Acute nonatherosclerotic coronary thromboembolism presenting with an inferior STEMI in a patient on oral contraception; A Case Report

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Abstract

Direct coronary embolism in the setting of oral contraceptive pills (OCP) use is a rare adverse effect. It is known for OCP to increase the risk of thrombosis, however leading to an inferior ST elevated myocardial infarction (STEMI) due to an acute occlusive embolism is a rare entity.

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Key Clinical Message: Direct coronary embolism in the setting of oral contraceptive pills (OCP) use is a rare adverse effect. It is known for OCP to increase the risk of thrombosis, however leading to an inferior ST elevated myocardial infarction (STEMI) due to an acute occlusive embolism is a rare entity.

Key Words: STEMI, Coronary thromboembolism, oral contraception, thrombosis

Introduction:

Nonatherosclerotic causes of STEMI may be life-threatening and can occur even in the absence of significant cardiovascular risk factors. A nonathersclerotic direct coronary thromboembolism is a rare occurrence. It requires further investigation and the initiation of appropriate therapy immediately.

Coronary embolism occurs in about 3% of patients with acute coronary syndrome [1]. It may be paradoxical, direct, or iatrogenic. An embolism breaks off an initial source such as a thrombus and then causes a decrease or blockage of blood flow up stream.

Oral contraceptive pills (OCPs) are used widely to prevent unwanted pregnancies and dysfunctional uterine bleeding. There has been much research on the increased risk of thromboembolic events from these drugs. Norgestimate / Ethinyl Estradiol is a progesterone and estrogen combination used to prevent ovulation and pregnancy. OCPs including Norgestimate / Ethinyl Estradiol are known to significantly increase the risk of clot formation in female smokers who are above the age of 35 [2].

Herein we report a 41-year-old female who presented with an inferior STEMI and was found to have a saddle clot (thrombus) involving the distal left main artery, left circumflex, and proximal LAD. Her only cardiac risk factors were smoking and the use of oral contraceptives.

Case history/Examination:

A 41-year-old gravida 6 para 3 female presented to the emergency department with a chief complaint of chest pain. Pain started two hours prior to presentation, was dull, left sided, substernal, radiated to her left arm, and with a severity of 7/10. One month prior to presentation the patient was complaining of an abnormal uterine bleeding and was started on oral norgestimate/ethinyl estradiol pills.

The patient has no significant past medical history. Her social history is significant for smoking $\frac{1}{2}$ a pack per day for the past 10 years. Her family history is not significant for premature coronary artery disease or thrombosis. Her past surgical history is significant for dilatation and curettage two weeks prior to presentation. Home medications include daily oral norgestimate/ethinyl estradiol pills. Her only cardiac risk factors were smoking and the use of oral contraceptives. Upon arrival to the emergency department the patient was vitally stable. Her physical exam was noncontributory. Cardiac and lung exams were unremarkable.

Investigations and treatment:

A twelve- lead ECG showed 1mm ST elevations in inferior leads with no reciprocal changes and a sinus rhythm at a rate of 60 beats/minute**(Fig 1)** . A STEMI code was called, and the patient was taken emergently to the Cath Lab. She was started on acute coronary syndrome (ACS) treatment including oral aspirin 324 milligrams, oral clopidogrel 600 milligrams, and intravenous heparin 5000U. Significant laboratory data showed a troponin of 0.615NG/ml, hemoglobin of 8.7g/dL and white blood cell count of 13.7 x 10^9/L.

Coronary angiogram revealed a saddle clot (thrombus) involving the distal left main artery, left circumflex, and proximal LAD **(Fig 2).** TIMI flow grade was 3 throughout and no intervention was taken place during coronary angiogram. There was also an occlusion in the apical portion of the LAD. Right coronary artery did not have any abnormalities. Echocardiogram revealed an estimated ejection fraction of 55-60% with apical septal dyskinesis and a normal diastolic function. There was no evidence of an intra-atrial shunt or left atrial appendage. Patient was admitted to the cardiac care unit (CCU) and was started on intravenous tirofiban for 10 hours, oral aspirin 81 milligrams daily, oral clopidogrel 75milligrams daily, and intravenous heparin drip as per ACS protocol. Troponin peaked at 11 NG/ml. Patient was given 2 units of PRBC due to persistent vaginal bleeding. Doppler of the lower extremities did not reveal any evidence of a DVT. Telemetry over 48 hours in hospital stay did not show any evidence of cardiac arrhythmia.

