

# Percutaneous Angioplasty of Severe Concomitant Carotid, Coronary, and Peripheral Arteriosclerosis: A Case Report and Literature Review

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## Abstract

**Introduction:** Severe presentation of concomitant carotid, coronary, and peripheral arteriosclerosis is not a common finding. However, some studies have reported surgical and noninvasive interventions for this condition.

**Case Presentation:** Herein, we present a patient with concomitant carotid, coronary, and peripheral arteriosclerosis, who underwent angioplasty in Tehran, Iran in November 2015. Some studies have been carried out on surgical and percutaneous coronary, carotid and peripheral intervention for concomitant lesions; however, reports about percutaneous coronary, carotid and peripheral intervention, similar to the present case, are not available.

**Conclusions:** Due to lack of evidence on the prevalence and management of concomitant multifocal coronary, carotid, and limb arteriosclerosis, it is necessary to perform well-designed studies on such groups of patients to define proper management (surgical versus endovascular interventions), periprocedural complications, as well as short- and long-term outcomes.

**Keywords:** Cardiovascular Disease, Vascular Diseases, Arterial Occlusive Diseases, Arteriosclerosis, Peripheral Arterial Disease, Angioplasty, Percutaneous Transluminal Angioplasty, Concomitant Severe Arteriosclerosis, Concomitant Arterial Stenosis, Polyvascular Disease, PVD, CVD

## 1. Introduction

According to the Lancet's global burden of disease study in 2015, cardiovascular disease (CVD) is the leading cause of all-cause mortality (1). Reasonably, prevention (2) and treatment of cardiovascular disease (CVD) should be of the highest priority for the development of health policies. The European Society of Cardiology (ESC) defines polyvascular disease (PVD) as "the simultaneous presence of clinically relevant atherosclerotic lesions in at least 2 major vascular territories" (3).

Mortality is significantly higher in PVD patients, compared to those with only 1 stenotic lesion (4, 5), while definite management of such groups (surgical versus nonsurgical interventions) is one of the challenging clinical decisions (4, 6, 7). Herein, we present a patient with symptomatic PVD, who was a candidate for non-surgical approach and angioplasty of carotid, coronary, and lower extremities with major arterial lesions.

## 2. Case Presentation

In November 2015, a 58-year-old man was admitted to the emergency ward of Firoozgar general hospital, Tehran, Iran, with sudden onset of paraparesia and falling on the

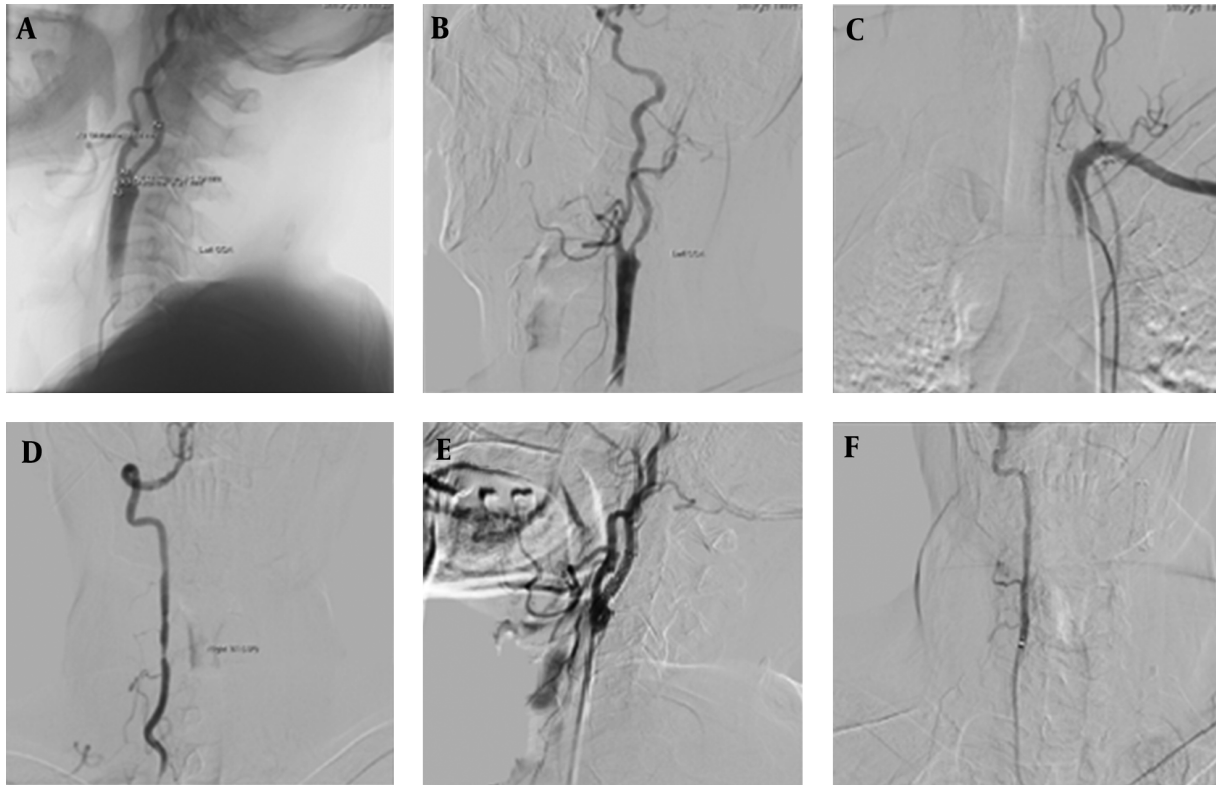
same day. The patient with primary impression of transient ischemic attack was admitted to receive neurology services. He had no history of cerebrovascular accidents, diabetes mellitus, coronary artery disease (CAD), hypertension, or dyslipidemia; also, he had no family history of these disorders and was a nonsmoker.

