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CONTEMPORARY APPROACH TO ST ELEVATION MYOCARDIAL INFARCTION IN VERY YOUNG

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СЪВРЕМЕНЕН ПОДХОД КЪМ ИНФАРКТ НА МИОКАРДА СЪС ST-ЕЛЕВАЦИЯ ПРИ МНОГО МЛАДИ

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Abstract. Coronary artery disease (CAD) commonly occurs in individuals over the age of 45 years. Several studies categorize "young" individuals with CAD or acute myocardial infarction as those below the ages of 40 and 45. The protection provided by young age has slowly been eroded by risk factors like smoking, obesity, and sedentary lifestyle that are becoming more common among young individuals. We report a case of 21-year-old male with family history of premature coronary artery disease, who presented with acute anterior wall ST elevation myocardial infarction. Coronary angiogram revealed 100% thrombotic occlusion of proximal left anterior descending coronary artery. Further evaluation of the lesion morphology using optical coherence tomography revealed plaque erosion. Thrombolysis in Myocardial Infarction coronary grade III flow was achieved after thrombus aspiration. Stent deployment was deferred to avoid the need for lifelong medication and its associated side effects in a young patient. Due to their anti-thrombotic qualities, we also recommend using novel oral anticoagulants in this situation for short-term therapy.

Key words: anterior wall myocardial infarction, coronary artery disease, anti-thrombotic therapy, optical coherence tomography

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Резюме. Коронарната артериална болест (CAD) обикновено се среща при хора на възраст над 45 години. Няколко проучвания категоризират „младите" индивиди с CAD или остър инфаркт на миокарда като лица на възраст под 40-45 години. Защитата, осигурена от младата възраст, бавно е ерозирана от рискови фактори като тютюнопушене, затлъстяване и заседнал начин на живот, които стават все по-често срещани сред млади хора. Докладваме случай на 21-годишен мъж с фамилна анамнеза за преждевременна коронарна артериална болест, който постъпи с остър миокарден инфаркт с елевация на ST-сегмента на предната стена. Коронарната ангиограма показва 100% тромботична оклузия на проксималната лява предна низходяща коронарна артерия. Допълнителна оценка на морфологията на лезията с помощта на оптична кохерентна томография разкри ерозия на плака. След аспирация на тромба чрез тромболиза е постигнато възстановяване на коронарния поток III степен в засегната от инфаркта зона. Разполагането на стент бе отложено, за да се избегне необходимостта от доживотно лечение и свързаните с него странични ефекти при млад пациент. Също така в подобна ситуация за краткосрочна терапия ние препоръчваме използването на новите перорални антикоагуланти поради техните антитромботични качества.

Ключови думи: миокарден инфаркт на предната стена, коронарна артериална болест, антитромботична терапия, оптична кохерентна томография

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Introduction

The INTERHEART study demonstrated that deaths due to acute myocardial infarction (MI) occur in south Asians 5-10 years earlier than the western population and the high risk of MI among young individuals was attributed to higher rates of 9 conventional risk factors (abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, consumption of fruits & vegetables, alcohol and regular physical activity) [1]. We present a novel approach to manage MI in a young patient.

Case report

A 21-year-old male, with family history of premature coronary artery disease (CAD) presented to the emergency department with acute chest discomfort that began 4 hours prior to arrival. He had no previous history of hypertension, diabetes or other comorbidities, and deleterious habits. Electrocardiogram showed ST segment elevation in leads V1-V4 with right bundle branch block and reciprocal changes in inferior leads (Figure 1A). 2D Echocardiogram demonstrated hypokinetic anterior wall, septum, and left ventricular (LV) apex with moderate LV dysfunction.

Coronary angiogram performed after stabilization revealed 100% thrombotic occlusion of proximal left anterior descending artery (LAD) (Figure 1B). Optical coherence tomography (OCT) pull back from LAD showed plaque erosion with red thrombus and fibro-fatty plaque in the mid LAD (Figure 1C). Thrombus aspiration of LAD was performed and TIMI grade III flow was established (Figure 1D). Post-procedure ECG showed narrow QRS complex with resolution of ST segment elevation (Figure 1E). OCT showed complete resolution of thrombus with minimum lumen area of 4.2 mm^2 (Figure 1F). The patient was administered aspirin (325 mg), prasugrel (60 mg immediately post-procedure, and 10mg OD), enoxaparin (0.6 ml BD) along with medications for cardiac remodeling (angiotensin converting enzyme inhibitors, β-blockers, high dose statins and diuretics) during hospital stay for 3 days. He was discharged with single antiplatelet (aspirin 75 mg OD), novel oral anticoagulants (NOAC) (rivaroxaban 2.5 mg twice daily), and high intensity statins.