Thrombophilia testing lab results showed antithrombin activity of 88%, antithrombin III AG 79%, cardiolipin AB IGA <9.4APL, beta-2 glycoprotein IGG <9.4 U/ml, beta-2 glycoprotein IGM <9.4 U/ml, Cardiolipin AB IGM MCLIP <9.4 MPL, Cardiolipin AB IGG GCLIP <9.4 GPL, Prothrombin G20210A Gene negative, beta-2 glycoprotein AB IGA <9.4 U/ml, PSPT IGG <9.4 U, PS/PT IGM 20.0 U and platelet count of 376 K/UL.

Outcome:

OBGYN were consulted and placement of IUD was recommended in order to help prevent bleeding. After 48 hours heparin was discontinued. EKG prior to discharge showed resolution of ST elevations **(Fig 3)** . A repeat angiography was not done as symptoms had resolved and EKG showed resolution of STEMI. OCPs were held and the patient was discharged on oral anticoagulation.

Discussion:

Coronary embolism occurs in about 3% of patients with acute coronary syndrome. However, it is a rare occurrence in a patient without a cardiac history of endocarditis, arrhythmia or family history. Coronary embolism is of three main types: direct, paradoxical and iatrogenic

Direct embolism usually results from a thrombus originating in the left ventricle, left atrium, or due to endocarditis involving the mitral or aortic valve. Paradoxical embolism occurs from the venous circulation through a patent foramen ovale. Iatrogenic embolism occurs after a cardiac procedure. [1]

Risk Factors include evidence of blood stasis (i.e left ventricular aneurysm, atrial fibrillation, deep vein thrombosis with ASD or PFO), Hypercoagulable state (i.e cancer, thrombophilia, oral contraceptive use, heparin induced thrombocytopenia), endothelial injury (i.e angioplasty, valvuloplasty, aortic/coronary surgery), and anatomic predisposition (i.e ASD/PFO, endocarditis, mitral stenosis)

Diagnosis of coronary embolism can be made using a scoring system proposed by Shibata et al. [3] Major criteria includes 1) Angiographic evidence of coronary embolus 2) Concomitant systemic embolization without evidence of left ventricular thrombus 3) Concomitant coronary emboli in multiple coronary territories 4) Evidence of an embolic source based on imaging. 5) Histological evidence of venous origin of coronary embolic material

Minor criteria include 1) <25% stenosis on angiography in the non-culprit vessels 2) Presence of Atrial fibrillation 3) Presence of embolic risk factors

Patients with 2 or more major criteria, 1 major and 2 minor, or 3 minor criteria were considered to have a definite coronary embolus. Patients with 1 major and 1 minor or 2 minor criteria were considered to have a probable coronary embolus. [1,3]

Our patient is a young female with tobacco abuse, on norgestimate /ethinyl estradiol pills for dysfunctional uterine bleed who presented with an inferior STEMI secondary to a clot (thrombus) involving the distal left main artery, left circumflex, proximal and distal LAD.

ECG changes were mainly seen in the inferior rather than anterior or antero-lateral leads. That can be explained by two theories. 1) There might have been a right coronary artery clot that was dislodged prior to the angiogram especially that the repeat ECG showed resolution of inferior ST elevations. 2) Complete occlusion of the distal LAD artery (which is a wrap-around artery), with evidence of continued flow in the left main and proximal LAD artery.

She did not have history of atrial fibrillation, no evidence of clot, valvular heart disease, wall motion abnormality or an intra-atrial shunt with rest and provocation on TTE, and no evidence of DVT. The primary hypothesis is that she had a direct arterial thromboembolism that developed secondary to the combination of oral contraception and smoking which is a rare entity, since most thromboembolisms due to acquired thrombophilia are rather venous. Although patient was monitored on telemetry over 48 hours without cardiac arrhythmias, she was recommended to have a long-term cardiac monitoring (by an event monitor) to rule out paroxysmal atrial fibrillation as a possible cause of this thromboembolism which was negative on further outpatient visits. Transesophageal echocardiogram was also recommended to be done in the outpatient setting to further assess the presence of a clot in the left atrial appendage.

