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Case Report

Anaesthetic challenges in emergency surgical repair of acute aortic dissection rupturing into the pericardium in a pregnant patient

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Abstract

Acute aortic dissection in pregnancy is a serious situation, because rapid and appropriate surgical decision making is required to save the life of both mother and baby. Aortic dissection is rare in young women but is likely during pregnancy (third trimester) secondary to the hyperdynamic and hypervolaemic circulatory state associated with pregnancy. A 35 years old 27 weeks pregnant patient weighing 90 kg presented in the emergency with severe chest pain. In the immediate post cardiopulmonary bypass period, the patient started bleeding profusely from the anastamotic sites irrespective of utilization of all the conventional methods of haemostasis including multiple units of whole blood, fresh frozen plasma, platelets, calcium and cryoprecipitates. As a last resort she was given low dose r FVIIa (1.2 mg containing 60 KIU of Factor VII). This stopped the bleeding and the haemodyramics were stabilized.

Keywords: Aortic dissection, pregnant patient, recombinant activated factor VII (r FVII a).

Introduction

Aortic dissection is an often fatal disorder in which the inner layer of the aortic wall gets torn. Aortic dissection can be categorized on the basis of DeBakey (I,II and III) or Stanford classification (class A (I and II) and B(III).[1]

Transesophageal Echocardiography (TEE) is a relatively good test for the diagnosis of aortic dissection, with a sensitivity of up to 98% and a specificity of up to 97%.[2]

Aortic dissection is rare in young women and is more during the pregnancy (third trimester) secondary to the hyperdynamic and hypervolaemic circulatory state associated with pregnancy.[3]

Acute aortic dissection in pregnancy requires rapid and appropriate surgical decision making to save the life of both mother and baby. Aortic root enlargement (> 4 cm) and Marfan syndrome significantly predispose to aortic dissection in pregnancy.[4]

Recombinant FVIIa is a genetically engineered product that was first introduced in 1988 for the treatment of patients with haemophilia A and B with high inhibitory antibody titres to factors VIII and IX. The mode of action of activated recombinant factor VII is not completely clear. It is thought to form a complex by binding tissue factor at the site of vascular damage and this activates the intracellular mechanism of coagulation within the platelets.

We are reporting a case of a pregnant woman who presented with acute aortic dissection that was found to have extended in retrograde direction causing haemopericardium and aortic valve incompetence, which is rare.

Case Report

A 35 years old, 27 weeks pregnant woman weighing 90 kg, presented in the emergency with severe chest pain. Initial workup was done in some private hospital which raised the suspicion of aortic dissection which was confirmed on Transoesophageal echocardiography (TEE).

Aortic dissection (DeBakey class I) was secondary to some connective tissue disorder most probably due to questionable Marfan syndrome and her primary pathology was compounded by the haemodynamic stresses of the third trimester of pregnancy.

When the patient arrived in the ER, her heart rate was 87 b/minute, B.P 90/60mmHg, R/R 20/minute and Spo2 100%.On examination, heart sounds showed diastolic mumur at the aortic area. Regarding respiratory system, air entry was equal bilaterally. There was no disparity of pulses in the upper and lower limbs.

Control of the heart rate and peripheral vascular resistance is very important to avoid the progression of the aortic dissection.

After applying the standard ASA monitoring, a wide bore I/V cannula was introduced in the right arm and arterial line in the left arm. After optimal preoxygenation, a rapid sequence induction and intubation was done with Etomidate, fentanyl and rocronium. Invasive montoring lines including CVP and Swan Ganz were put in the right IJV. Another arterial line was put in the left femoral artery for assessing the perfusion of the lower limb and for back up in case the radial arterial line did not work due to extention of aortic dissection.

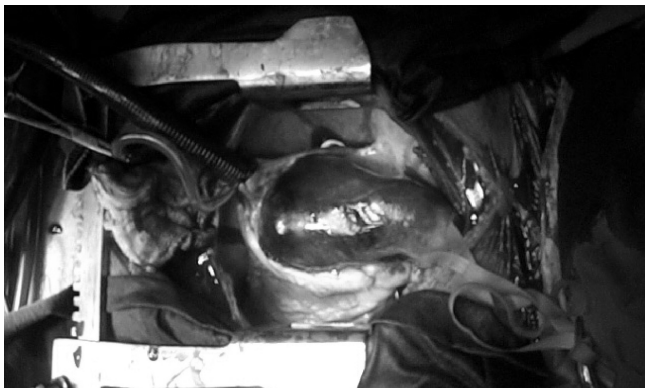

Figure-1: Aortic dissection rupturing into the pericardium.