Biochemical investigations revealed elevated low-density lipoprotein (142 mg/dL) and apolipoprotein B (146 mg/dL). Tests for prothrombin time, activated partial thromboplastin time, antithrombin III level, protein C and S activities, lupus anticoagulant, anticar-

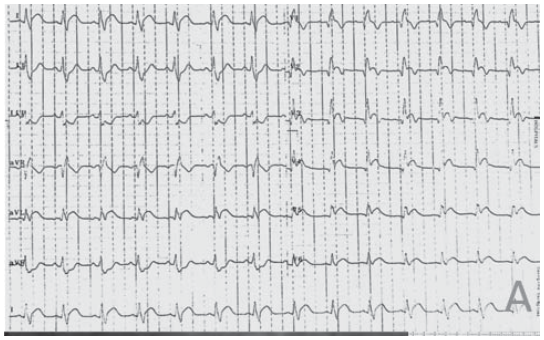

Fig. 1A. 12-lead Electrocardiogram showing RBBB (right bundle branch block pattern) with ST segment elevation in the anterior chest leads at presentation

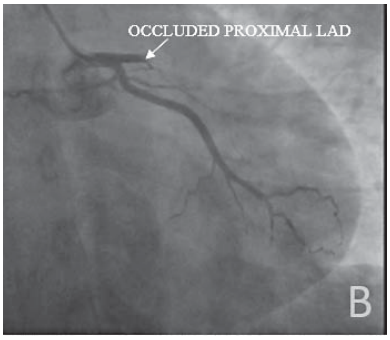

Fig. 1B. Coronary angiogram (Postero-anterior caudal view) showing 100% occluded proximal Left anterior descending artery (LAD)

Fig. 1C. Optical coherence tomography (OCT) image showing red thrombus (irregular borders protruding into lumen) in LAD

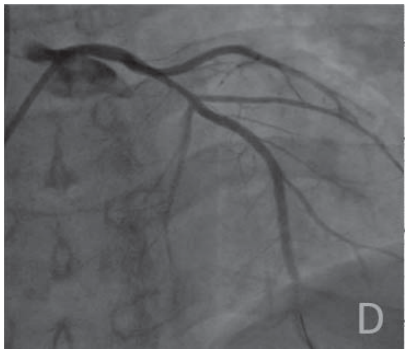

Fig. 1D. Postero-anterior (PA) cranial view of coronaries post thrombus aspiration showing TIMI III flow in LAD

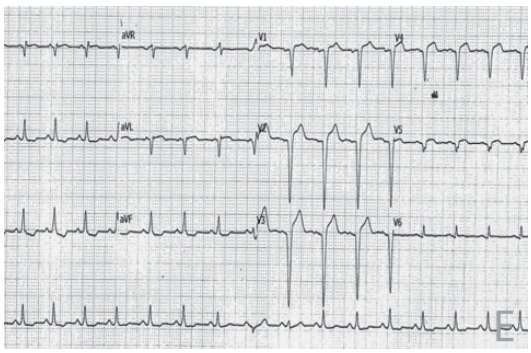

Fig. 1E. Post procedure 12-lead ECG showing narrow QRS complex with resolution of ST segment elevation

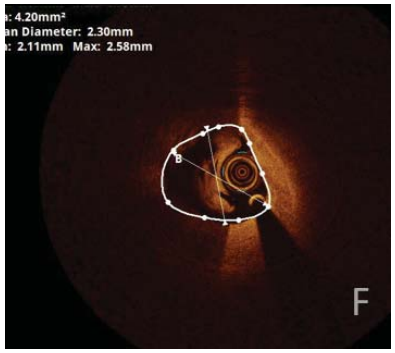

Fig. 1F. OCT image post thrombus aspiration showing minimal lumen area (MLA) – 4.20 mm^2

