Original Article

Management Protocols of stable coronary artery disease in India: Executive summary

Sundeep Mishra [a,*], Saumitra Ray [b], Jamshed J. Dalal [c], J.P.S. Sawhney [d], S. Ramakrishnan [a], Tiny Nair [e], S.S. Iyengar [f], Vinay K. Bahl [a]

[a] Department of Cardiology, All India Institute of Medical Sciences, Ansari Nagar, New Delhi 110029, India
[b] AMRI Hospital, Kolkata, India
[c] Kokilaben Dhirubhai Ambani Hospital, Mumbai, India
[d] Department of Cardiology, Sir Ganga Ram Hospital, New Delhi, India
[e] PRS Hospital, Trivandrum, India
[f] Consultant Cardiologist, Manipal Hospital, Bangalore, India

1. Introduction

In the last three decades, the prevalence of coronary artery disease (CAD) has increased from 1.1% to about 7.5% in the urban population and from 2.1% to 3.7% in the rural population.[1] Coronary artery disease tends to occur at a younger age in Indians with 50% of cardiovascular (CV) mortality occurring in individuals aged less than 50 years.[2,3]

In a view of high prevalence of CAD in India there is a need for cardiologists' even physicians' to be updated on the recent developments in diagnosis and treatment. However, currently every clinician is inundated with numerous data (for which he/she may have not have sufficient time to go through). Herein clinical guidelines provide a quick solution for day-to-day problems and assist physicians, particularly cardiologists, in clinical decision-making by delineating a gamut of commonly acceptable modalities for the diagnosis, management, and prevention of stable CAD (SCAD). On the other hand guidelines by themselves may have several limitations; they are generally developed based on practice in West (which might be different in developing world), they are too many, and they may be difficult to understand by an average physician. In this context practice standards and management algorithms may offer better guidance to a practicing physician.

The current practice standard has defined practices that meet the needs of most patients in the Indian context. A modified GRADE system was used to derive quality of evidence as 1 (high-quality evidence from consistent results of well-performed randomised trials), 2 (moderate quality evidence from randomised trials), 3 (low-quality evidence from observational studies), or 4 (practice point). The strength of recommendations was categorised as either A ("RECOMMENDED", strong recommendation) or B ("SUGGESTED", weak recommendation).

2. Diagnosis

- Patient's history and physical examination should be considered to identify all the symptoms and signs of CV disease, CV risk factors, and other cardiac aetiologies. (Grade A, Evidence level 3)[4,5]
- The basic first-line testing in patients with suspected SCAD includes standard laboratory biochemical testing (including haemoglobin, glycated haemoglobin [HbA1c], lipid profile, liver, renal and thyroid function tests), a resting ECG, resting echocardiography and, a chest X-ray. (Grade A, Evidence level 3)[6–11]
- It is recommended to include assessment of resting heart rate in SCAD patients as a routine clinical practice. (Grade A, Evidence level 2)[12–14]
- Exercise electrocardiogram testing, if possible, should be preferred in patients with a pre-test probability (based on character of symptom, age and sex) of 15–65% as it is more relevant to their activities than pharmacological testing. (Grade A, Evidence level 2)[15,16]
- In patients who cannot exercise to an adequate workload, pharmacological testing with adenosine-induced vasodilator perfusion imaging or dobutamine echocardiography should be considered. (Grade A, Evidence level 4)[6]
- An invasive coronary angiogram is indicated in significantly symptomatic patients and patients with high risk features on non-invasive testing. [Grade A, Evidence 4]
- Certain specific types of angina (microvascular, vasospastic and silent angina) should be diagnosed by a combination of available diagnostic techniques and should be individualised. (Grade A, Evidence level 4)[6]

3. Lifestyle management and control of risk factors

- It is recommended to stop all forms of tobacco (smoking and smokeless) for the prevention and control of cardiovascular risk. (Grade A, Evidence level 1)[17–20]
- Patients with previous acute myocardial infarction, coronary artery bypass graft (CABG), percutaneous coronary intervention (PCI), stable angina pectoris, or stable chronic heart failure

* Corresponding author.
E-mail address: sundeepmishraihj@gmail.com (S. Mishra).

should undergo moderate-to-vigorous intensity aerobic exercise training ≥3 times a week and 30 min per session. Sedentary patients should be strongly encouraged to start light-intensity exercise programmes after adequate exercise-related risk stratification. (Grade A, Evidence level 3)[21]

- Weight reduction in overweight and obese people is recommended to have favourable effects on blood pressure and dyslipidaemia, which may lead to less CVD. (Grade A, Level 1). More precisely, it is recommended to attain BMI <22.9 kg/m^2 and WC (Men: 90 cm; women: 80 cm) to minimise the cardiovascular risk. [Grade A, evidence 1][50,58–61]
- All the SCAD patients should be treated with statins to achieve optimal LDL-C goal <70 mg/dl. [Grade A, Evidence 2][27–30]
- All the SCAD patients with hypertension should be recommended to attain systolic blood pressure/diastolic blood pressure goal of 140/90 mmHg and in diabetes 140/85 mmHg with medical management. (Grade A, Evidence level 2)[31–36]
- HbA$_{1c}$ of <7.0% should be the objective while treating SCAD patients with diabetes. (Grade A, Evidence level 2)[37–39]

