Acute Myocardial Infarction in Nephrotic Syndrome

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Abstract

A 28 year old male, known case of nephrotic syndrome since 12 years, hypertensive presented with acute myocardial infarction (AMI) and accelerated hypertension. Coronary angiography revealed 100% thrombotic occlusion of mid left anterior descending artery, treated with thrombus aspiration and intracoronary tirofiban and nitroglycerine. He was stabilized within 24 hours. The pathogenesis of AMI in nephrotic syndrome has been discussed with this case report.

Introduction

Acute myocardial infarction (AMI) in young adults can be broadly classified into 2 groups – those with angiographically normal arteries and those with coronary artery disease of varying aetiology; there could be significant overlap between the two groups. The former may be due to coronary artery thrombosis, embolism, spasm or a combination of these. Coronary thrombosis can be seen in hypercoagulable states such as antiphospholipid syndrome, nephrotic syndrome (NS), protein C, S and factor XII deficiencies, etc. The pathology in the abnormal coronary arteries in the young include significant accelerated atherosclerosis, spontaneous dissection, aneurysm, ectasia and anomalous origin of coronary artery. In autopsy studies the incidence of advanced atheroma in young adults is reported to be 2% and 20% in males aged 15-19 years and 30-34 years respectively. In females it was 0% and 8 % respectively in the same age groups.¹

We report the case of a 28 year old male with NS since 12 years, hypertensive presented with AMI requiring emergency percutaneous coronary intervention (PCI). The pathogenesis of AMI in NS has been discussed.

Case Report

A 28 year old male presented to the emergency department with severe retrosternal chest pain radiating to left arm and sweating since 4 hours. At the age of 16 years, he had developed puffiness of face, underwent investigations. As per the old records available, there was no hematuria, proteinuria was 1.5 g/day; ASO, ANA/anti-dsDNA were negative and IgA levels were 104 mg/dL, which were normal for that age. Thyroid function tests were within normal limits. As per kidney biopsy he was diagnosed to have NS – mesangiproliferative glomerulonephritis. He was treated with oral prednisolone 1 mg/kg; there was reduction in proteinuria to 0.5 g/day. Dose of prednisolone was reduced to 10/mg/day and azathioprine was added. Over the next 3 years, he was also put on antihypertensives namely, losartan, atenolol and frusemide. However, he had omitted all medications on his own 1 year ago. There was no family history of ischemic heart disease.

On admission he was pale, had a pulse 84/min, blood pressure of 240/130 mm Hg, puffy face and pedal edema; chest was clear, fundus showed changes of hypertensive retinopathy. ECG was suggestive of acute anterior wall ST elevated myocardial infarction (Figure 1). Two-D echocardiography showed left ventricular hypertrophy, apical and septal hypokinesia, LVEF of 45%. Intravenous metoprolol and nitroprusside infusion was administered. But the blood pressure remained persistently high, so he was unsuitable for intravenous thrombolysis and was taken up for PCI. Coronary angiography (CAG) revealed 100% occlusion of mid left anterior descending (LAD), Thrombolysis In Myocardial Infarction (TIMI) grade I flow, 50% stenosis of proximal circumflex and LCx: Left circumflex artery (Figure 2). Thrombus aspiration was done from LAD with thrombus aspiration catheter (6F Diver C). Thrombus quantity was excessive. Intracoronary tirofiban, nitroglycerine and nitroprusside were administered. At the end of the procedure, TIMI grade III flow was established with TIMI myocardial perfusion grade (TMPG) III perfusion (Figure 3). Intravenous tirofiban and unfractionated heparin was continued for 24 hours. Patient soon stabilized. After 24 hours, he was haemodynamically stable and had no chest pain. ECG showed decrease in ST elevation and echocardiography

Fig. 1: ECG shows acute anterior wall ST elevated myocardial infarction

Fig. 2: Coronary angiogram showing 100% occlusion of mid left anterior descending (LAD). LAD: Left anterior descending artery; LCx: Left circumflex artery

