Case Report

Premature Coronary Artery Disease in Young Male Patient with Strong Family History

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ABSTRACT

Background: Premature coronary artery disease (CAD) occurs in those under the age of 45. According to recent studies, PCAD affects 4-10% of the population. PCAD is linked to negative patient outcomes and has a greater impact on quality of life. The easiest way to describe complex interactions between two risk factors is to look at their family history.

Case: A 37-year-old man was admitted to Saiful Anwar Hospital to have his anginal discomfort evaluated further. The patient has been suffering from recurrent chest pain for the past five months, yet it is still eased by rest. Wellens Type B, which is specific for significant stenosis of the left anterior descending (LAD) artery, was found on the electrocardiogram. A 46 mm drug-eluting stent (DES) was implanted from the proximal to distal LAD. After a day of observation, the patient was discharged.

Discussion: With consideration of atherosclerotic diseases in this patient, we decided to give rivaroxaban as an anticoagulant combined with aspirin and statin high dose. But due to lack of source in our hospital, and patient also denied for further management, treatment for the patient cannot be optimal, so the patient discharge with unresolved limb ischemia.

Conclusion: Approach to a patient with PCAD comprises managing traditional risk factors and careful investigation of Family History. Individuals with a positive family history of PCAD should be treated more cautiously.

1. Introduction

Cardiovascular disease (CVD) is the most common cause of mortality worldwide, with Asia accounting for half of all CVD cases. Although coronary artery disease (CAD) mortality has declined globally, it is still relatively high in several developing countries. In Indonesia, CAD and stroke are estimated to cause more than 470,000 deaths annually.3

According to current studies, between 4% and 10% of CAD patients are under 45 years old. Premature coronary artery disease (PCAD) is described as a form of coronary artery disease that develops in women and men under the age of 55 and 45, respectively. The cut-off value for each study, however, varies, ranging from 45 to 65 years old.4 National Cardiac Center Harapan Kita (NCCHK) in 2008 reported the incidence of acute myocardial infarction approximately 1300 cases/year. Currently, 10% of acute myocardial infarction (MI) cases occur before 40 years old, with all patients having a family history and history of smoking.5

Because of the interconnections between hereditary and environmental risk factors, CAD is a complicated illness, and the best tool for assessing the interplay of these shared risk factors is currently family history. Angina, myocardial infarction, angioplasty, or coronary artery bypass surgery in a sibling, uncle or aunt, parent, or grandparent was considered a positive family history (excluding cousins, relatives by marriage, and half-relatives).6 The percentage of patients who have a positive family history ranges from 14% to 69%. The incidence of CAD among siblings of a young patient with MI is 10 times higher, and around half of young patients with MI had single-vessel coronary disease.7 Nevertheless, there is the utility of family history in terms of the CAD predictive model.

2. Case Illustration

A 37-year-old male with a body mass index (BMI) of 22.9 kg/m2 was admitted for evaluation of frequent episodes of chest pain, which began five months before admission. It was described as a heavy-like sensation radiating to the back in less than 10 minutes. It occurred while doing heavy activity like running and was relieved by...
Chest pain has become more intense and frequent for the last two months. The patient got admitted for a heart attack at a local hospital two months before and hospitalized for three days. After discharge from the hospital, he routinely consumed Bisoprolol 2.5mg once daily, Aspirin 80 mg once daily, clopidogrel 75 mg once daily, atorvastatin 40 mg once daily, ramipril 5 mg once daily, and nitroglycerine 2.5 mg twice daily. The patient had been an active smoker for approximately 25 years with up to 24 cigarettes/day. He had a history of alcoholism for about one year but was completely rehabilitated. Dyslipidemia noticed 2 months ago (Total Cholesterol 212 mg/dL, Triglyceride 304 mg/dL, low-density lipoprotein [LDL] 174 mg/dL, high-density lipoprotein [HDL] 31 mg/dL). The patient had never used recreational drugs before. History of hypertension and diabetes mellitus were denied. There is a strong family history of CAD on his first-degree relatives (figure 1). His mother was known for coronary artery disease and currently consuming dual antiplatelet drugs. She was also known suffering from hypertension and hypercholesterolemia (Total Cholesterol 236 mg/dL, Triglyceride 170 mg/dL, LDL 186 mg/dL, HDL 40 mg/dL). His brother developed similar anginal symptoms, triggered by moderate to heavy activity and relieved by rest.

Figure 1. Pathophysiology intracellular calcium overload during ischemia and after reperfusion.

Figure 2. ECG shows sinus rhythm, normoaxis, poor R wave progression with symmetrical deep T wave inversion on V2-V4 (Wellens Type B).
In the room air, physical examination revealed blood pressure of 110/70 mmHg, regular heart rate of 70 beats per minute, respiratory rate of 18 times per minute, and peripheral oxygen saturation of 98%. On auscultation, there were no murmurs or rales. The results of other physical examinations were similarly within normal norms. Electrocardiograms (ECGs) with 12 leads revealed sinus rhythm, a heart rate of 70 beats per minute, a normal axis, and a deep, symmetrical T wave inversion V2-V4 (Type B Wellens Syndrome) (Figure 2). A chest radiograph was within the normal limit (cardiotoracic ratio [CTR] 45%). Two-dimensional echocardiography showed slightly dilated left ventricular dimension (left ventricular internal dimension in diastole [LVIDd] 5.87 cm), left ventricular ejection fraction (LVEF) 62%, normal left ventricular diastolic function, and slight hypokinetic at the anterior segment of the mid and apical level.

