CHALLENGES AND OPPORTUNITIES IN NUCLEAR CARDIOLOGY FROM LATIN AMERICAN AND ASIAN PERSPECTIVES−REVIEW ARTICLE

Challenges and Opportunities of Nuclear Cardiology in India

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Abstract

Nuclear Cardiology in India is underutilized. Contributing factors include high cost of starting Nuclear medicine facility, stringent regulations, small pool of trained nuclear physicians and technologists, high cost of radio pharmaceuticals and supply issues, poor penetrance of nuclear medicine in rural areas, inadequate exposure of cardiologists during training to the advantages of nuclear cardiology. India is poised to see an epidemic of coronary artery disease (CAD) and diabetes by end of few decades and nuclear cardiology would make significant contributions to handle this epidemic. Government and insurance companies advocacy is necessary for nuclear Cardiology to get its important rightful place in the management of CAD in India.
Keywords: Coronary artery disease, India, Nuclear cardiology, Prevalence
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Coronary artery disease (CAD) in India is assuming epidemic proportions (1). It was reported by the Registrar General of India that CAD led to 23% of total and 32% of adult deaths in 2010-2013. The prevalence of CAD in India has increased over the last 60 years from 1% to 10% in urban populations and <1% to 6% in rural populations. Important risk factors for CAD in India according to case control studies are dyslipidemias, smoking, hypertension, diabetes, abdominal obesity, psychosocial stress, unhealthy diet and physical inactivity. Patients from India with established CAD are younger than their western counterparts (2).

Nuclear myocardial perfusion imaging (MPI) is a well-established technique for diagnosis of myocardial ischemia, quantifying extent of ischemia and giving prognostic information to decide management strategies. Robust literature over several years has established its utility (3).

It would be expected that a modality with such an established powerful performance would be widely used in parts of the world where the CAD incidence is on the rise and where access to angiography is limited.

In this article, we will discuss 1) whether there is a role for MPI in the CAD demographics and health economics in India 2) what drives the current utilization of MPI in the country 3) opportunities and challenges in using MPI in India.

Is there a role for MPI in the CAD demographics in the health economics of the region?

A WHO report indicated that by the end of this century, India will have over half of the CAD patients in the world (4). India will have more than 10% of the world's diabetics in the next decade and high prevalence of other traditional risk factors (5, 6). There is thus an obvious need for a robust infrastructure to detect and treat CAD and to enhance preventive efforts. There is a striking dichotomy between health care facilities in urban and rural areas. In many urban areas, the most advanced diagnostic and therapeutic facilities including CT, MRI, Nuclear Medicine (NM), Coronary angiography along with facilities for coronary revascularization are available and are at par with the best in the world. Such facilities are woefully inadequate in the rural areas. There is also a general reluctance to avoid invasive procedures. Thus, MPI with its ability to detect CAD

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noninvasively and act as a gatekeeper to decide which patient should undergo further invasive strategies, is ideally poised for widespread use.

What drives the current utilization of MPI in India?

The ground reality, however, is that MPI is grossly underutilized in India. There are an estimated 450 centers capable of performing MPI scans in India. However, only approximately 60,000 MPI scans are annually done. With a population over 1 billion and a prevalence of CAD over 10%, this is indeed a gross underutilization, when compared to USA with a 303 million population and a CAD prevalence of 4.85%, where 7-8 million scans are annually done (7). India is a country of paradoxes. In the major urban cities state of the heart coronary diagnostic facilities in form of cardiac MRI, CT, angiography suites, electrophysiology studies, angioplasty and bypass facilities all exist with excellent equipment and highly skilled personnel. There is no shortage of NM facilities in major cities. Despite this, MPI scans are not showing a growing trend of utilization as compared to CT and conventional angiography for initial management strategies. A possible reason for this is likely financial. The cost of putting up a NM facility is daunting. The practice of NM in India is regulated by AERB (Atomic Energy Regulatory Board) which lays down stringent requirements for setting up a NM facility such as not permitting installations in residential areas and requiring mandatory number of personnel with no permission for a nuclear physician to operate from multiple centers. The overheads of a NM facility with recurring high costs of radioisotopes and radiopharmaceuticals, maintenance and other administrative costs make the cost of performing an MPI scan equivalent to the cost of a regular coronary angiogram. Thus, many cardiologists prefer to go straight for an angiography to make their management decisions. The large number of interventional cardiologists and plethora of angiography suites compared to smaller pool of trained NM physicians and NM centers also skews the diagnostic algorithm in favor of coronary angiography. The logistics of starting a NM center in rural areas, with its attendant problems of timely availability of radiopharmaceuticals and high requirement of trained personnel (nuclear physician, nuclear technologist) also precludes young entrepreneur nuclear physicians from daring to venture into these areas. Certification in NM is obtained after three-year training period, MD or a Diplomate of the National Board of Examinations (DNB), followed by a licensing examination. Successful candidates are then authorized by AERB to practice NM at certified institutions and centers. Nuclear Cardiology (NC) training is offered as part of the training in general nuclear medicine, with the minimum required exposure to cardiac physiology and clinical cardiology. Training programs in cardiology (equivalent to the fellowship programs in the United States) offer minimal or no exposure to NC procedures, and, indeed, there is no short pathway for a cardiologist to obtain a license from the AERB to perform radionuclide-based imaging tests. Given this situation, the practicing cardiologist has little incentive to pursue an interest in NC, and is often not fully familiar with the scope and potential of radionuclide cardiac imaging. This profoundly influences utilization of NC by cardiologists, the primary players in the field, who are more likely to choose familiar tests such as stress echocardiography and coronary angiography. This is perhaps the most important factor leading to the underutilization of radionuclide cardiac imaging in the urban areas. To promote NC in these areas, attention should be directed to the core curriculum of cardiology training programs, where dedicated nuclear cardiology training should be mandated to the same level as echocardiography and cardiac catheterization, as is the practice in the United States and England (8). Such a mandate will, of course, require that institutions training cardiology fellows be equipped with the facilities and personnel to provide such training. It will also require advocacy by leaders who influence health policy decisions.

Opportunities and challenges in using MPI in India

In the smaller cities and rural areas hospitals generally lack sophisticated equipment and highly trained personnel. Patients are likely to have more access to stress echocardiography, and sometimes even coronary angiography, than MPI. These tests are also likely to be cheaper than MPI. Although a minority of government-run hospitals may provide MPI at a subsidized cost, the average cost to patients of MPI with a Tc-99m-based agent is approximately $180 (compared to the average monthly middle-class income of about $500)(9). In addition, the uninterrupted availability of tracer in areas remote from big cities is also likely to be a problem. Thus, promoting NC in smaller cities and rural areas is likely to be more challenging, and will require investment in equipment and training of personnel and the continuous supply of radionuclide tracers at an affordable cost.

Conclusion

For nuclear cardiology to thrive in India (10), a multifactorial approach of introducing exposure during training of cardiologists to nuclear cardiology, having more centers offering nuclear procedures, with a larger pool of trained nuclear physicians and technologists, and government advocacy and insurance company intervention insisting on incorporation of nuclear scans in diagnostic and management algorithms for CAD management will be required.

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