Case Report

Extremely Late Stent Thrombosis in a First Generation Drug-Eluting Stent 10 Years After Stent Deployment: A Case Report.

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Abstract:

Stent thrombosis is one of the gravest complications of percutaneous coronary intervention which usually manifest as ST-segment elevation myocardial infarction or sudden death. There are a very few case reports in the literature regarding extremely late stent thrombosis in a drug-eluting stent. Here we report a case of extremely late stent thrombosis in a first generation drug-eluting stent in a 54 year old gentleman. To the best of our knowledge, this is the first case report with the longest duration (10 years) after sirolimus eluting first-generation DES in Bangladesh.

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Introduction:

Stent thrombosis (ST) is a potentially life-threatening complication of percutaneous coronary intervention (PCI) as in most cases it manifests as ST-segment elevation myocardial infarction (STEMI) or sudden death. Stent thrombosis is defined as the complete occlusion of a coronary vessel in place of previously implanted stent[1]. Very late stent thrombosis (VLST) is defined as thrombosis that occurs more than 1 year after stent implantation[2] and accounts for 20% of new cases of myocardial infarction (MI) after index PCI[3]. A new term "extremely late stent thrombosis" was suggested for cases of stent thrombosis which occur ≥5 years after stent implantation[4]. First-generation drug-eluting stents (DES) are more prone to develop VLST than BMS, and the majority of VLST occur within 1-4 years of stent implantation. VLST is extremely rare after 5 years of stent implantation, and the first case was reported in 2009[5]. In the literature, there are a very few case reports regarding extremely LST due to first-generation DES with the longest reported period being 12 years[6-8]. To the best of our knowledge, this is the first case report with the longest duration (10 years) after sirolimus eluting first-generation DES in Bangladesh and 3rd case report with the longest duration in the literature (first longest duration 12 years and second longest duration 11 years)[7,8]. We report a case of extremely LST occurring 10 years after first generation DES implantation in a patient presented with acute inferior ST-segment elevation myocardial infarction (STEMI).

Case presentation:

A 53-year-old gentleman first reported on 7th October in the year 2010 with acute onset of retrosternal chest pain of 24-hour duration in Thailand. Electrocardiogram showed ST segment elevation in the inferior leads with normal sinus rhythm. Among the conventional risk factors for ischemic heart disease (IHD) he had hypertension, smoking, dyslipidemia, and family history of IHD.

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Echocardiogram revealed inferior wall hypokinesia with an ejection fraction of 50% with no mitral regurgitation.

Coronary angiography revealed a normal left main artery (LM), left circumflex artery (LCX), and 80% stenosis of left anterior descending artery (LAD). The right coronary artery (RCA) had a total occlusion from the distal segment (Figure 1A) and the patient underwent PCI to RCA with implantation of a 2.5 X 13 mm Cypher stent (first generation DES) in the mid-RCA (Figure 1B). His LAD was also stented with another DES (2.25 X 15 mm). He was on dual antiplatelet therapy (daily aspirin and clopidogrel) for long time. The patient remained asymptomatic and was on a regular medical follow-up by a local cardiologist.

On April 2021, patient suddenly discontinued both antiplatelets (aspirin and clopidogrel). On May 2021, the patient presented to us with sudden onset compressive chest pain radiating to the both arms with sweating of 14 hours duration. His electrocardiogram showed ST-segment elevations in leads II, III, and aVF (Figure 2). ST-segment depression with T wave inversion in leads I, aVL, V2-V4.

Laboratory investigations revealed WBC : 15.4 (x 10^3/mcl), lymphocyte:16%, neutrophil:80%; Hemoglobin: 14 gm/dl; Troponin I: 31.82 ng/ml; CK-MB: 406 U/L; Serum Creatinine: 0.9 mg/dl; SGPT: 94 unit/L; Random blood sugar:8 mmol/L; HbA1c: 5.3%; Serum electrolytes: Na^+ - 138.7 mmol/L, K^+ – 4.02 mmol/L; chlorides – -99.6 mmol/L and Fasting lipid profile: Total cholesterol- 217 mg/dl, LDL-166 mg/dl, HDL- 48 mg/dl, Triglyceride-184 mg/dl. His chest X-ray was normal. Echocardiography revealed akinetic basal-mid inferior wall, mild left ventricular (LV) systolic dysfunction (Ejection Fraction: 45%).