The right femoral artery was used to perform the diagnostic coronary angiography (DCA). Multiple stenoses were found from the proximal to the distal Left Anterior Descending (LAD) Artery, with critical stenosis of 99% at the mid LAD and 80% at the proximal LAD. There was also 60% stenosis at the obtuse marginal (OM) 4 branch, which was dominated by the Left Circumflex (LCx). We used a Sirolimus Cre8 3.5x46 mm drug-eluting stent (DES) from the proximal to the distal LAD. Thrombolysis in myocardial infarction (TIMI) Flow 3 was seen on cineangiography, with no residual stenosis, and the treatment was completed without complications. (Figure 3). The patient was discharged after 1-day observation with therapy Bisoprolol 2.5mg once daily, Aspirin 80 mg once daily, clopidogrel 75 mg once daily, atorvastatin 40 mg once daily, ramipril 10 mg once daily, and nitroglycerine 2.5 mg twice daily.

3. Discussion

Patients with PCAD are more likely to have negative outcomes. At an early age, it carries severe morbidity, psychological impacts, and financial restraints for the individual and his or her family. In patients with PCAD, some traditional risk factors, such as cigarette smoking, dyslipidemia, and family history, are more prominent. In terms of PCAD, patients often have multiple risk factors contributing to the disease (i.e., the culmination of genetic and non-genetic factors). Among those conventional risk factors, age, cholesterol, blood pressure, and cigarette smoking were observed to be strong and independent risk factors for PCAD in long-term follow-up. Exposure to conventional risk factors throughout lifespan increases the risk for cardiovascular disease. Mortality rates for patients with no risk factors, one risk factor, or two or more risk factors respectively were 0.7, 2.4, and 5.4% 1000 person-years. Several conventional risk factors are present in this case including, smoking approximately 25 years, newly diagnosed dyslipidemia and a strong history of premature CAD, which make a 5.4% increase in mortality risk, according to the report.

In patients with early-onset coronary artery disease, family history is a significant and independent risk factor. Nearly 40% of young CAD patients have a first-degree relative who has developed early atherosclerosis. Despite this, it rarely follows a Mendelian pattern, implying complicated inheritance and a strong reliance on environmental influences. The risk of premature CAD in people with a positive family history ranged from 3.25 for a standard family history of CAD in a first-degree relative to 5.9 for a family history of early CAD in a first-degree relative before the age of 45, and 6.1 for a strong family history of CAD defined as CAD in at least two first-degree relatives. There is a strong family history of PCAD in our case that his brother also came with anginal symptoms that began at an early age. Besides, we also found that his mother had already been diagnosed with CAD and consumed DAPT, although it came at a late age. In addition to this finding, we found CAD in second-degree family relatives with a similar symptom. Elucidating the association of Family History of premature CAD with subclinical atherosclerosis may have clinical implications because we should consider performing subclinical disease screening on another degree of family relatives. In general, a history of CAD in a first-degree family member is associated with 1.5 to 3-fold increased disease risk. The risk increased more than 10-fold because the patient's brother was affected before the age of 45.

Figure 3. A. Coronary angiography shows multiple stenosis proximal until distal LAD with critical stenosis 99% at Mid LAD and 80% at proximal LAD (Red arrow). B. Cineangiography shows TIMI Flow 3 after implantation DES.
independent prognostic predictor.16 Those with a low Framingham risk profile, family history may be an
1.56; p = 0.080) were linked to family history. In female patients and
MACEs (hazard ratio [HR], 1.41; p = 0.009) and cardiac death (HR,
Study demonstrates the prognostic significance of family history.
impact due to the risk of early-onset illness. In the context of secondary
ham score may underestimate CAD risk in those with a family history,
Heterozygous family hypercholesterolemia, familial mixed hyperlipid-
metabolically induced dyslipidemia is the early development of CAD.
looked at the incidence of lipid abnormalities in early-onset MI patients.
Dyslipidemia, which is critical in the early stages of CAD, was
another risk factor. When compared to matched controls, one study
looked at the incidence of lipid abnormalities in early-onset MI patients.
A major hallmark of several kinds of genetically determined and/or
metabolically induced dyslipidemia is the early development of CAD.
Heterozygous family hypercholesterolemia, familial mixed hyperlipid-
emia, familial dyslipoproteinemia, primary hyperlipoproteinemia (low HDL
levels), and familial hypertriglyceridemia are among them. Wiesbauer et al.18 reported that the Familial Combined Hyperlipidemia
phenotype was associated with a 24-fold increased adjusted risk for MI
(95% CI 7.5–81, P < 0.001). The patient had hypercholesterolemia and
hypertriglyceridemia prior to CAD onset, which suggests the probability of familial hypercholesterolemia. Besides, there is a familial history of
hypercholesterolemia in his mother. In spite, we still need to establish
the diagnosis by checking the apolipoprotein B100 level.

4. Conclusion
PCAD is a multifactorial disease that requires a special clinical approach. A positive family history of coronary artery disease is a
strong predictor of PCAD. Patients with this predisposing risk factor
should be treated more cautiously, and diagnostic procedures should be
considered more frequently when there is a likelihood of PCAD.

5. Declarations
5.1. Ethics Approval and Consent to participate
This study was approved by local Institutional Review Board, and all
participants have provided written informed consent prior to involve-
ment in the study.
5.2. Consent for publication
Not applicable.
5.3. Availability of data and materials
Data used in our study were presented in the main text.
5.4. Competing interests
Not applicable.
5.5. Funding source
Not applicable.
5.6. Authors contributions
Idea/concept: DAK; Design: DAK; Control/supervision: DS, NK, AFR;
Data collection/processing: DAK; Extraction/Analysis/interpretation:
DAK; Literature review: DS, NK, AFR; Writing the article: DAK; Critical
review: DS, NS, AFR. Reviewed and approved the final draft and are
responsible for the content and similarity index of the manuscript.

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