Although thrombophilia workup is seldom indicated at part of coronary embolism workup [1], it was performed during her admission and was negative. Long - term cohort studies revealed increased risk of venous rather than arterial thromboembolism in patients with inherited thrombophilia's [8].

Antiplatelet therapy was continued in our case due to presence of a distal LAD (apical) occlusion which is most likely due to the presence of a clot (thrombus) but we were unable to completely rule out the presence of atherosclerotic disease in that area.

Although estrogen and progesterone therapy may be an effective method of dysfunctional uterine bleeding, it is an oral contraceptive which is known to create a hypercoagulable state in combination with smoking and thereby increase the risk for a thromboembolic event [4, 5, 6].

Valdeti et al performed a literature review on a total of 214 cases of coronary thromboembolism with the etiology being atrial fibrillation (26%), endocarditis (24%), iatrogenic emboli (21%), prosthetic valve thrombi (12%), hypercoagulable state with PFO (6%), aortic atheroma (5%), myxoma (2%), fat emboli (2%), and coronary stent emboli (2%) [7]

Treatment of coronary embolism depends on the root cause. Patients with atrial fibrillation or recurrent coronary embolism should be offered long term anticoagulation regardless of their CHADS2-VASc score.

Patients with a reversible risk factor such smoking or OCP use should receive oral anticoagulation for 3 months [1]

After review of literature, we believe that this is the first case report to describe a case of a STEMI due to coronary embolism in a patient who is taking OCP's without evidence of a DVT or a patent foramen ovale.

Conclusion:

Atherosclerotic coronary artery disease is the main cause of STEMI. While coronary embolism is rare and often not considered in the differential of acute coronary syndrome; it is of utmost importance for clinicians to keep a wide differential of nonatherosclerotic causes of STEMI especially when the patient is young, without significant cardiac risk factors, and has no visible atherosclerosis on angiography.

Authorship:

Nabil Braiteh (MD): Was part of patient care, writing/editing portions of case report, data gathering, research and finalizing case report.

Raheel Chaudhry (MD): Was part of patient care, writing/editing portions of case report, data gathering, research and finalizing case report.

Ibraheem Rehman (BS): Writing up case history and examination of case report and editing.

Jowana Breiteh (BS): Was part of research and writing history and examination of case report.

Alon Yarkoni(MD): Was part of patient care, finalizing case report and overviewing project.

Acknowledgments

None.

Conflicts of Interest

None.

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Author 2: Raheel Chaudhry, M.D: Study design, planning, data collection, preparation of manuscript**Author 3: Ibraheem Rehman, M.D:** Data collection and Literature analysis/search

Author 4: Jowana Breiteh, B.Sc : Data collection and Literature analysis/search**Author 5: Alon Yarkoni, M.D:** Study design and planning.

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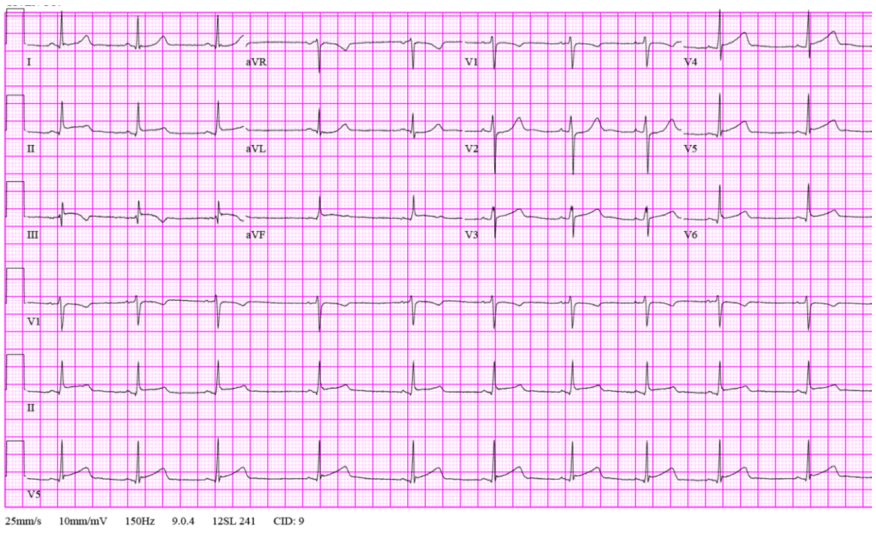
Figures:

Figure 1. Electrocardiogram showing 1mm ST elevations in inferior leads with no reciprocal changes and a sinus rhythm at a rate of 60 beats/minute

Figure 2. Coronary angiogram revealed a saddle clot (thrombus) involving the distal left main artery, left circumflex artery, and proximal left anterior descending artery (red circle).