Coronary angiogram revealed left main coronary artery free of disease, LAD free of significant disease with patent stent, 60-70% stenosis at the distal segment of LCX. RCA was dominant vessel having total occlusion from mid segment with thrombus (Figure 1 C).The right coronary artery was engaged with a Judkins right guiding catheter (6 French, 3.5), and the lesion was crossed (Figure 3A) using a 0.0143 Runthrough guidewire (TERUMO Corporation, Tokyo, Japan) and manual thrombus aspiration (Figure 3B) was done using a 6 French thrombus suction catheter Eliminate (TERUMO Corporation, Tokyo, Japan). The lesion was predilated aggressively (Figure 3C) with a 3.0 × 12mm NC Euphora

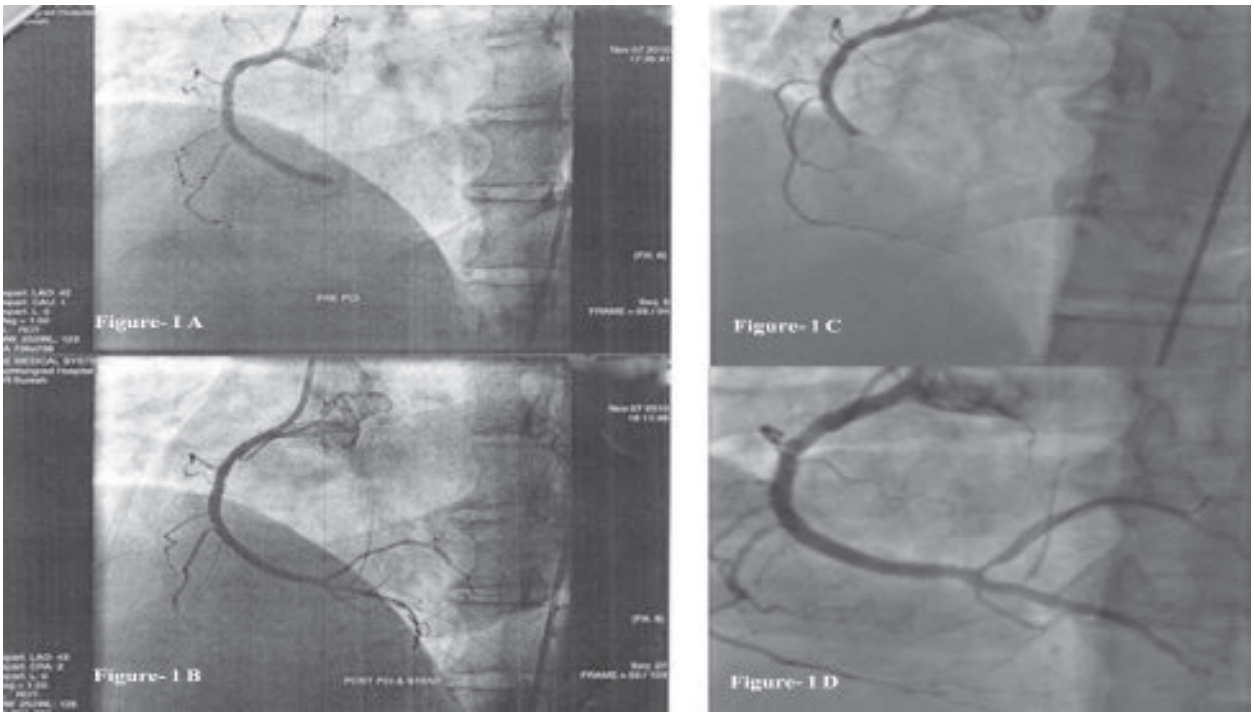

Fig.-1: A) Total occlusion of right coronary artery (RCA) from distal segment; B) Final image after stent deployment in distal RCA; C) Total occlusion of RCA from mid segment; D) Final image after stent deployment from mid to distal RCA.

