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Case Report
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Severe Postoperative Anemia after Repair of Type A Aortic Dissection in a Jehovah's Witness

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Abstract

We report successful surgery for acute type A aortic dissection in a Jehovah's Witness (JW) patient without the use of transfusion of allogeneic blood or blood products despite perioperative severe anemia. Intraoperative strategy to minimize blood loss is critical but appropriate management in the perioperative period is also crucial in saving the patient.

Introduction

Acute Type A Aortic Dissection (TAAD) is an emergent disease associated with high surgical mortality [1,2]. Multiple transfusions of blood products are often required in the perioperative period and re-exploration for bleeding is not an uncommon procedure in such patients. We report a successful treatment of TAAD without the use of blood products in the JW patient with severe perioperative anemia.

Case Presentation

An age 64 female was urgently transferred to our hospital with suspected acute aortic dissection. On admission to the Cardiac Surgery Department, the patient's condition was relatively stable. Transthoracic echocardiography was performed, confirming the presence of dissection at the ascending aorta. There was a small amount of pericardial effusion but the cardiac function was normal (EF 65%) and also the valves showed no significant pathological changes. Laboratory tests: Hemoglobin (Hb) 11.7 g/dl, Hematocrit (HTC) 34.6%, Red Blood Cell count (RBC) 3.50 T/l, Platelet (PLT) 128 G/l, internal thromboplastin time (aPTT) 20.4 (normal range, 18.8 sec to 29.1 sec), International Normalized Ratio (INR) 1.03 (normal range 09.3 to 1.13), and creatinine 0.81 mg/dl. However, the patient refused surgical correction and preferred conservative management. Staying in the intensive care unit, pain and vital signs were strictly controlled under continuous monitoring. The patient was relatively stable, but on hospital day 3 she complained of orthopnea and a new onset of atrial fibrillation was observed. Chest Computed Tomographic (CT) angiography was performed and a large amount of pleural and pericardial effusion was noted which was not observed in the initial CT angiography (Figure 1). The patient was informed of the life-threatening situation and underwent surgical correction.

General anesthesia was induced according to the standard operating procedures. The arterial cannulation for cardiopulmonary bypass was performed through the right femoral artery. Unfortunately, the ascending aorta was ruptured after opening the pericardium and a sucker to bypass was initiated. After inserting the venous cannula through the right atrial appendage, routine cardiopulmonary bypass was initiated and lowered the body temperature immediately. The aorta was clamped at the base of the aortic arch and after aortotomy; cold crystalloid cardioplegia (HTK solution) was administered into the coronary ostia directly. The primary intimal tear site was in the mid ascending aorta and the dissection flap began from the aortic root to whole descending aorta. The total circulatory arrest was initiated when the rectal temperature reached 25°C. Direct cannula were inserted to the innominate artery and the left common carotid artery for bilateral brain perfusion. The proximal and distal parts of the aorta were reinforced with Teflon strips and the ascending aorta was replaced using a vascular prosthesis (Gelweave 30 mm). The lowest level of HCT during the cardiopulmonary bypass was 24%. Hemofiltration was performed during the cardiopulmonary bypass and modified ultrafiltration was also performed after the end of the bypass. Protamine sulfate was administered for reversing the heparin activity. The ACT was normalized but severe medical bleeding continued. Inevitably, gauzes were packed around the aorta and a pericardial hood was fashioned by suturing a bovine pericardial patch along the Superior Vena Cava (SVC), the Right Atral (RA) appendage, the Right Ventricular (RV) outflow tract, the main

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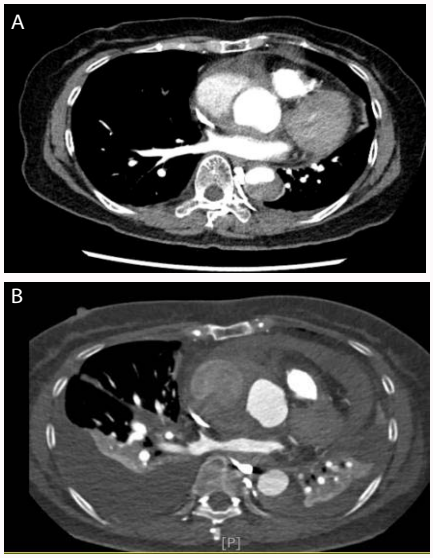

Figure 1: Preoperative CT angiography.
Figure 1A: Admission day (No pericardial and pleural effusion).
Figure 1B: Third hospital day (Increased pericardial and pleural effusion).