Figure 3. Electrocardiogram showing evidence of ST elevation resolution in the inferior lead



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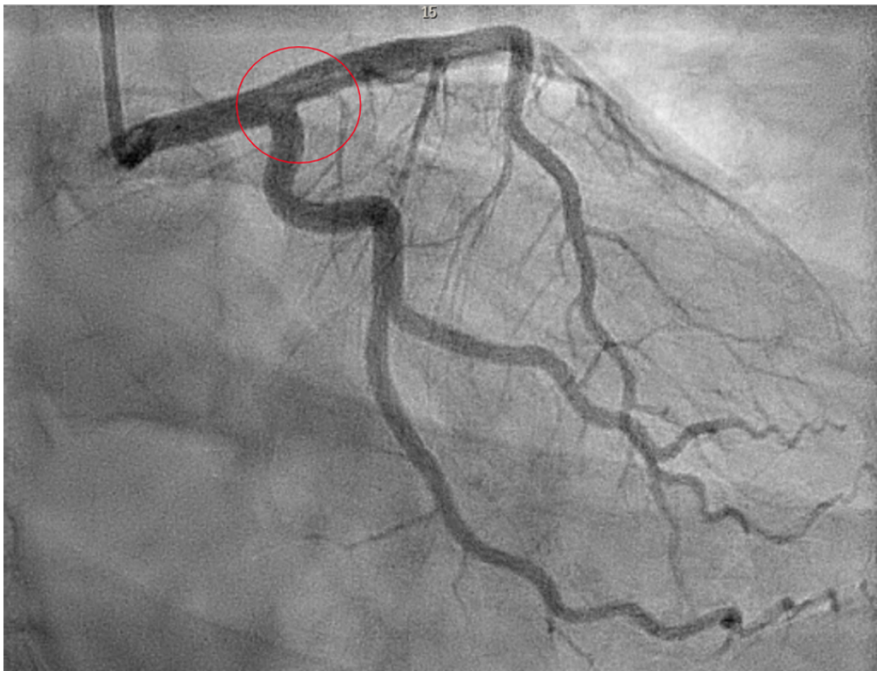

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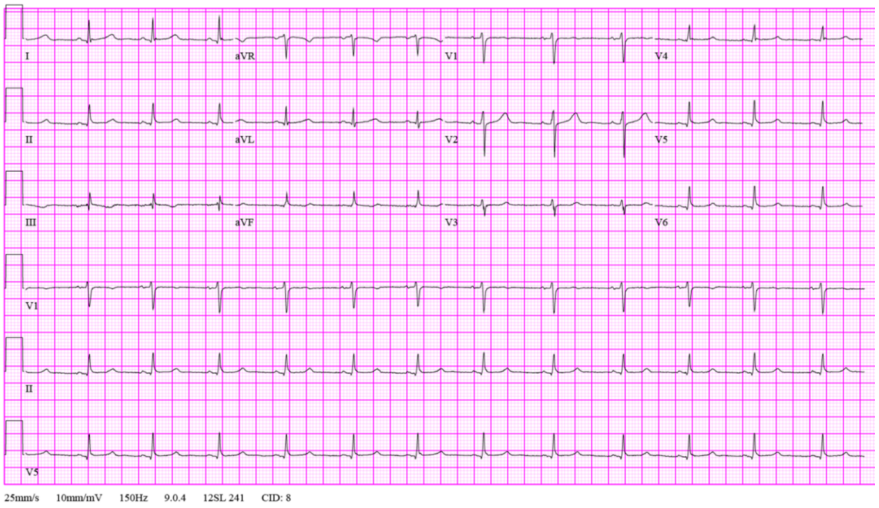

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