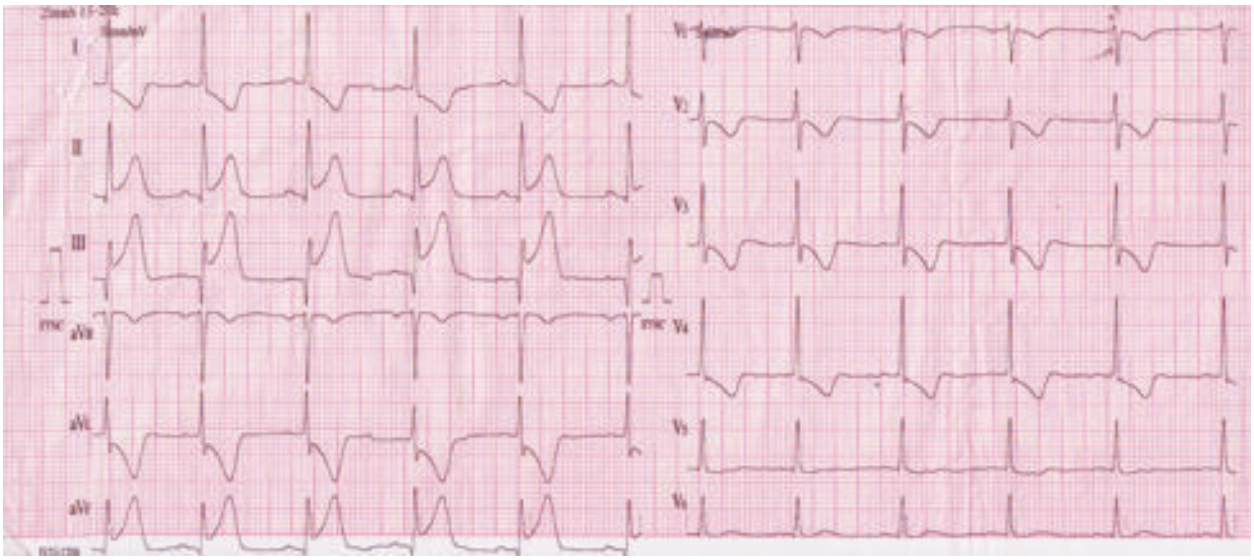

Fig.-2: *ST-segment elevations in leads II, III, and aVF. ST-segment depression with T wave inversion in leads I, aVL, V2-V4.*