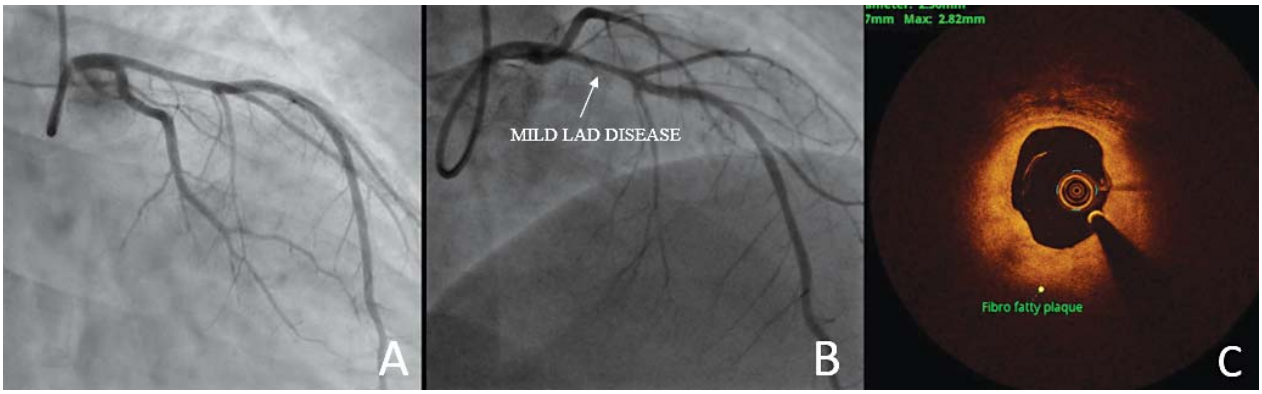

Fig. 2A. PA caudal view of coronaries at follow up showing TIMI III in LAD

Fig. 2B. RAO (Right anterior oblique) cranial view showing mild atheroma (white arrow) in LAD

Fig. 2C. Follow up OCT image at 2 weeks showing fibrofatty plaque with adequate lumen area and no residual thrombus

diolipin/antiphosphatidylserine antibodies, factor II, V Leiden mutation were performed to determine possible hypercoagulable states. All values were found to be within normal limits.

A repeat coronary angiogram at 2-week follow-up showed TIMI III flow in LAD (Figure 2A) with a mild atheroma (Figure 2B). Follow up OCT showed fibro-fatty plaque with adequate lumen area and no residual thrombus (Figure 2C). NOAC was replaced with prasugrel and other medications were continued. At 4-week follow-up, the patient's LDL dropped to 69 mg/dL.

Discussion

It is known that young and old individuals with CAD have different clinical presentations, risk profiles and vessel characteristics. A recent 10-year retrospective autopsy based study on CAD revealed that 36.9% of patients had thrombotic occlusion, related to plaque erosion [2]. A study that investigated at clinical and laboratory predictors for plaque erosion found that younger age, absence of diabetes mellitus, a higher level of haemoglobin, and normal renal function were associated with plaque erosion rather than the traditional risk factors for CAD, such as older age, dyslipidaemia, chronic kidney disease, and hypertension [3]. Our patient had positive family history and elevated low-density lipoprotein at initial evaluation. Statin therapy was utilized to treat elevated lipoproteins, fibrofatty atheroma, and for its pleotropic effects.

Patients with ACS are routinely treated with catheter-based reperfusion of the affected vessel and intracoronary stent placement. Coronary angiography cannot determine the morphology of the culprit lesion, or the status of the fibrous cap [4]. Failure to identify the underlying disease not only entails the use of a "one-size-fits-all" approach, but it also puts patients, particularly the young ACS group, at risk for potential early (vessel dissection, distal embolism, acute stent thrombosis) and late stent complications (restenosis, neo-atherosclerosis, late/very late stent thrombosis). Hence, OCT may be used to assess lesion severity, plaque vulnerability and optimize post percutaneous intervention [5]. A no-stent approach is desirable for patients who have intact fibrous caps and non-obstructive lesions following thrombus aspiration or thrombolysis [4]. There are presently no randomized controlled trials comparing MACCE and complications in STEMI patients treated with stenting versus no-stent approach. A sub analysis of the DANAMI3-DEFER with 603 patients in the deferred stenting group, of which 84 did not receive a stent showed no significant difference between stented patients and those who did not receive a stent in terms of all-cause mortality, recurrent MI, and target vessel revascularization over a 3.4-year median follow-up period [6].

The results of the EROSION trial [6] showed that dual anti-platelet therapy significantly decreased the thrombus volume and increased the effective area in 92.5% of the study participants. After the first year, there is little evidence on the duration of antiplatelet medication in patients without stent placement. OCT guidance may help determine need for continuation in such individuals.

Conclusions

We demonstrate the importance of choosing an imaging-based treatment strategy for ACS in young patients thereby avoiding stents implantation and its associated complications. Short-term use of NOAC with antiplatelet agents is beneficial. Larger trials are required to establish the duration of such therapy in ACS with plaque erosion.

No conflict of interest was declared

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