Does Smoking Amplify the Risk of Acute Myocardial Infarction Related with Pregnancy in Factor V Leiden Carriers?

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A normal pregnancy period is associated with major changes in all aspects of hemostasis. Physiological changes in pregnancy result in a procoagulant state and increasing stress on the cardiovascular system, particularly during delivery. Cigarette smoking increases the risk of thrombosis due to enhanced platelet aggregability. Although especially associated with venous thrombosis, hipercoagulability may also contribute to the risk of arterial thrombosis. The factor V Leiden mutation (FVLM) is a hereditary coagulation disorder caused by a single nucleotide substitution of arginine by glutamine. Thus, factor Va become resistant to activated protein C inactivation, leading increased generation of thrombin. There is conflicting data about FVLM effects on the susceptibility to arterial thrombosis and acute myocardial infarction (AMI). Myocardial infarction in pregnancy is uncommon. To our knowledge, there is first report of the AMI associated with pregnancy in heterozygous FVLM carriers. In this report, we present a 33-year-old woman who had postpartum AMI associated with heterozygous FVLM.

A 33-year-old female was referred to emergency department with the complaint of retrosternal chest pain for 3 hours. She had a normal vaginal labor 15 days ago. The infant had a normal birth weight and was apparently healthy. She had no risk factors for AMI such as diabetes, dyslipidemia, eclampsia or preeclampsia in her history except smoking (40 cigarettes per day). A 12-lead electrocardiogram revealed a normal sinus rhythm and ST-segment elevations in V1–6 and D1-aVL leads. A coronary angiography was immediately performed to the patient. The angiography revealed 98% narrowing with thrombus formation (TIMI grade 1 flow) before first septal perforator at the level of first diagonal branch of the left anterior descending coronary artery (LAD). The remainder of the coronary vasculature was normal. A guide-wire was passed thorough the LAD. TIMI grade 3 flow was restored following percutaneous transluminal coronary angioplasty with 3.0 x 15 mm balloon. There was no residual stenosis.

Blood examinations were as follows; high-density lipoprotein; 37 mg/dl, total cholesterol; 128 mg/dl, low-density lipoprotein; 58 mg/dl, triglycerides; 172 mg/dl, prothrombin time; 12.9 sec, activated partial thromboplastin time; 30 sec, fibrinogen; 346 mg/dL (200-400 mg/dL), antithrombin III; 95%, protein C; 98%, protein S; 96%, homocysteine; 15μmol/L (5.5-17 μmol/L) and D-dimer; <0.5 μg/l. Antinuclear antibody, antidsDNA, anticardiolipin antibodies IgM and IgG, and anti-phospholipid antibodies were negative. We performed genotype analysis for methylenetetrahydrofolate reductase C677T polymorphism, Factor II (G20210A) and Factor V Leiden mutations (G1691A) by polymerase chain reaction. It showed heterozygous FLVM.

In a normal pregnancy period, major changes are seen in the parameters of thrombosis and fibrinolysis such as increased levels of some clotting factors, fibrinogen, decreased levels of protein S, and acquired activated protein C resistance, which in turn provides maintenance of placental functions and limits blood loss during labor.[1] The overall balance shifts towards hypercoagulability, which is the most marked around term and immediate postpartum period. Thrombosis risk is approximately 10 times higher during pregnancy and puerperium than non-pregnant women of fertile age.[2] Moreover, thrombosis risk is 15-20 times more frequent in puerperium than in pregnancy.[2] Heterozygosis of factor V Leiden increases risk of thrombosis 3-8 fold in general population and increases 4-16 fold during pregnancy and the puerperium.[3]

A serious thrombotic complication of pregnancy is an AMI. Although AMI in pregnancy remains rare (between 1 in 10.000 and 1 in 35.700 deliveries), it's an important cause of morbidity.[4,5] Some studies indicated that chronic h§ypertension, advanced maternal ages, eclampsia, severe preeclampsia, thrombophilia, smoking, diabetes mellitus and postpartum infections increase risk of pregnancy related AMI.[5] Spontaneous coronary artery dissection (SCAD) is an extremely uncommon cause of myocardial infarction, occurring particularly in women during the peripartum and postpartum period.[6] The etiology of SCAD remains unclear. SCAD frequently affects young, healthy women who have no risk factors for coronary artery disease. However, we did not observe any dissection during coronary angiography in our case.

The data remains controversial about risk of AMI and FVLM. Agostoni et al.[7] reported a 19-year old pregnant woman with heterozygous FVLM presenting with AMI. But this case had patent foramen ovale as a risk factor for development of paradoxical thromboembolism. It seems that presence of additional risk factors such as smoking together with heterozygote FVLM is important for development of arterial thromboembolic event. Rosendaal et al.[8] reported that smoker young women who carried the FVLM had a 32-fold increased risk of AMI, but the risk was not increased at non-smoking carriers. But this study did not include pregnant women. Although association between smoking and AMI is complex, we know that the most common risk factors for AMI in young patients are strong family history and high prevalence of smoking.[9]

In conclusion, pregnancy and puerperium may precipitate arterial thrombotic events in patients with FVLM. In addition, smoking may amplify the risk of AMI in these cases. For this reason, smoking cessation should be recommended to patients with FVLM during pregnancy and puerperial period.

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