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Artículo de revisión

La cirugía coronaria en Asia – La perspectiva desde la India

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La revascularización miocárdica es la intervención más común de cirugía cardíaca en India. Se ha desarrollado con extraordinaria rapidez en los últimos años, y en especial la cirugía sin circulación extracorpórea, entre otras razones por temas económicos. La anatomía de la cardiopatía isquémica en los pacientes indios, con un patrón de enfermedad difusa, obliga la realización de reconstrucciones con parche y endarterectomías. Se realiza una breve revisión de los factores patogénicos, fisiopatológicos y las estrategias quirúrgicas relacionadas con la cirugía coronaria en India con el fin de ofrecer al lector una visión general de la situación actual en el país.

Palabras clave: Cirugía coronaria. India. Cirugía sin circulación extracorpórea.

Coronary artery surgery in Asia – The Indian perspective

Coronary artery bypass graft surgery (CABG) is the most commonly performed operation in cardiac surgery in India. It has grown fast in recent years with the booming of off-pump revascularization due, among others, to financial reasons. The anatomy of coronary artery disease in Indians, with a generalized pattern of diffuse disease, makes mandatory the association of extensive patch reconstruction and endarterectomies of the coronary arteries. A brief review of the pathogenesis, epidemiology and surgical strategies related to CABG in India is performed in an attempt to offer the reader with an overview of the current situation in the country.

Key words: **Coronary artery surgery. India. Off-pump coronary surgery.**

INTRODUCTION

Ever since Dr. KM Cherian, from Chennai, performed the first coronary artery bypass grafting (CABG) in India, the scenario of coronary artery disease (CAD) and its therapy has undergone a sea change. Technologic advances in the field of cardiac surgery have changed the spectrum of patients with CAD referred for CABG. The improvements in percutaneous intervention, better understanding of cardiac physiology and evolution of the off-pump technology have all played a part in the progress of coronary artery surgery in the country. Most importantly, indigenisation of products and techniques has helped the surgeons in the subcontinent to reach out to the millions in a cost-effective way[1]. Nearly 60,000 open heart operations are performed in India in a year of which 50,000 are CABG's. The number of CABG's has gone up dramatically in two decades. The proportion of CABG's has gone up from 30% of total cardiac surgeries in the 1980's to 90% in the new millennium.

The etiopathogenesis of coronary artery disease and its management is significantly different in our subcontinent as compared to that of the west. More and more data have been published recently highlighting the differences in etiology, pathology, management strategies and operative technique of CAD from that in the west. This article attempts to give an overview of all these

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aspects as well as to highlight the authors experience in this field.

EPIDEMIOLOGY

Coronary artery disease is an epidemic in India at present[2]. There has been a steady increase in the incidence and prevalence of coronary artery disease in the country. While many countries in the west have shown a decline in the incidence, such a trend has not yet been identified in this country.

The risk of CAD in Indians is 3-4 times higher than white Americans, 6 times higher than Chinese and 20 times higher than Japanese. Indians are prone to CAD at a much younger age. CAD affects Indians at least 5-10 years earlier than other communities[3]. The urban population is at a particularly high risk than rural population (9.5 vs. 4%)[4].

Various factors are implicated in the etiopathogenesis of CAD in Indians. Conventional risk factors like diabetes, smoking, dyslipidemia, hypertension are more common in Indians predisposing them to CAD[5]. India is presently labeled as the "Diabetic capital of the world" with a diabetic population of 40.9 millions expected to rise to 69.9 million by 2025. The Indian diabetics have higher insulin resistance, greater abdominal adiposity, lower adiponectin and higher high-sensitive C-reactive protein levels, resulting in poor glycaemic control[6]. Higher glycosylated haemoglobin is correlated directly with CAD in Asian Indians[7].

Smoking and tobacco use in various forms is more prevalent in Indians. This has resulted in young Indians being predisposed to CAD compared to the rest of the world. A decline in smoking in young is noted recently, and will prove a major factor for reduction of CAD in India[8].

Indians undergoing CABG have been documented to have higher incidence of dyslipidemia. The cholesterol/HDL ratio, which is a better predictor of CAD than absolute values of lipids, is also found to be higher in the Indian population requiring coronary interventions or surgery[9].

Non-conventional risk factors have also been investigated extensively. Most important of these factors include lipoprotein A, homocysteine, infectious agents, hyperinsulinemia, hyperfibrinogenemia and insulin resistance syndrome.

Lipoprotein A is probably the most investigated non-conventional risk factor for CAD. It is ten times more atherogenic than LDL-cholesterol and is a stronger independent risk factor than diabetes mellitus[10]. The proposed mechanism of action of Lp(a) include preferential uptake of Lp(a) into macrophages in atherosclerotic plaques by binding with fibrin and plasminogen receptors.

Elevated homocysteine level is also hypothesized as an independent risk factor of CAD in India. Though a high level of homocysteine was documented in South Asia, it did not translate into an independent risk factor of CAD[1]. An association between infective agents and CAD has also been investigated. The most important agents include *P. Pneumoniae* and *M. Pneumoniae.* No concrete evidence has surfaced as yet and postulates remain postulates[11].

Growing urbanization and migration of population to the cities has resulted in majority of Indians adopting a western lifestyle. Moreover, the growth of information technology and business process outsourcing industries has caused a major shift in the lifestyle and food habits. Added to this is the work pressure and stress, which the employees are exposed to. All this has resulted in a steep increase in the conventional risk factors. The impact of these factors are already being felt in the health sector with increased referrals for heart disease related problems, metabolic disorders including diabetes, hypertension and obesity and psychiatric disorders[12].

PATHOLOGY

Indians have been documented to have smaller coronary artery dimensions (indexed to body surface area) than the western population. This factor, associated with earlier onset of CAD, higher incidence of triple vessel CAD and associated comorbidities like diabetes have resulted in a higher perioperative morbidity and mortality in the subcontinent. An improvement in infrastructure and better intensive care facilities has helped surgeons produce results comparable to the West[12,13].

Over the last decade, the spectrum of surgical patients has undergone a major change. More and more patients with single and double vessel disease now undergo percutaneous interventions. The introduction of drug eluting stents (DES) in the market has resulted in a major portion of these patients being managed with angioplasty and stenting. India has not remained far behind in the indiscriminate use of DES in triple vessel disease (TVD), like in the west, until recently. Though the evidence base is lacking, the socio-economic conditions and anxiety on part of patients to undergo a major cardiac surgery has resulted in many a patients with TVD being subjected to PCI with stenting. There is at present a lot of debate going on in this area. All these factors have resulted in only the worst coronary artery disease being referred for surgery.