The patient's only complaint was limping while walking, which was compatible with vascular involvement. Neurologic physical examination and brain imaging (CT scan and MRI) were normal, based on the radiologist's report. Diminished dorsalis pedis pulses in the lower extremities were the only abnormal finding.

According to the laboratory findings at admission (Table 1), it was revealed that diabetes mellitus had not been diagnosed in the patient. Due to primary impression, the patient underwent color Doppler sonography of carotid arteries and transthoracic echocardiography (TTE) for cardiac examination. After establishment of left common carotid artery stenosis on color Doppler sonography and reduced left ventricular ejection fraction on TTE (LVEF=40% with segmental wall motion abnormalities), angioplasty of the left common carotid (Figure 1) and coronary arteries (Figure 2) was carried out in 2 separate sessions.

Considering the patient's complaint of vascular limping, color Doppler sonography of both lower extremities

Figure 1. Figure 1



The internal carotid artery showed significant stenosis in the proximal region before angioplasty in the lateral (A) and left anterior oblique (B) views and after angioplasty in the lateral view (E). The left vertebral artery was cut at the ostium (C) in the anteroposterior view. The right vertebral artery showed significant stenosis in the middle part and before angioplasty (D) and after angioplasty (F).

was carried out, which showed that both left and right common femoral arteries were cut (Figure 2). Accordingly, percutaneous transluminal angioplasty (PTA) of the lower extremities was planned.

Due to common femoral artery occlusion, access to femoral artery was impossible; therefore, popliteal artery access was considered in the prone position via fluoroscopy and Doppler sonography guidance. Finally, angioplasty was performed on the left femoral, common, and internal iliac arteries. In the fourth session, PTA was performed on the right lower extremity (Figure 2). Intensive hydration and close monitoring of renal function were the main considerations during and after the procedures. Both lower limbs showed a relatively acceptable distal flow after angioplasty.

