General Medicine: Open Access

Mahmood, General Med 2015, 3:1
DOI: 10.4172/2327-5146.1000163

Case Report Open Access

Management of Residual Cardiovascular Risk in Dyslipidaemic Patient with Metabolic Syndrome

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Rec date: Dec 31, 2014 **Acc date:** Feb 10, 2015 **Pub date:** Feb 15, 2015

Abstract

Metabolic syndrome (MS) is a clustering of metabolic and underlying risk factors which doubles the risk of atherosclerotic cardiovascular disease. It is more prevalent in some ethnic groups, especially in the Asian world.

Global urbanization and sedentary life habits have increased the underlying risk factors characterised by physical inactivity, atherogenic diet and obesity. Therefore, its detection, prevention, and treatment serve as an important approach for the reduction of cardiovascular risk in the general population and strictly emphasized on strict therapeutic lifestyle changes.

In our case report, we present effective management of a dyslipidaemic patient with MS by medication. However, her underlying risk factors were not controlled due to her inability to strictly adopt therapeutic lifestyle changes.

Introduction

Metabolic syndrome (MS) or Syndrome X is a clustering of metabolic and underlying risk factors which doubles the risk of atherosclerotic cardiovascular disease (CVD). The metabolic risk factors include atherogenic dyslipidemia (elevated triglycerides [TG], small-dense low density lipoprotein [LDL] and low high-density lipoproteins [HDL]), elevated blood pressure (BP) and fasting plasma glucose (FPG), and prothrombotic and proinflammatory states [1]. Underlying risk factors for MS include physical inactivity, atherogenic diet, abdominal or upper body obesity, measured by waist circumference, insulin resistance, characterized by impaired FPG. The other major risk factors include cigarette smoking, family history of premature coronary heart disease (CHD), and aging.

We present a case report of management of residual CVD risk in a female dyslipidaemic patient with MS.

Case Report

A 62-year old Mexican American woman went to a routine clinical visit. Her body mass index (BMI), waist circumference, FPG, and BP were 31.2 kg/m^2, 36 inches, 115 mg/dL and 136/77 mm Hg, respectively. She was already on angiotensin-converting enzyme (ACE) inhibitor, the antihypertensive medication, which helped to reduce her BP. Her lipid profile revealed borderline elevation of various lipid parameters, including total cholesterol (227 mg/dL), LDL-C (130 mg/dL), HDL-C (40 mg/dL), TG (285 mg/dL), and non-HDL-C (187 mg/dL). Her clinician diagnosed her with impaired fasting glucose and MS and reported her Framingham risk score of 12%. He prescribed atorvastatin (10 mg/day) and suggested to adopt therapeutic lifestyle changes (diet, exercise) and stop smoking.

During her follow up visit after 3 months (Visit 1), she reported that her smoking habits were reduced from 1 pack to half pack a day. However, there was no change in her BMI (31.8 kg/m^2) and waist circumference (36.5 inches). Her BP was slightly raised (from 136/77 mm Hg to 138/80 mm Hg). To normalize her BP, the clinician prescribed amlodipine, a calcium channel blocker, in addition to existing ACE inhibitor. After the use of atrovastatin a change in her lipid profile was observed. Her total cholesterol, LDL-C, non-HDL-C, and TG were reduced from 227 to 181 mg/dL; 130 to 89 mg/dL; 187 to 139 mg/dL, and 285 mg/dL to 248 mg/dL, respectively and HDL-C levels were increased from 40 to 42 mg/dL. She reached her target goal of LDL-C (<100 mg/dL) but did not reach target goal of non-HDL-C (<130 mg/dL) as per ATP III guidelines (Table 1). Though there was an overall improvement in the metabolic parameters, her FPG was elevated (132 mg/dL) and was diagnosed with type 2 diabetes. The clinician prescribed metformin (500 mg, twice a day) to reduce her FPG levels and added fenofibrate (145 mg/day) to existing atorvastatin therapy to further elevate HDL-C and lower TG levels. He explained the importance of lifestyle changes and again stressed her to strictly adopt lifestyle changes.