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with hypertriglyceridemia which often inhibits the activity of antithrombin III, a coagulation inhibitor, reduced fibrinolytic activity and hypertriglyceridemia which often occurs in NS. The extent of alteration in levels of all the proteins mentioned above correlate with the degree of hypoalbuminemia. A serum albumin of <25 g/L is a significant risk factor for combined arterial and venous thrombosis in NS. A rise in plasma fibrinogen is also due to increased hepatic synthesis proportional to the urinary protein loss. Protein C and protein S deficiency have also been implicated. Other factors contributing to hypercoagulable state are a thrombocytosis and increased platelet adhesiveness and aggregation (that correlates with serum cholesterol concentrations). All these abnormalities can cause coronary thrombosis without atherosclerotic plaque rupture. Besides this, patients with long lasting NS and even mild propensity for hyperlipidemia may be at increased risk for ischaemic cardiovascular events. Patients with hyperlipidemia and proteinuria >3.5 g/day predisposes (nephrotic hyperlipidemia), as in our patient, predisposes the patients to accelerated atherosclerosis and may be another contributing factor in AMI.

Thromboembolic episodes in NS remain one of the most serious complications in patients with NS. The most frequent site of thrombosis is the venous system, particularly the renal vein, incidence reported as 2-62.5%. It is seen predominantly in adults. Arterial thrombosis in NS is uncommon, incidence about 3%; is seen mainly in children and rarely reported. The first report on ischaemic heart disease complicating NS was published in 1969 by Berlyne and Mallick, who described the occurrence of AMI in four patients with NS due to glomerulonephritis.

In cases of ACS with ST elevation, like our patient, it has been reported that intracoronary administration of tirofiban followed by intravenous infusion with an improved TIMI flow grade III flow; LAD (left anterior descending artery), LCx (left circumflex artery)

showed only moderate left ventricular dysfunction.

His laboratory parameters revealed Hb 10.4 g%, platelet count of 4.8 lakhs/cmm; hyperlipidemia with serum cholesterol of 410 mg/dl and triglycerides of 280 mg/dl; blood urea 94 mg/dl and creatinine of 3.5 mg/dl. There was severe proteinuria 4.5 g/24 hours and hypoalbuminemia (serum albumin of 1.9 g/dl). Plasma concentration of fibrinogen was elevated (564 mg/dl) and antithrombin III levels significantly reduced (<50%). He was discharged on antihypertensives, antiplatelets and statins. He is following up with the nephrologist for immunosuppressive therapy.

Discussion

Proteinuria associated with NS results in the loss of low molecular weight proteins which in turn alters the concentration and activity of coagulation factors. Due to increased excretion, factors IX, XI and XII are reduced. As the liver tries to compensate for the hypoalbuminemic state, there is increased synthesis of factors II, VII, VIII, X, XIII and fibrinogen resulting in their increased blood levels. There is also evidence of decreased levels of antithrombin III, a coagulation inhibitor, reduced fibrinolytic activity with hypertriglyceridemia which often occurs in NS. The extent of alteration in levels of all the proteins mentioned above correlate with the degree of hypoalbuminemia. A serum albumin of <25 g/L is a significant risk factor for combined arterial and venous thrombosis in NS. A rise in plasma fibrinogen is also due to increased hepatic synthesis proportional to the urinary protein loss. Protein C and protein S deficiency have also been implicated. Other factors contributing to hypercoagulable state are a thrombocytosis and increased platelet adhesiveness and aggregation (that correlates with serum cholesterol concentrations). All these abnormalities can cause coronary thrombosis without atherosclerotic plaque rupture. Besides this, patients with long lasting NS and even mild propensity for hyperlipidemia may be at increased risk for ischaemic cardiovascular events. Patients with hyperlipidemia and proteinuria >3.5 g/day predisposes (nephrotic hyperlipidemia), as in our patient, predisposes the patients to accelerated atherosclerosis and may be another contributing factor in AMI.

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