4. Pharmacological management (Fig. 1)

- Short-acting nitrates are indicated for the immediate relief of anginal symptoms (Grade A, Evidence level 2)[6,40,41]
- β-Blockers and/or calcium channel blockers are the initial agents for long-term symptom management and heart rate control based on co-morbidities, contra-indications and patient preference. (Grade A, Evidence level 1)[6,42–44]
- The combination of nondihydropyridine calcium channel blocker with β-blockers should be avoided in patients with anticipated risk of atrioventricular block or severe bradycardia. (Grade A, Evidence level 4)[45,46]
- The addition of long-acting nitrates or trimetazidine or ivabradine or ranolazine or nicorandil is proposed in case of intolerance or contraindications or failure in achieving angina control by β-blockers and/or calcium channel blockers. The choice of the drug should be made on the basis of blood pressure, heart rate and tolerance. (Grade A, Evidence level 2)[47–54]
- Ivabradine may be considered in symptomatic patients who do not tolerate beta-blockers or in whom the resting heart rate remains above 70 bpm, despite administration of the full tolerable dose of beta-blockers. [Grade: A, Evidence: 2][51,55,56]
- When two haemodynamically acting drugs fail to achieve the desired results in reducing angina, preference may be given to cardio-metabolic agents like trimetazidine or ranolazine which has a different mode of action and offers better efficacy in combination with a haemodynamic agent. (Grade A, Evidence level 2)[57,58]

5. Event prevention (Fig. 2)

- Indefinite daily low-dose aspirin is recommended in all SCAD patients if not contraindicated. (Grade A, Evidence level 1)[59–61]
- Clopidogrel is recommended in patients with aspirin intolerance. (Grade A, Evidence level 2)[62–65]
- In view of absence of any trial showing the benefit of prasugrel or ticagrelor in stable angina patients and also considering their cost in this sub-set of patients, they may be avoided pending results of the trials addressing this issue. [Grade A, Evidence 4]
- Statin should be prescribed in all patients with SCAD irrespective of lipid levels. (Grade A, Evidence level 2)[66]
- All stable angina patients with diabetes, hypertension, heart failure or early chronic kidney disease should be recommended

to receive angiotensin converting enzyme (ACE) inhibitors if not contra-indicated. (Grade A, Evidence level 1)[67–70]
- Rest of the patients with SCAD should also be recommended to receive ACE inhibitors. (Grade A, Evidence level 2)[69–71]
- A combination of ACE inhibitors and amlodipine may be considered in hypertensive CAD patients for improving CV outcomes. (Grade A, Evidence level 2)[72–74]
- Angiotensin receptor blockers treatment may be used as an alternative therapy for patients who are intolerant to ACE inhibitors. (Grade A, Evidence level 2)[75,76]

6. Treatment of certain forms of SCAD

6.1. Silent myocardial ischaemia

- Silent myocardial ischaemia should be managed in the similar lines as symptomatic stable angina and needs administration of anti-ischaemic therapy and revascularisation as required. (Grade A, Evidence level 4)[6]
- Use of optimal medical therapies such as lipid-lowering agents, β-blockers and metabolic therapies such as trimetazidine or ranolazine can be prescribed after careful examination of the patient according to the individual on a case to case basis. (Grade A, Evidence level 3)[77–80]

6.2. Microvascular angina

- Microvascular angina patients can be initially treated with β-blockers in addition to secondary preventive agents including aspirin and statins. (Grade A, Evidence level 3)[81–83]
- Calcium channel blockers can be prescribed if β-blockers are inadequate or not tolerated in microvascular angina. (Grade A, Evidence level 3)[84–86]
- Novel agents like trimetazidine, ranolazine and ivabradine may be effective in microvascular angina. (Grade A, Evidence level 3)[87–89]

6.3. Vasospastic angina

- The treatment of vasospastic angina should be individualised according to the diagnosis of each case. (Grade A, Evidence level 4)[6]
- Calcium channel blockers can be used for effective prevention of vasospastic angina. (Grade A, Evidence level 3)[6,90,91]
- In patients who continue to be symptomatic agents like trimetazidine, nicorandil, ranolazine and ivabradine may be effective. [Grade A, Evidence 3]

6.4. Revascularisation

- The decision of considering revascularisation in patient with SCAD should be individualised. Revascularisation can be opted early when patients symptoms are uncontrolled by medical therapy alone and/or have high-risk features. (Grade A, Evidence level 4)[6]
- While selecting whether PCI or CABG for revascularisation, the decision should be purely individualised and consensus based. (Grade A, Evidence level 4)[6]

The management algorithm of stable coronary artery disease is given in Fig. 1A & B.