Risk categories	Criteria	LDL goal	Non-HDL goal
High risk	10-year risk for CHD >20% or CHD risk equivalent, including diabetes	<100 mg/ dL (2.6 mmol/L)	<130 mg/dL (3.3 mmol/L)
Moderate	2 or more risk factors and 10-year risk for CHD < 20%	<130 mg/ dL (3.3 mmol/L)	<160 mg/dL (4.1 mmol/ L)
Low	1 major risk factor and 10-year risk for CHD < 10%	<160 mg/ dL (4.1 mmol/L)	<190 mg/dL (4.9 mmol/L)

Table 1: NCEP ATP-III comparison of LDL-C and non-HDL-C target goal [9]. LDL-C: low-density lipoprotein cholesterol; HDL-C: high

density lipoprotein cholesterol; NCEP ATP-III: National Cholesterol Education Program Adult Treatment Panel-III

Three months after Visit-1, no change in BMI and waist circumference was observed in spite of her reduced smoking habit. The combination of amlodipine plus ACE inhibitor normalised her BP (from 138/80 mm Hg to 122/74 mm Hg) and metformin reduced her FPG (from 132 mg/dL to 114 mg/dL). After treatment with fenofibrate and atorvastatin her lipid profile was further improved. Her total cholesterol, LDL-C, non-HDL-C, and TG reduced to 158 mg/dL, 80 mg/dL, 110 mg/dL, and 148 mg/dL, respectively, and her HDL-C increased to 48 mg/dL. Since she did not experience any adverse muscle, liver, or kidney events, the treatment was continued. The medications helped her lower presence of most of her metabolic and major risk factors. However, no changes in underlying risk factors were observed owing to her inability to adopt to a strict lifestyle changes.

Discussion

The two most widely accepted criteria for the diagnosis of MS in the United States have been proposed by the National Cholesterol Education Program Adult Treatment Panel (NCEP ATP III) and the American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI). International Diabetes Federation (IDF) was similar to NCEP ATP III and AHA/NHLBI criteria Except that it included central obesity plus two or more than two criteria (Table 2) [2]. Enlarged waist plus elevated triglycerides serves as a stronger predictor of cardiovascular mortality and all-cause mortality after adjustment of age, smoking status, and LDL-C levels [1,3]. In our report, the patient was a 62-year old female of Mexican American descent with enlarged waist (36 inches) and borderline elevation of lipid parameters with elevated TG levels (285 mg/dL), and had diagnosis of MS. Our results corroborated with earlier reports where females aged >60 years, enlarged waist, elevated TG and the Mexican American descent have higher predisposition to MS. Lifestyle modifications have been reported to be effective in resolving metabolic syndrome and reducing the severity of related abnormalities (fasting blood glucose, waist circumference, systolic and diastolic blood pressure, and triglycerides) in people with metabolic syndrome. Hence doctor advised her therapeutic lifestyle changes in addition to medications for her problem. She was asked to do a routine physical activity for 30-60 minutes daily of moderate-intensity aerobic activity plus an increase in daily lifestyle activities. Secondly, she was told to reduce her weight as it is important for those with abdominal obesity and MS. Lastly, she was asked to modify her diet composition which should include fresh fruit and vegetables, wholegrain or high-fiber, reduction in fat intake, diet rich in mono-unsaturated fats (eg, olive oil), omega-3 polyunsaturated fatty acids (PUFAs), and complex carbohydrate to form the major portion of calories. Other lifestyle suggested modifications were quit smoking cessation and avoid excessive alcohol intake. It has been reported that lifestyle factors potently determine both physical and mental health. In modern affluent societies, the diseases inflicting the greatest mortality and morbidity such as CVD, obesity, diabetes, and cancer are now said to be strongly determined by lifestyle. It has been reported that differences in just four lifestyle factors which include smoking, physical activity, alcohol intake, and diet could exert a major impact on mortality, and even small differences in lifestyle could make a major difference in health status. Consequently, there is growing awareness that contemporary medicine needs to focus on lifestyle changes for primary prevention, for secondary intervention, and to empower patients' self-management of their own health [4].

