

Advances and Challenges in Cardiac Sciences circa 2009

Cardiac disease especially coronary artery disease has emerged as the number 1 killer of urban Indians, and this is mainly due to lifestyle factors such as poor dietary habits, lack of awareness of the importance of physical activity, as well as acquired bad habits such as tobacco use: we are also the world capital of Diabetes another lifestyle related disease and one of the strongest risk factors for developing coronary artery disease.

One of the greatest challenges therefore is to increase awareness urgently in the general public regarding dietary habits as well as the need for regular physical activity at a governmental level , to reduce fat content in packaged foods especially trans fats, to declare the nutritional value of foodstuffs and to promote healthy lifestyle habits : governmental activism is effective and has been shown to work in numerous studies done , such as reduction in incidence of cardiac deaths after banning smoking in public places.

Staying with the theme of awareness, the public should be alerted to be aware of signs of heart disease such as a heart attack and the need to get early treatment which is very effective in saving lives as delay results in unnecessary death and disability.

Advances in Diagnostics:

1. Imaging of coronary arteries by multi slice CT scanners are improving the way we see them, although these as yet have some limitations especially in those patients with high or irregular heart rates and those with with large amount of calcium deposits around their vessels, these are being overcome by better, newer higher resolution scanners. The challenge is then to have properly trained radiologists/Cardiologists reporting the scans as a lot depends on their training and experience.
2. Cardiac Cath Lab: Within the Cath lab where much of the cardiac work is done several advances in imaging technology to better delineate cholesterol deposits (called plaques) are being utilized such as OCT (Optical Coherence technology) to obtain a virtual characterization of the plaque; Doppler pressure wire to assess the functional significance of a blockage to guide therapy and more emphasis on use of IVUS (intra vascular ultrasound) to assess lesions as well as to guide stent deployment.
3. PET scan is becoming available and will greatly help in identifying alive but hibernating myocardium to assess the benefits of surgery or angioplasty especially in patients with much compromised heart function in whom these procedures carry high risk.

Advances in Therapeutics

Drugs

1. Statins : These very important cholesterol lowering drugs continue to have increasing evidence of having heart protective effects not only in patients who already have heart disease but also in persons with normal cholesterol and , in the foreseeable future these drugs may be taken by everyone above 40 years of age.
2. Anti coagulant drugs: patients with a wide variety of conditions are prescribed blood thinning drugs; these however need constant monitoring because of inconsistent biological effects as well as interference in their action by a wide variety of drugs and foodstuffs. Newer research has thrown up newer and safer drugs that are effective and consistent in their effects, and these are in advanced stages of clinical testing. They are likely to be available for commercial use by next year and will be an important advance in this field after 40 years.
3. Polypill concept: An important concept being developed and researched in India is to include a combination of drugs in one pill which can be given to a healthy population with an idea to prevent the development of coronary artery disease by addressing multiple risk factors at the same time, as the clustering of risk factors multiplies risk several folds. This concept has been tested in clinical trials involving a small no. of patients as proof of concept, and development in this field is eagerly awaited.

Devices

1. Stents : The most popular method today of dealing with critical coronary artery blockages is by use of stents through angioplasty techniques, and this technique has been one of the major advances in treatment of coronary artery disease. Developments in this regard continue with newer concepts being use of better drugs to coat the stent to limit the injury response, one of the drawbacks of this technique which led to reblockage in upto 30% of cases, is now down to less than 5% with the best type of stents. Newer drug analogues which are safer, newer polymer coatings which are biocompatible or biodegradable and absorbable stents made of magnesium are being developed to provide safe, effective and sustainable results to patients who receive stents.
2. Heart valves: Heart valves that can be delivered through catheters without the need of opening the chest have been researched over the last few years. The new generation devices are less bulky and easier to deliver, and may see commercial application in the near future. These will represent a significant advance in view of ease of delivery, less morbidity and shorter hospitalization times for patients. Similarly for

Patients with leaky valves, catheter based techniques of repairing heart valves are being increasingly researched and will play an important role in the next few years.

3. Atrial appendage closure devices: Patients with irregular heart rhythm are commonly found in the elderly population and these persons have a high risk of developing clots in the atria or upper chamber of the heart which can then break off and lodge themselves anywhere with devastating effects. Devices to seal of the atrial appendage or the most vulnerable part of the atria have been developed and shown to be very good in reducing the risk of these clots developing.
4. Left Ventricular Assist Devices (LVAD'S): Miniaturised non pulsatile pumps are now available to take over the cardiac function of patients with very poor heart function, known as LVAD'S. These are very useful as the patient can remain mobile with this inserted, and these can be a long term solution for these patients especially in those countries where cardiac transplantation is not widely available.