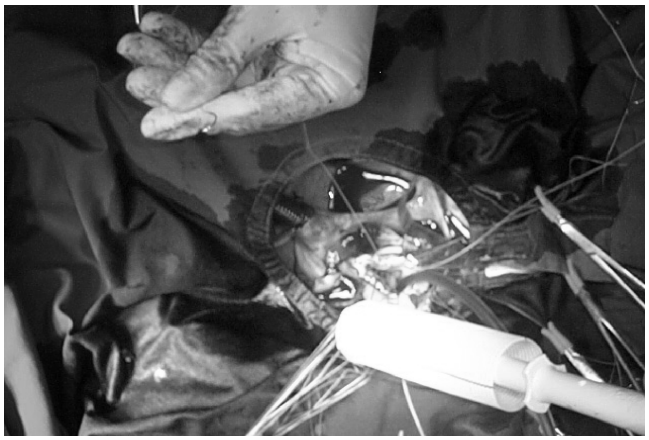

Figure-2: Aortic root graft with mechanical valve.

All measures to prevent preterm labour were taken including administration of intravenous magnesium and nitroglycerine infusion. Preoperatively progesterone was given as a prophylaxis against preterm labour.

When the pericardial cavity was opened it showed haemopericardium (Figure-1). Ascending aorta opening showed true and false lumens. The patient was put on the cardiopulmonary bypass. The temperature was dropped down to 32ºC. During the CPB, the important considerations were to keep the flows and perfusion pressures optimal .The haemoglobin was kept around 8gm/dl and PH neutral. The adequacy of cardiac output was monitored through systemic venous oxygen saturation. The ascending aorta and the aotic valve were replaced with aortic root with inbuilt mechanical valve as shown in Figure-2.

In the immediate post cardiopulmonary bypass period the patient was bleeding profusely from the anastamotic sites irrespective of utilization of all conventional methods of haemostasis including multiple units of whole blood, fresh frozen plasma, platelets, calcium and cryoprecipitates. The bleeding was so profuse that the patient became hypotensive

due to hypovolaemia. As a last resort 1.2mg of recombinant factor VII (containing 60 KIU of Factor VII) was injected. The bleeding stopped and consequently haemodynamics got stable. The patient was shifted to cardiac Intensive care unit (CICU) with an open chest where she was monitored till all the parameters became stable. The chest was then closed and she was successfully extubated. Immediately on arrival in the CICU, the foetus was evaluated but unfortunately the foetus was dead. The possible factors could be hypothermia, nonpulsatile flow and retrograde perfusion through the femoral atery which could result in placental hypoperfusion.

Discussion

The association between pregnancy and aortic dissection has been well described in previous reports in the literature. Acute aortic dissection during pregnancy, particularly during the third trimester, accounts for half the cases in women under the age of 40 years.[5] The presence of a pre-existing aortopathy secondary to a connective tissue disorder increases the risk for dissection.

Becker and colleagues[6] found that pregnancy carries a mortality of 1.5%, whereas foetal mortality is up to 16.2%. This is mostly dependent on the maturity of the foetus, and some reports suggest that cardiopulmonary bypass may cause intrauterine foetal death.

Bleeding is relatively common during the post-bypass period and after cardiac surgery, especially in patients with re-do surgery, prolonged bypass time, and recent anti-platelet agent use. The incidence of the bleeding complications are more in parturients due to gestational thrombocytopenia and dilutional coagulopathy. It is a cause of a significant morbidity and mortality, prolonged ICU and hospital stay and increased cost.

Studies suggest that the action of rVIIa is dependent on sufficient levels of coagulation factors (>30%), specifically fibrinogen (>50-75 mcg/dl), Factor V and Factor X (> 5-10%) and sufficient platelet count (50x109/ml). If pH is below 7.2, the proportion of patients responding to rVIIa decreases. Hypothermia decreases its effect at core body temperature below 33°C. Current recommendations, however, consider the use of rVIIa in refractory haemorrhage in cardiac surgery appropriate in cases in which significant clotting factor replacement therapy has occurred. The suggested dose is 41-90 mcg/kg. The dose may have to be repeated in 2 to 4 hours if bleeding persists.

Although rFVIIa is expensive, it would appear to be cost effective when compared with the combined cost of large amounts of blood and blood products. Moreover, the risks of transfusion e.g. incompatibility, and infection cannot be ignored. The earlier use of rFVIIa may also help to conserve the already diminishing blood pool and stores.

It is important to note that the use of recombinant factor VIIa requires attention to replacement of deficient coagulation factors, red cells, fibrinogen, and platelets in addition to more general measures such as avoidance of hypothermia, acidaemia, and ongoing surgical bleeding.[7]

Use of rFVIIa should be considered for any patient with coagulopathic haemorrhage in which surgically-accessible bleeding has been controlled. Prospective trials of FVIIa in patients with traumatic coagulopathy are strongly indicated, and should focus on appropriate patient selection and the dose and timing of therapy.[8]

Conclusion

In summary, even though most published studies reported reduction in blood loss either as witnessed by surgeon, decreased chest tube drainage or decreased need for further blood products, in the absence of large double-blinded, placebo-controlled, randomized studies, the exact role of rVIIa in cardiac surgery is hard to predict with certainty. Current data suggest a potential benefit in refractory bleeding, but further investigation is warranted in order to design guidelines on the use of rVIIa in cardiac surgery and to determine its safety profile especially in the pregnant patients.

Acknowledgements

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