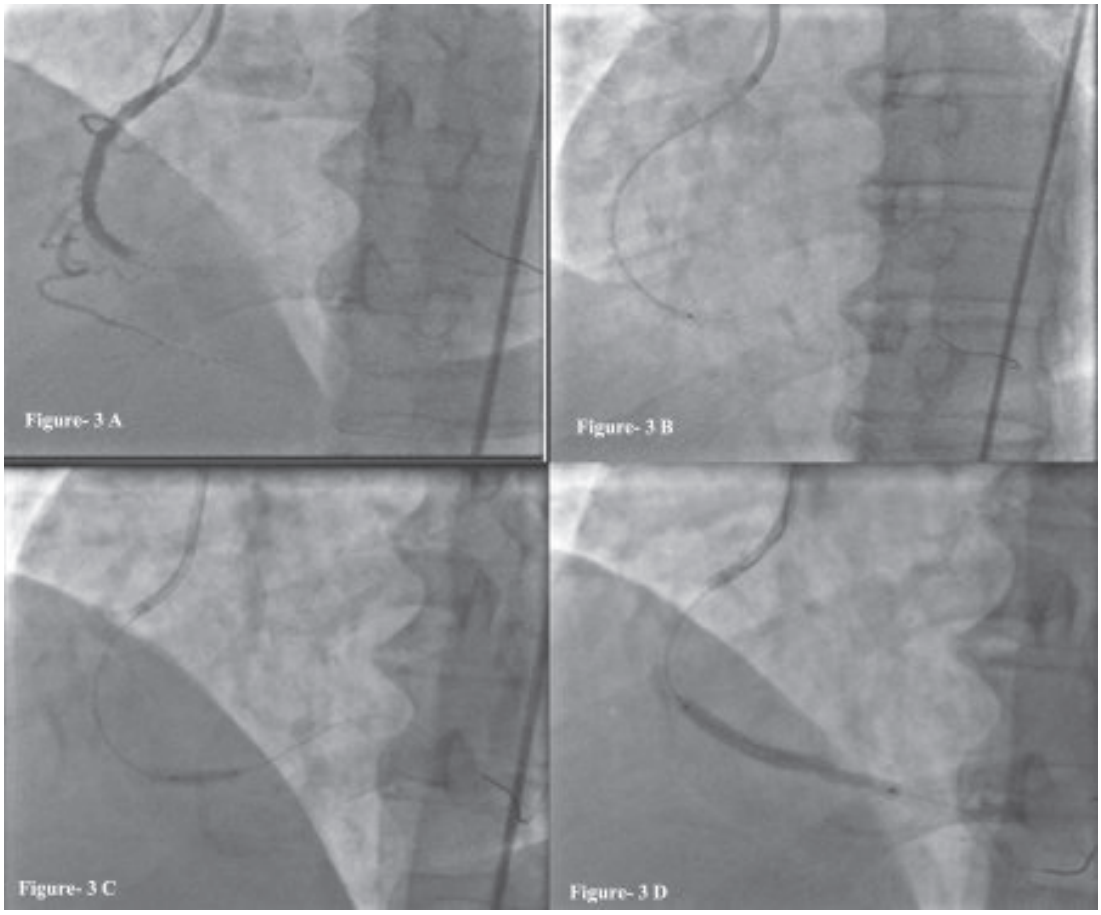

Fig.-3: *A) the lesion of the right coronary artery was crossed using a guidewire; B) manual thrombus aspiration; C) aggressive pre-dilatation; D) stent deployment.*

balloon (Medtronic, USA) distal RCA in previous stent portion at 16-18 ATM. The 3rd generation stent Ultimaster Tansei (3.0 × 38mm) (Sirolimus-eluting), TERUMO Europe N.V. (Leuven, Belgium) was deployed in mid-RCA to distal RCA at 14 ATM (Figure 3D). Postdilatation was done using 3.5x12 mm NC Euphora noncompliant balloons (Medtronic, USA) successively at 14-20 ATM. Postprocedure angiography showed TIMI III flow (Figure 1D). The patient was discharged in a stable condition on dual antiplatelets and statins.

Discussion:

ST occurring at any time (early, late or very late) is a grave complication carrying a significant risk of death. There is a limited data in the literature regarding extremely LST as it is a very rare incidence. Our patient fits the criteria of having a definite ST (either angiographic or post-mortem evidence of thrombotic stent occlusion) according to the definition of ST by the academic research consortium[2]. Incidence of VLST between 1 and 5 years is in 0.5% of BMS-treated patients, 1.8% of first-generation DES (DES_1)-treated patients, and 0.9% of second-generation DES (DES_2)-treated patients[9].

Risk factors of VLST are divided into 3 broad categories: patient and lesion-related factors, procedural and stent-related factors, and pharmacotherapy-related factors[10]. Patient- and lesion- related factors are: Black race, younger age, diabetes, hypertension, hyper-cholesterolemia, present malignancy, current smoking, renal dysfunction, prior PCI, previous coronary artery bypass graft (CABG), previous MI, high platelet reactivity, hypercoagulable state, presentation with acute coronary syndrome (ACS), impaired left ventricular ejection fraction (LVEF), postprocedural Thrombolysis In Myocardial Infarction (TIMI) <3, multivessel disease, bifurcation lesions, long lesions, lesions within left descending artery (LAD)[10]. Procedural and stent-related factors are: Underexpansion, malapposition, PCI of vein graft, multiple stents, longer stented length, overlapping stents, small stent diameter, stent type, large residual stenosis[10]. Pharmacotherapy-Related Factors are: antiplatelet therapy (APT) discontinuation, hyporesponsiveness to APT, choice of APT[10]. Our patient had several risk factors for the development of VLST (hypertension, dyslipidemia, current smoking, prior PCI, previous MI, presentation with ACS, impaired LVEF and discontinuation of antiplatelet therapy one month back). The mechanisms underlying the development of VLST are multifactorial: (1) late stent malapposition, (2) uncovered struts, (3) neoatherosclerosis, (4) hypersensitivity and inflammation reactions, (5) changes in shear stress, and (6) plaque rupture and neointimal erosion[10].

The first generation drug-eluting stent (DES) was introduced to reduce the incidence of restenosis and other complications following the implantation of bare metal stent (BMS)[11]. But risk of ST was increased with first generation DES.

An increased incidence of very late ST following implantation of first-generation DES led to development of second-generation DES which were coated with antiproliferative drugs that were less toxic, polymer coatings that were more biocompatible, and thinner stent struts made of modern alloys[12]. These improvements resulted in a reduced risk for the occurrence of late and very late ST.

There are 3 types of treatment for the treatment of VLST: (1) balloon angioplasty, (2) thrombus aspiration, and (3) additional stent deployment[13]. Perfusion balloon angioplasty is a novel modification of balloon angioplasty which has the unique characteristic of maintaining blood flow during balloon inflation and can be inflated for a longer period of time as compared to conventional balloons[13].We treated our patient with combination of thrombus aspiration, aggressive balloon dilatation and additional stent deployment.

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