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A 40-year-old male with diabetes and limb threatening ischemia

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ABSTRACT

Introduction: Silent myocardial ischemia is defined as documented ischemia in the absence of typical angina or its equivalents and is more common in individuals with diabetes. Type I SMI, the least common form (2.5–10% of middle aged men), occurs in asymptomatic patients with obstructive coronary artery disease who do not experience angina symptoms at any time. Case Report: This case describes silent myocardial ischemia Type I in a young, 40-year-old male with diabetes, severe peripheral vascular disease of the lower limb and advanced occlusive coronary artery disease without a history compatible with angina. Conclusion: Improving clinician awareness of silent myocardial ischemia in high-risk populations represents an important opportunity to reduce adverse cardiovascular events and death rates.

Keywords: Diabetes, Early detection, Primary care, Silent myocardial ischemia

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INTRODUCTION

Silent myocardial ischemia (SMI) (Table 1) is defined as the objective documentation of ischemia in the absence of chest discomfort suggestive of typical angina or its equivalents [1]. SMI is a major component of the total ischemic burden for patients with ischemic heart disease [1] and is most likely to occur in older diabetics (aged over 60 years) with other risk factors for cardiovascular disease [2–4]. Type I SMI is the least common form (2.5–10% of middle aged men) and occurs in asymptomatic patients with obstructive coronary artery disease [1]. Greater awareness of SMI in high-risk populations (e.g., persons with diabetes), particularly among primary care providers, can help reduce adverse cardiovascular events and death rates [5, 6]. This case focuses on SMI Type I in an individual with severe peripheral vascular disease of the lower limb, presenting at a much younger age than what is typically observed in the clinical setting.

CASE REPORT

A 40-year-old smoking male with poorly controlled insulin dependent diabetes and elevated cholesterol presented to his family physician after visiting the emergency department for pain and discoloration of the left foot. In the month prior to his clinical presentation, the patient had an HbA1C of 10% with a fasting sugar of 14.8mmol/L and was on mixed insulin, twice daily. He had a history of retinopathy and denied any symptoms of neuropathy. Broad spectrum antibiotics (cephalexin 500 mg four times daily) were prescribed in the emergency room for possible cellulitis with little improvement during the course of several days. Physical examination revealed marked erythema in the left foot and complete absence of peripheral pulses on palpation. No other abnormal findings were noted. Anti-platelet therapy

(clopidogrel bisulfate 75 mg once daily) was initiated and the following day the patient underwent successful urgent revascularization of the left posterior tibial artery with angioplasty. The angioplasty revealed occlusions in all tibial vessels below the mid-calf. Successful recanalization of his posterior tibial artery was achieved. Family history included a father with diabetes and a myocardial infarction at age 43.

Despite the absence of any symptoms suggestive of cardiac ischemia (SMI Type I), a myocardial perfusion (exercise cardiolite) scan was carried out given the patient's established vascular disease and strong family history of premature cardiac disease (Table 1). Although able to achieve a predicted maximal heart rate that was in the normal range with reports of mild dyspnea, the myocardial perfusion scan revealed evidence of advanced ischemic burden and severe myocardial dysfunction (Table 2). ECG findings were consistent with prior anterior myocardial infarction and ischemia, and included sinus rhythm, showing anteroseptal Q-waves that extend to V4, likely a prior anterior myocardial infarction, with ST and T-wave changes that are compatible with ischemia (Figure 1). Triple vessel disease that was not amenable to revascularization was confirmed, including an apical mural thrombus. Implantation of a single-chamber defibrillator was carried out for primary prevention.

DISCUSSION

This case highlights important clinical features of SMI in a young patient with diabetes and significant myocardial dysfunction at the time of diagnosis. Evaluation of myocardial function was prompted largely by the patient's history of smoking, advanced peripheral vascular disease, suboptimal diabetes control, and premature myocardial infarction involving the patient's father. The extent of ischemic burden observed in this individual suggests that the disease process began years before and underscores the importance of having a raised index of suspicion in at risk individuals.

