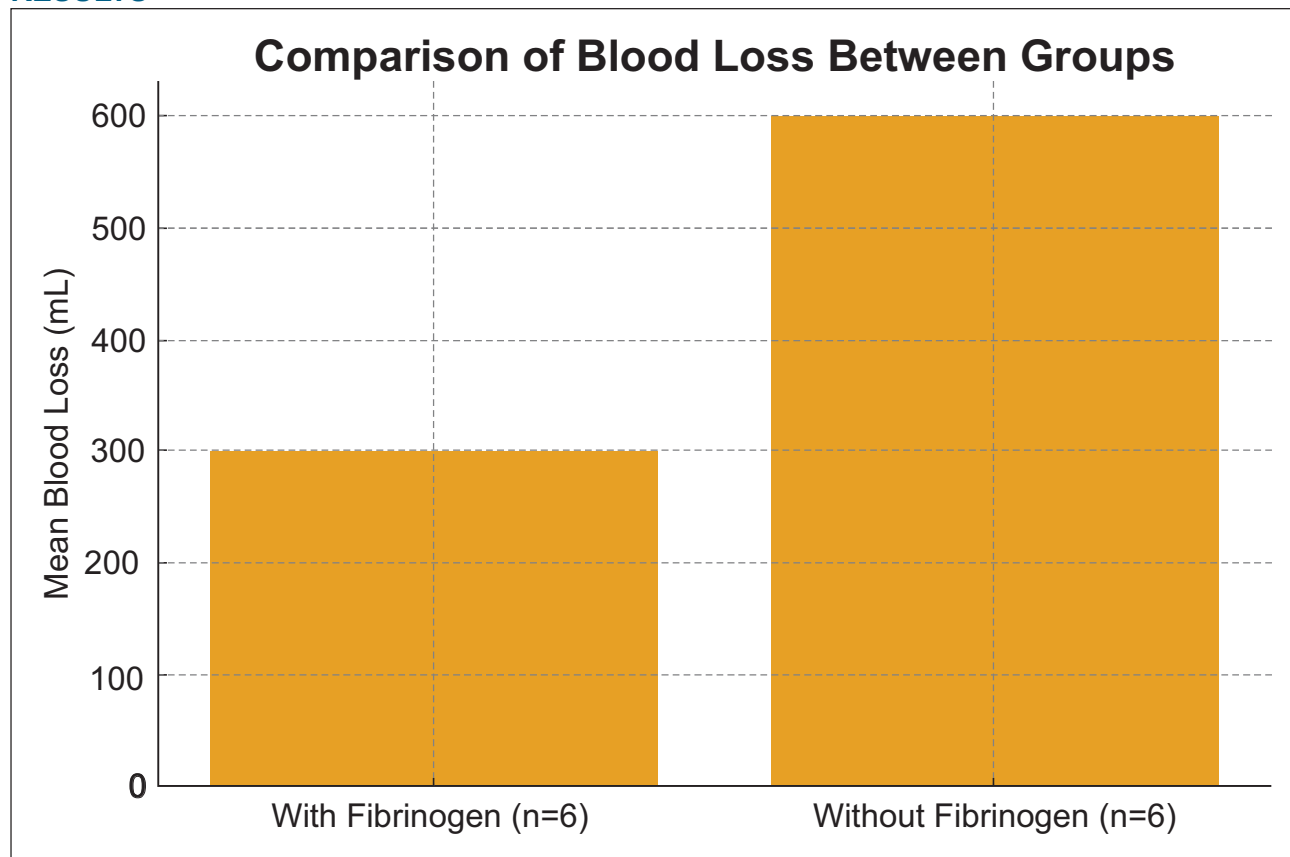
A total of **12 patients** undergoing cardiac surgery on CPB were studied, divided into two groups:

- **Group A (n=6):** Received Human Fibrinogen Concentrate (40 mg/kg) after separation from bypass and before protamine administration

- **Group B (n=6):** Did not receive fibrinogen concentrate.

All patients underwent routine preoperative hematological investigations (CBC, PT/INR). Patients with abnormal coagulation profile or known bleeding disorders were excluded.

RESULTS



Graph 1: Graph showing blood loss between groups.

Mean blood loss in Group A was significantly lower compared to Group B. Statistical analysis showed **$p < 0.001$ (highly significant)**. Patients receiving fibrinogen concentrate required fewer transfusions of blood and blood products.

DISCUSSION

Our findings support the role of Human Fibrinogen Concentrate in reducing perioperative bleeding in cardiac surgery with CPB. The average blood loss in patients receiving fibrinogen was almost half compared to those who did not. These results align with international evidence that fibrinogen concentrate improves clot firmness and reduces bleeding after major surgery.

Excessive bleeding following CPB is multifactorial, commonly due to dilutional coagulopathy, platelet dysfunction, and hypofibrinogenemia. Conventional therapies such as FFP and cryoprecipitate are limited by delayed preparation, variable fibrinogen content, and transfusion-related risks. In contrast, fibrinogen concentrate allows targeted correction of hypofibrinogenemia, rapid reconstitution, and standardised dosing.

Previous studies, including randomised controlled trials, have demonstrated reduced blood loss and transfusion requirements with fibrinogen concentrate use in cardiac surgery. The European Association of Cardiothoracic Anesthesiology (EACTA)

has also endorsed fibrinogen concentrate as part of bleeding management algorithms in cardiac surgery.

CONCLUSION

Administration of Human Fibrinogen Concentrate in patients undergoing cardiac surgery with CPB significantly reduced perioperative blood loss and transfusion requirements compared to controls. Its use provides a safe and effective alternative to traditional blood products in the management of bleeding.

Larger randomised studies are warranted to further validate these findings and to establish standardised dosing protocols for diverse cardiac surgical populations.

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