To the Editor: A 47-year-old male patient was admitted because of chest discomfort for 2 weeks. He had no obvious incentive. Precordial discomfort 2 weeks ago, accompanied by palpitation. He immediately went to the town hospital. Electrocardiogram (ECG) showed myocardial infarction. Coronary angiography showed coronary artery disease accompanied by a ventricular aneurysm. The patient was transferred to Beijing Anzhen Hospital. ECG showed sinus rhythm, heart axis deviation + 111°, anterior septal, anterior lateral, anterior myocardial infarction, and complete right bundle branch block. Chest X-ray showed no obvious abnormalities in heart and lung. Echocardiography showed abnormal motion of segmental ventricular wall; formation of a ventricular aneurysm in apex area of the heart, the diameter of the ventricular aneurysm was 2 cm, the diastolic function of left ventricle was reduced. Coronary angiography showed left anterior descending artery filling slowly and its intima was not smooth; the stenosis rate was 90%. The stenosis rate of the circumflex artery was 90% [Figure 1a and b]. He was diagnosed with acute anterior myocardial infarction, left ventricular aneurysm, and hypertension.

The patient received treatment of dilation of a coronary artery, anticoagulation, nourishing myocardium, and other symptomatic and supportive treatment. He underwent off-pump coronary artery bypass surgery with median incision of the sternum. Take the left internal mammary artery and the right saphenous vein in reserve. Thrombosis was found in the left internal mammary artery and the left anterior descending artery, performed. Thrombosis in anastomosis and grafts was carefully removed and the proximal and the distal grafts was spied. The distal circumflex artery was not satisfying. The distal left anterior descending artery was satisfying. Aorta - saphenous vein - anterior descending artery, aorta - saphenous vein - obtuse marginal branch vascular anastomosis were performed again. Anastomotic stoma was unobstructed. Extracorporeal circulation device could not stop so as to install extracorporeal membrane oxygenation (ECMO) assist device. Stop extracorporeal circulation device followed by routine chest shut surgery.

The patient’s vital signs were closely surveilled in Intensive Care Unit (ICU). The patient accepted cardiotonic agents, anti-infection, nourishing myocardium, and other symptomatic treatment. The patient condition gradually improved, ECMO device was removed on the fourth postoperative day. Trachea cannula was removed on the fifth postoperative day. IABP device was removed on the seventh postoperative day. The patient went back to the ward on the eighth postoperative day. Heart rhythm was regular. Cardiac murmur did not exist. Chest X-ray, echocardiography, and ECG showed no abnormalities. The patient was discharged 15 days after the operation.

Thrombosis is a common complication of coronary artery bypass graft surgery. The thrombosis is classified as arterial thrombosis and venous thrombosis. Venous thrombosis is common, arterial thrombosis is rare. The main causes of venous thrombosis are vascular intimal injury and blood clotting disorders. The intimal injury may activate platelet function and make platelets release thromboxane A and other clotting factors to promote thrombosis. Coagulation abnormalities may lead to increased activity of clotting factor which could cause thrombosis. Arterial thrombosis is rare.
and its mechanism is unknown. Currently, it is known that heparin resistance is one of the reasons for arterial thrombosis.

Heparin is an acidic mucopolysaccharide composed of glucosamine L-iduronic glucoside, N-acetyl glucosamine, and D-glucuronic acid. It is mainly produced by mast cells and basophils. Despite its little content in plasma under normal physiological conditions, it has rich content in the lung, liver, and other tissues. The anticoagulant effect of heparin is strong. It enhances the affinity of antithrombin III and thrombin, accelerates thrombin inactivation, inhibits clotting factor activation, inhibits platelet adhesion and aggregation, increases protein C activation, and stimulates vascular endothelial cells to release anticoagulant and fibrinolytic substances. Heparin is widely used in cardiovascular surgery. Studies have shown that patients undergoing coronary artery bypass surgery shows heparin resistance. The incidence of this phenomenon is rising. Heparin resistance refers to the phenomena that ACT value is <400 s under the use of a standard dose of heparin. If ACT value is <400 s, it is not sufficient for the patient to have plasma anticoagulant capacity in vivo. Meanwhile, the use of extracorporeal circulation system will lead to excessive activation of the coagulation system. Lower activity of antithrombin III may be the cause of heparin resistance. However, some reports showed that there is no direct relationship between antithrombin III and heparin.

Patients show symptoms of heparin resistance with the high levels of platelet in the blood. The mechanism is that platelets can release platelet factor 4 which could inhibit the function of heparin. The patients with the high levels of platelet in the blood will be able to inhibit the effect of heparin to a certain extent. The reason for heparin resistance is very complex. ACT value is not a specific indicator for the anticoagulant capacity of heparin. ACT value is affected by many variables in cardiac surgery. However, clinicians still use ACT value as the detection indicator of heparin anticoagulant capabilities. Heparin resistance can lead to a variety of serious complications such as bleeding, cardiac arrhythmia, ventricular fibrillation, prolonged intubation time, and prolonged residence time in ICU. This patient who had coronary artery bypass grafting surgery may have heparin resistance which lead to thrombosis in a coronary artery, artery, and vein grafts. The mechanism of heparin resistance is unclear. It is hoped that medical workers gain experience in future clinical work. Hence, heparin resistance phenomenon can be reduced.

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Conflicts of interest
There are no conflicts of interest.

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