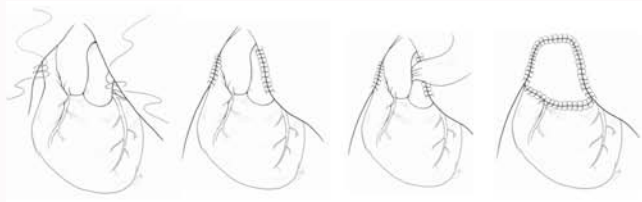

Figure 2: Temporary pericardial hood formation.
The pericardial hood is made by suturing the bovine pericardial patch along the SVC, RA appendage, RV outflow tract, main pulmonary artery, and thymic tissue.
SVC: Superior Vena Cava; RA: Right Atrial appendage; RV: Right Ventricle

pulmonary artery, and the thymic tissue (Figure 2). We then closed the sternal wound preparing for the scheduled delayed reoperation. The total cardiopulmonary bypass duration was 115 min, with 95 min cross clamp duration and 19 min of distal circulatory arrest duration.

The patient was transported to the surgical intensive care unit postoperatively. Chest tube bleeding was minimal and re-exploration for hood and packed gauze removal was performed 16 h postoperatively. On the first operative day the patient was conscious but had left hemiplegia. Laboratory tests on the first post operative day showed: Hb 6.9 g/dl, HTC 20.5%, RBC 2.12 T/l, PLT 29 G/l, total bilirubin 3.88 mg/dl, AST 137 U/L, ALT 156 U/L, BUN 46 mg/dl, and creatinine 1.38 mg/dl. The patient received erythropoietin every other day in addition to folic acid and iron supplementation. The lowest values of blood counts were observed on day 17 after the surgery: (Hb 4.1 g/dl, HTC 13.9%, RBC 1.20 T/l, and PLT 149 G/l). The highest value of total bilirubin was checked on day 7 after the surgery (total bilirubin 13.6 mg/dl). The level of AST/ALT was 137/156 on the operative day and decreased the next day and was normalized after day 14 of surgery. The bilirubin level reached to the highest level a few days after the peak level of AST/ALT and decreased more gradually, normalized two weeks after normalization of the AST/ALT.

Additional continuous lasix infusion was started on the day of surgery to maintain an ideal amount of urine output without using

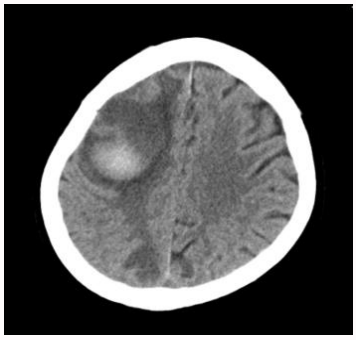

Figure 3: The right frontal lobe intracranial hemorrhage.

Continuous Renal Replacement Therapy (CRRT). The highest values of the BUN and creatinine were observed on day four after the surgery (BUN 127 mg/dl, creatinine 3.64 mg/dl).

Delirious mentality continued and for the left hemiplegia, brain CT was performed on day 19 of surgery and intracranial hemorrhage was confirmed but craniectomy was not performed (Figure 3). Because of the delirious mentality and respiratory failure, the patient remained on a mechanical ventilator until the thirtieth postoperative day. The general condition improved in proportion to the increase of Hb. The level of Hb was 10.4 mg/dl on day 35 of the surgery and the patient was transferred to the general ward. She was transferred to rehabilitation medicine, walking independently, and was discharged on day 97 of the operation.

Discussion

It is critical to prepare an appropriate surgical technique and postoperative care to minimize bleeding for this circumstance in which no transfusion is accepted. We used a temporary pericardial hood with the packing of surgical gauzes around the prosthetic graft and closed the sternum considering staged delayed re-exploration. The gauze and the hood localized compression around the anastomotic site. The temporary pericardial hood was effective in managing difficult hemostasis by avoiding undue prolonging of surgery and maintaining the hemodynamic status without massive transfusion.

The risk of death is low in patients with postoperative Hb levels of 7.1 g/dl to 8.0 g/dl, but decreasing post operative blood counts incur the risk of mortality and/or morbidity rises and becomes extremely high at below 5 g/dl to 6 g/dl [3]. Even bleeding was minimal; the postoperative lowest level of Hb (4.1 g/dl) was checked at postoperative day 17. It was gradually increased and the level was above 10 g/dl after postoperative day 35. During the anemic period we focused on the patient's nutritional support and minimizing unnecessary blood loss.

Nutritional support began with the parenteral TPN, started on post operative day 3 and continued to postoperative day 16. The mental state became more alert on post operative day 14 and the patient's motor power improved. We then decided to taper the parenteral TPN, overlapping with the L-tube feeding. Feeding through the L-tube was gradually increased, the intake reached to appropriate calorie week later and was able to terminate parenteral feeding. As the urine output was acceptable on continuous lasix infusion, to minimize the loss of blood to the circuit, we refused to use CRRT even though it was indicated.

In summary, Intraoperative strategy to minimize blood loss is

critical but also the patient can be exposed to severe anemia in the perioperative period, but strategies to minimize blood loss and full supportive care may save the patient.

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