NCEP III	NHLBI/AHA Criteria	IDF Criteria
	Any 3 or more criteria	Central obesity + any 2 or more criteria
Waist circumference: men ≥102 cm (40 in); women≥35 in (88 cm)	Waist circumference: men ≥102 cm (≥40 inches); women ≥88 cm (≥35 inches); lower cut-points for insulin-resistant individuals	Waist circumference ethnicity specific
TG ≥150 mg/dL (1.7 mmol/L)	TG>150 mg/dL (1.7 mmol/L) or on specific treatment	TG>150 mg/dL (1.7 mmol/L) or on specific treatment
HDL-C: men <40 mg/dL (1.03 mmol/L) Women <50 mg/dL (1.3mmol/L)	HDL-C: men<40 mg/dL (1.03 mmol/L); women<50 mg/dL (1.29 mmol/L)	HDL-C: men<40 mg/dL (1.03 mmol/L); women<50 mg/dL (1.29 mmol/L) or on specific treatment
SBP≥130 mm Hg or DBP≥85 mm Hg	SBP≥130 mm Hg or DBP≥85 mm Hg or antihypertensive medication	SBP≥130 mm Hg or DBP ≥85 mm Hg or antihypertensive medication
FBG≥110 mg/dL	FBG≥100 mg/dL (5.6 mmol/L) or on drug treatment for elevated glucose	FBG≥100 mg/dL (5.6 mmol/L) or previously diagnosed type 2 DM

Table 2: NHLBI/AHA and IDF Diagnostic Criteria for Metabolic Syndrome [1,2]. DBP = diastolic blood pressure; FBG = fasting blood glucose; HDL-C = high-density lipoprotein cholesterol; IDF: International Diabetes Federation; NHLBI/AHA: National Heart Lung Blood Institute/American Heart Association; SBP = systolic blood pressure; TG = triglyceride

Non-HDL-C reported as a stronger predictor of CVD risk than LDL-C and was considered as a secondary target after attainment of LDL-C goal with TGs≥200 mg/dL (5.17 mmol/L) [1,5-8]. During her follow up visit her LDL-C, total cholesterol, TG got reduced by 31.5%, 20.2%, and 13%, respectively, and HDL-C goal was elevated by 5% after the use of atorvastatin (10 mg/day). Our results were in agreement with the previous study where standard doses of statins (simvastatin 10-40 mg/day, pravastatin 40 mg/day and lovastatin 20-40 mg/day) reduced total cholesterol by 18-26%, LDL-C by 25-30% and TG by 11-17%, and increased HDL-C by 5-7% [7]. However, other studies reported statins to be inadequate in the residual CVD risk associated with lipid abnormalities, especially above TG>220 mg/dL [8-10]. As per NCEP ATP III guidelines, statins or TG lowering drugs, such as fibrates or niacin served a vital role in achieving non HDL-C and LDL-C goals where the non-HDL-C goal was always 30 mg/dL higher than the LDL-C goal [11]. In our report too, we observed that the patient after treatment with fenofibrate and atorvastatin achieved the largest goal of LDL-C and non-HDL-C. The NCEP ATP III and the AHA/NHLBI recognized HDL-C as a tertiary target but did not set an HDL-C goal level. These two organisations including ADA advocated the use of fibrates to reduce TG and elevate HDL-C in patients with the MS or diabetes and suggested that fenofibrate combination with statin may be an effective and safer alternative than statin alone. In 2010, in a review, fenofibrate is of benefit in the

treatment of dyslipidemia, especially among those with MS [12]. Another study, the same year, reported that both atorvastatin and fenofibrate exhibited multidirectional pleiotropic effects in subjects with MS [13]. Though, the ACCORD trial did not support routine use of combination therapy with fenofibrate and simvastatin [14] to reduce cardiovascular risk in the majority of high-risk type 2 diabetic patients, but we had prescribed atorvastatin that the patient was responding well. Furthermore, we also observed that the patient did not experience any side-effects with the combination therapy of atorvastatin and fenofibrate and hence prescribed to continue her treatment.

In conclusion, the metabolic risk factors for MS in dyslipidaemics can be well managed by appropriate treatment but the underlying risk factors could only be managed by adopting strict therapeutic life style changes.

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