

## The Complexity of Coronary Artery Disease in Indians - Issues with Management

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### Abstract

Cardiovascular diseases (CVDs) have become the leading cause of mortality in India attributing to one fourth of all deaths and more than 80% of CVD deaths are due to coronary artery disease (CAD) and stroke [1]. Data from numerous epidemiological studies showed that the burden of CAD was 3-5% in rural and 7-10% in urban populations.

Numerous angiographic studies [2,3] have shown that CAD pattern in Indian patients have some peculiarities which include: relatively younger age at presentation, a predominance of multivessel disease, diffuse coronary artery involvement, distal disease and significant left ventricular dysfunction at presentation. This complexity in CAD among Indians is due to increased incidence of diabetes mellitus, smoking, hypertension, sedentary lifestyle, abdominal obesity, unhealthy diet and dyslipidemia in younger age both in men and women. In one study, the incidence of angiographically proven CAD in the young (<40 yr) was about 10 per cent [4,5].

The alarming rise in CAD prevalence is further complicated by high treatment costs and lack of health insurance coverage for the poor people who are entirely dependent on Government institutions for their health care needs. This results in long waiting lists and undue delay in delivering optimal coronary intervention. However, recently the health schemes policies by the Central and state governments have made advanced cardiac interventions and cardiac surgeries readily available for this section of the society.

The National Interventional Council 2016 registry data showed that there are currently around 800 cath labs all over India providing coronary intervention. There is also an increase in the numbers of septuagenarians who undergo interventional procedures. There has been increase in the use of drug eluting stents (DES) in coronary interventions (>95%). The use of newer advances in interventional cardiology like intravascular ultrasound (IVUS), rotablation, optical coherence tomography (OCT) is also increasing. But unfortunately, all these facilities are charged exorbitantly adding to the healthcare cost burden. This has recently resulted in the Government of India putting price cap to the stents used in India.

Ever since the first coronary artery bypass graft surgery (CABG) was first performed in India in 1975, the number of CABGs have increased and currently about 60000 CABGs are done all over India according to industry sources. The complex nature of CAD results in several technical challenges for the cardiac surgeons. These are chiefly related to small size of the coronary vessels and arterial conduits, diffuse nature of the disease and late presentation [6]. Smaller sized vessels may cause difficulty during anastomosis and may result in early graft closure leading to higher mortality [6]. Initial concerns on the

size of the arterial conduits have been refuted by autopsy studies by Reddy *et al* [7] which showed the size of arterial conduits to be adequate to make use of regularly in CABG.

Indians also tend to have diffused CAD which, during CABG, results in (i) vessels requiring frequent endarterectomy, (ii) higher incidence of perioperative myocardial infarction, and (iii) an increased likelihood of bypass grafts occlusion after successful surgery. Few studies have reported the requirement of endarterectomy as around 15 percent in patients with diffuse disease undergoing CABG [8]. Trehan *et al*. [6] reported the presence of adherent plaques with moderate inflammation with patchy areas of erythema in the coronary arterial walls of some patients undergoing CABG which makes it difficult to dissect in this area.

Left ventricular dysfunction is also common in Indian patients seen in up to 20 percent at the time of CABG [5] with major bearing in the post-operative recovery [6]. But these surgical issues have been partly overcome by the increased adaptation of off-pump coronary artery bypass grafting (OPCAB), minimally invasive techniques (MIDCAB) and robotic surgery or totally endoscopic coronary artery bypass surgery (TECAB), LV remodeling employing decellularized bovine pericardium with or without stem cell implantation.

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