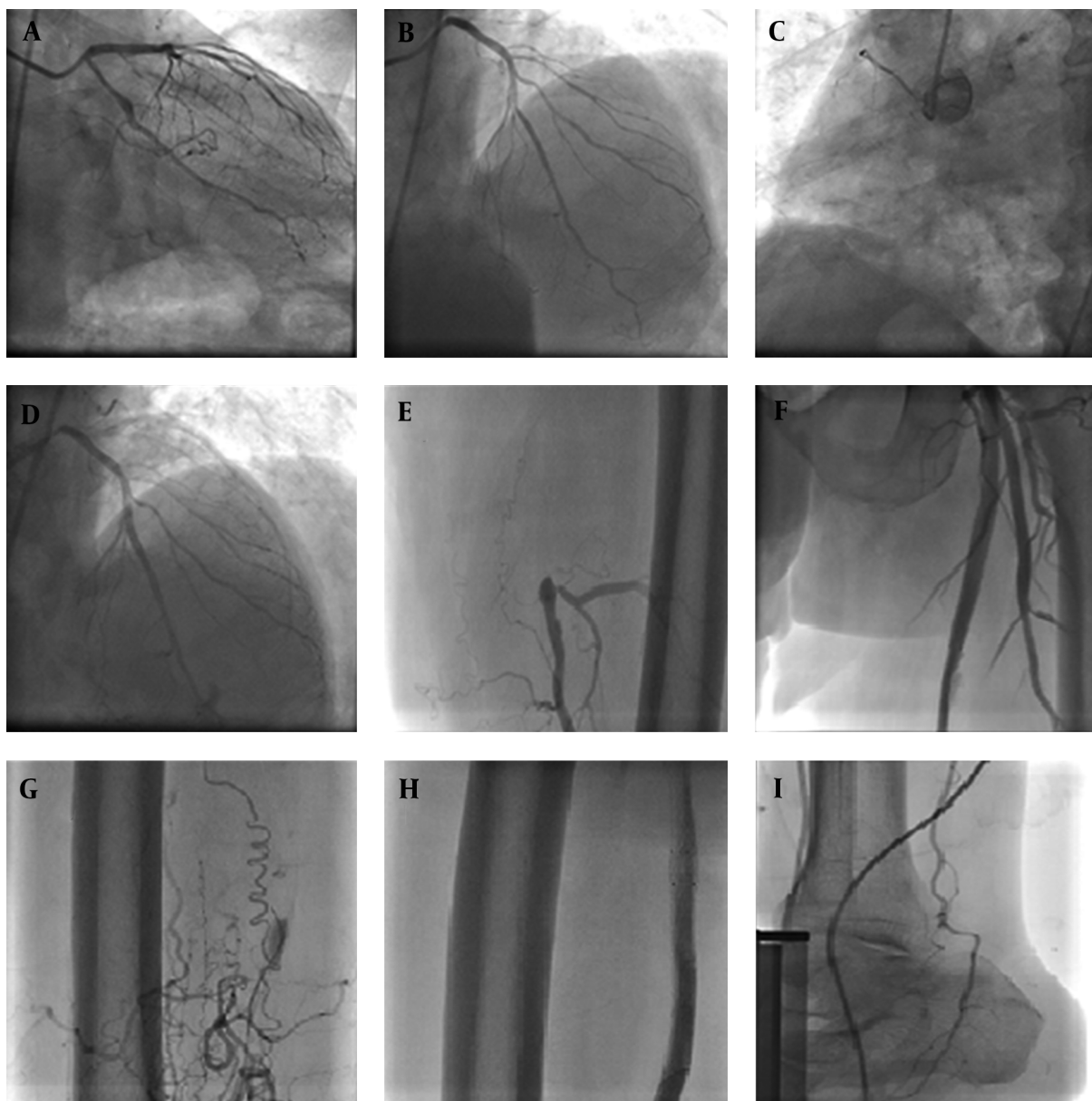
### 3. Discussion

According to early registries, patients with concomitant peripheral artery disease (PAD) and coronary artery

disease (CAD) have higher mortalities, compared to those with only CAD (5); these reports are compatible with recent studies (3, 4). Overall, no prevalence estimation has been performed on severe presentation of concomitant carotid, coronary, and peripheral arteriosclerosis (3, 8-11), whereas carotid artery stenosis, concurrent with coronary or peripheral artery arteriosclerosis, is not a rare finding (with or without symptoms) (3, 4, 10, 12).

It is reasonable to consider early revascularization for the prevention of mortality and further morbidities in such patients. However, there is a gap of information about proper management of patients with PVD (3, 13). Some studies have discussed surgical, percutaneous, and non-invasive interventions (4, 6, 11, 13, 14). Surgical revascularization may lead to more perioperative complications (e.g., stroke, hemorrhage, and vascular complications) (13), while percutaneous coronary intervention (PCI) is one of the options for preventing such adverse events, reducing the length of admission, and facilitating early return to work.

Figure 2. Figure 2



A significant left anterior descending (LAD) lesion was detected in the middle part (B), which underwent angioplasty (D) for adequate coronary blood flow. The right coronary artery was cut at the origin (C). The retrograde filling of the right coronary system is presented in (A). The left femoral artery was cut (E), as shown after PTA (F). The right femoral artery was cut (G) and wired for PTA. Following PTA (H), the right femoral artery showed a relatively good distal flow (I)

On the other hand, contrast-induced nephropathy is a major concern and may lead to permanent hemodialysis in some patients, especially diabetics. Therefore, intensive hydration and close monitoring of renal function are mandatory. Although Surgical interventions and percutaneous coronary intervention (PCI) have been performed in concomitant lesions (11, 15), reports about percutaneous in-

tervention, as a single revascularization technique, are not available in similar cases.

Due to lack of evidence on the prevalence and management of PVD, it is necessary to perform well-designed studies on this group of patients to define proper management (including surgical, endovascular, and noninvasive strategies), periprocedural complications, as well as short- and

**Table 1.** Laboratory Test Results Upon Admission (Diabetes Mellitus Presented by High FBS and HbA1c Levels)

Tests	Results	Units	Reference Values
Fasting blood sugar (FBS)	433	mg/dL	70 - 100
HbA1c	15.5	NA	4 - 5.6
Creatinine	1.1	mg/dL	0.5 - 1.4
Potassium	4.2	mEq/L	3.5 - 5.5
pH	7.38	NA	7.35 - 7.45
HCO <sub>3</sub>	21	mmol/L	22 - 26
Triglyceride (TG)	111	mg/dL	60 - 160
Cholesterol	162	mg/dL	< 200
High-density lipoprotein (HDL)	49	mg/dL	30 - 75
Low-density lipoprotein (LDL)	91	mg/dL	60 - 130
Aspartate transaminase (AST)	26	IU/L	5 - 40
Alanine transaminase (ALT)	29	IU/L	5 - 40
White blood cell count	8.8	1000/mm <sup>3</sup> *	4 - 10
Red blood cell count	5.04	million/mm <sup>3</sup>	4.5 - 6.3
Hemoglobin level	16.7	g/dL	14 - 18
Platelet count	258	1000/mm <sup>3</sup> *	140 - 440
ESR	15	mm/hour	< 15
Thyroid-stimulating hormone (TSH)	0.9	microIU/mL	0.5 - 5.5

long-term outcomes. Although the number of patients in such groups is not favorable, decision-making for proper management and long-term positive outcomes is essential.

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