Coronary artery disease (CAD) represents a leading cause of death in patients with diabetes [7]. Similar to this case, myocardial ischemia in patients with diabetes is often relatively asymptomatic and is in an advanced stage upon clinical presentation [8, 9]. Indeed, reports suggest a higher incidence of painless myocardial infarction in individuals with diabetes [10, 11] and myocardial infarction tends to be more extensive and severe in patients with diabetes [12–14]. It is suspected that SMI may result from interruption in impulse transmission at some point along the normal anginal pain pathway [10]. How the disruption of this pathway contributes to the clinical presentation of SMI remains complex and likely includes a cardiac autonomic neuropathy (CAN) where damage to the nerves that supply the heart result in a failure of ischemic signals reaching the central nervous system [10].

It is reported that the prevalence of SMI is about 4% in diabetic patients without coronary artery disease, 10% in patients with peripheral neuropathy and up to 30% in the presence of established coronary or peripheral artery disease [15]. It is relevant to consider that painless myocardial infarction associated with CAN may present with common symptoms such as diaphoresis, dyspnea, fatigue, lightheadedness, palpitations and vomiting among other signs and symptoms [16].

Table 1: Cohn Classification of Silent Myocardial Ischemia [1, 17]

Type I occurs in asymptomatic patients with obstructive coronary artery disease who do not experience angina symptoms at any time as in this case.
Type II silent ischemia most commonly occurs in patients with a documented previous myocardial infarction.
Type III is the most common form; it occurs in patients with chronic stable angina, unstable angina or variant angina.

Table 2: Test Summaries and Interpretation

Stress Test Summary
- Patient exercised for 0.07:01 minutes [18]. Maximum stage achieved was 3 (speed of 3.4 METs; grade of 14). Maximum HR was 154 bpm (i.e., 86% of maximum).
- Resting and maximum BP was 121/89 and 193/94 mmHg, respectively.

Reason for Ending the Test
- Target HR was achieved.

Interpretation
- Patient experienced fatigue and mild dyspnea.
- Resting ECG indicates old anterior scar.
- Hypertensive response.
- No definite ST segment changes of ischemia at peak exercise.

Exercise Myocardial Perfusion Scan Summary
- Left ventricle markedly dilated. EDV at rest was 337mL and post-exercise was 324 mL.
- Post-exercise images demonstrated a large, severe perfusion abnormality involving the distal half of the anterior wall, extending into the apex and distal inferior wall.
- On resting images, there was no significant reversibility demonstrated.
- Gated wall motion showed dyskinesis of the apex.
- Resting and post-exercise EF was 24% and 22%, respectively.

Interpretation
- Extensive infarction in the LAD territory with a probable apical aneurysm.
- Very severe ventricular dysfunction and marked cardiomegaly.

BP: Blood pressure, HR: Heart rate, METs: Metabolic equivalents, ECG: Electrocardiogram, EDV: End-diastolic volume, EF: Ejection fraction, LAD: Left anterior descending.

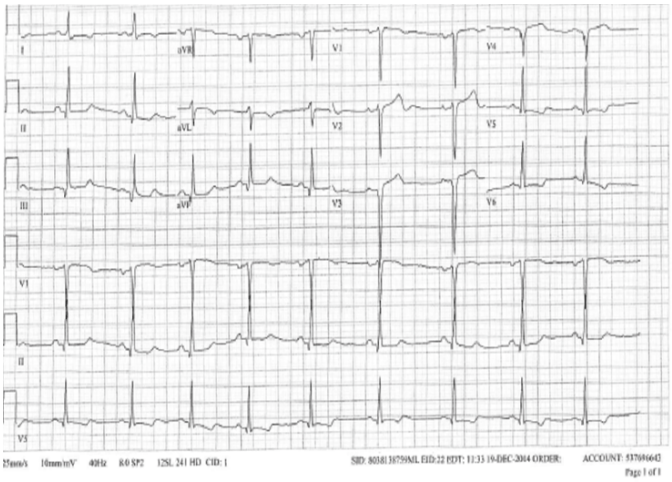

Figure 1: Echocardiogram findings.

CONCLUSION

Type I SMI is a very uncommon clinical condition, particularly among younger individuals. This case highlights that SMI should be considered among high risk individuals regardless of age since early detection and intervention may serve to minimize morbidity and improve mortality rates.

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Katrina Antoinette D'Urzo – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Keon Maleki-Yazdi – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Magdy Elkhashab – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

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Conflict of Interest
Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.