

## Trends and Disparity in Surgical Management of Coronary Diseases

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### Abstract

World health Organization projects that Cardio Vascular Diseases (CVD) is the first leading cause of death in the world. Mortality data from the Registrar General of India shows that cardiovascular diseases are a major cause of death in India now. CVD is caused by both modifiable and non modifiable risk factors. CVD can be treated by medicines or invasive procedures such as Percutaneous coronary Intervention, Atherectomy, Brachytherapy, Coronary Balloon Angioplasty or Coronary Artery Bypass Graft.

**Keywords:** Cardio Vascular Diseases; Risk Factors; Atherectomy; Brachytherapy; Angioplasty.

### Introduction

World health Organization projects that CVD is the first leading cause of death in the world. Coronary artery disease (CAD) is the leading cause of cardiovascular mortality worldwide, with more than 4.5 million deaths. As per world heart federation by the year 2030, cardiovascular disease will cause an estimated 23.6 million deaths worldwide.

Mortality data from the Registrar General of India shows that cardiovascular diseases are a major cause of death in India now. The disease occurs at a much younger age in Indians as compared to those in North America and Western Europe. India is at 39<sup>th</sup> rank in the world with death rate of 138 per 1,00,000 population with regard to coronary diseases [1,2,3].

### Meaning

*Trends:* A general direction in which something is

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developing or changing.

*Disparity:* A great difference

*Coronary:* Relating to the arteries which surround and supply the heart

*Coronary Diseases:* Coronary diseases include ischemic heart disease, heart attack, myocardial infarction and angina pectoris.

### Definition

*Coronary Disease or Coronary artery disease (CAD) or Coronary heart disease* occurs when the inside (the lumen) of one or more coronary arteries narrows, limiting the flow of oxygen-rich blood to surrounding heart muscle tissue [4].

### Causes

#### I. Non-Modifiable

- Age
- Gender
- Family history
- Ethnic background

#### II. Modifiable

- Smoking

- High cholesterol in blood
- Stress
- Physical activity
- High amount of sugar in blood

### Pathophysiology

As plaque builds up in the arteries of a person with heart disease, the inside of the arteries begins to narrow, which lessens or blocks the flow of blood [5].

### Signs & Symptoms

- Chest pain
- Shortness of breath
- Palpitations
- A faster heartbeat
- Weakness / dizziness
- Nausea
- Sweating [6]

### Diagnosis

- ECG
- Stress Test
- Chest X-Ray
- Holter Monitor
- Echo cardiogram
- Cardiac CT

### Treatment

1. Medicines
2. PCI- Percutaneous coronary Intervention
3. Atherectomy- Plaque is removed with laser
4. Brachytherapy
5. Coronary Balloon Angioplasty- Balloon tipped catheter advanced
6. CABG- Coronary Artery Bypass Graft

1. Medicines
  - a. Nitrates

- b. Betablockers
- c. Calcium blockers.
- d. A newer fourth agent, ranolazine (Ranexa)
- e. For people at risk
  - Aspirin
  - Statin

## 2. PCI- Percutaneous Coronary Intervention

**(a) Percutaneous Transluminal Coronary Angioplasty (PTCA)** is a minimally invasive procedure to open up blocked coronary arteries, allowing blood to circulate unobstructed to the heart muscle.

If a treatable blockage is noted, the first catheter is exchanged for a guiding catheter. Once the guiding catheter is in place, a guide wire is advanced across the blockage, then a balloon catheter is advanced to the blockage site. The balloon is inflated for a few seconds to compress the blockage against the artery wall. Then the balloon is deflated.

This treatment may be repeated at each blocked site in the coronary arteries. A device called a stent may be placed within the coronary artery to keep the vessel open. Once the compression has been performed, contrast media is injected and an x-ray is taken to check for any change in the arteries. Following this, the catheter is removed and the procedure is completed.

### (b) PCI Procedures Includes

- PTCA- Percutaneous transluminal coronary balloon angioplasty and
- Coronary vascular stents (or scaffolds) such as bare metal stents (BMS), and drug eluting stents (DES).

#### i. Bare Metal Stents (BMS)

Coronary vascular stents are metallic 'scaffolds' that hold a blocked vessel open to restore coronary artery blood flow. The earliest type of stent developed was bare metal stent (BMS). Later, drug eluting stents (DES) were developed and widely used for PCI.

#### ii. Drug Eluting Stents (DES)

A drug-eluting stent (DES) is comprised of three components: a bare metal backbone (platform), the durable polymer, and anti-proliferative agents such

as everolimus, biolimus, or sirolimus.

*The first-generation* of DES, containing sirolimus or paclitaxel, was shown to reduce in-stent neointimal hyperplasia, reduce rates of clinical restenosis, and curtail the need for repeated PCI compared with BMS. Hypersensitivity reactions to the durable polymer component of the first generation DES can produce chronic inflammation which is thought to delay endothelial healing

*The second-generation* DES were thus developed using a thinner stent struts, permanent but biocompatible polymers to minimize inflammation or hypersensitivity reactions, and novel anti-proliferative agents

*Third generation* The most recent innovation (the third generation) in stent technology is the development of bioabsorbable stents. With bioabsorbable polymer stent, a bioabsorbable polymer impregnated with anti-proliferative drug is designed to elute the drug from the metallic stent with the polymers gradually degraded after implantation

### 3. *Atherectomy*

Atherectomy is a minimally invasive endovascular surgery technique for removing atherosclerosis from blood vessels within the body. It is an alternative to angioplasty for the treatment of peripheral artery disease, with no evidence of superiority to angioplasty.

### 4. *Brachytherapy*

Radiation is given to blocked coronary arteries to prevent reoccurrence after angioplasty.

### 5. *Coronary Balloon Angioplasty*

Interventional cardiologists perform angioplasty, which opens narrowed arteries. They use a long, thin tube called a catheter that has a small balloon on its

tip. They inflate the balloon at the blockage site in the artery to flatten or compress the plaque against the artery wall. Angioplasty is also called percutaneous transluminal coronary angioplasty (PTCA).

### 6. *CABG - Coronary Artery Bypass Graft*

CABG surgery creates new routes around narrowed and blocked arteries, allowing sufficient blood flow to deliver oxygen and nutrients to the heart muscle [7].

### Conclusion

The 20th century witnessed dynamic, worldwide changes in Coronary heart disease. (CHD) is the largest cause of mortality in the world and majority of deaths occur in low- and middle-income countries such as India and China.

Coronary heart disease mortality was expected to increase approximately 29 percent in women and 48 percent in men in developed countries between 1990 and 2020.

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