

UNDERSTANDING MY HEART



A Pathway To Better Informed Healthcare



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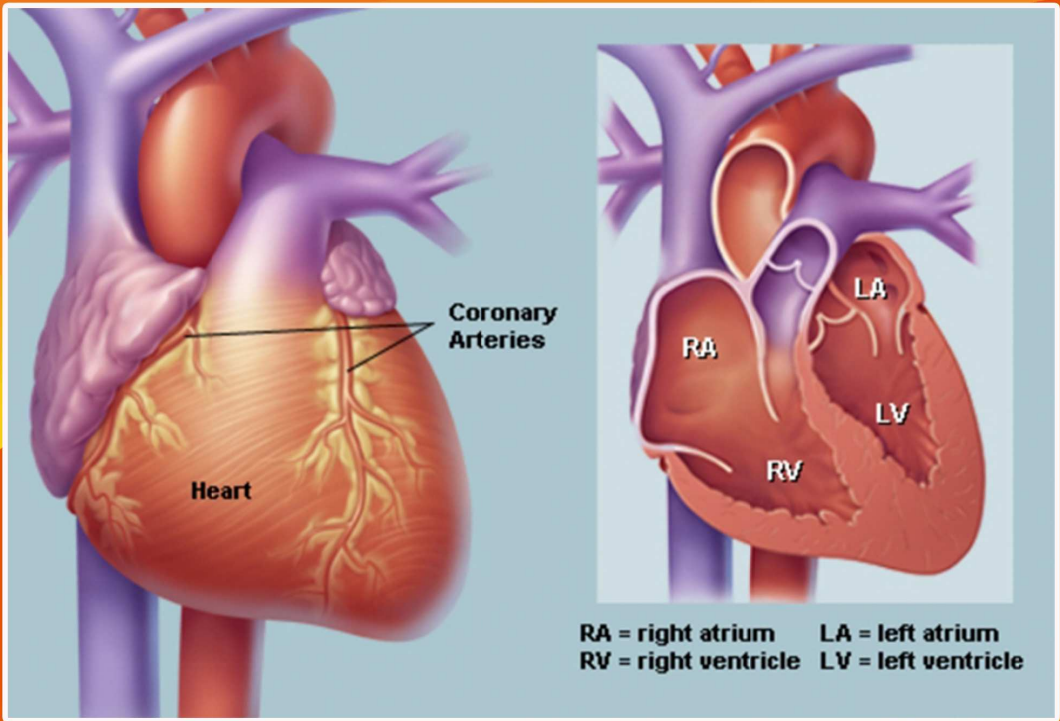
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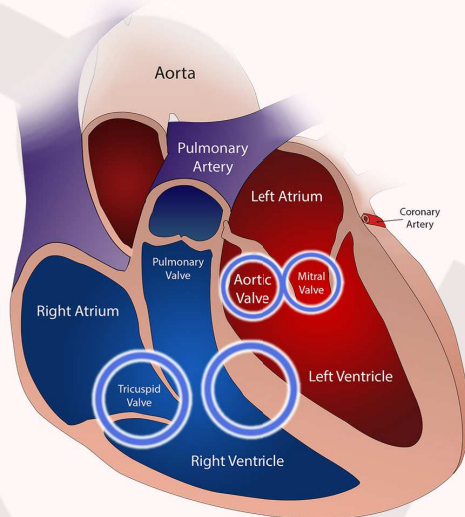
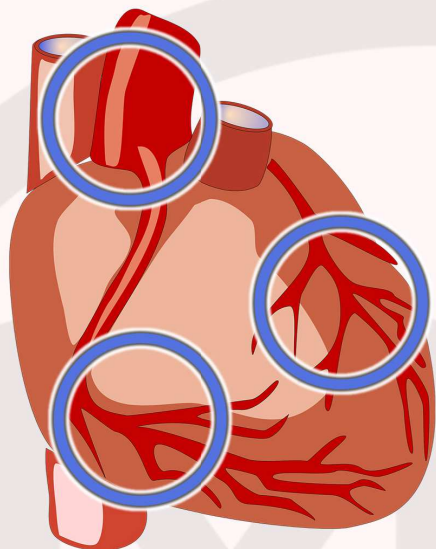
UNDERSTANDING MY HEART

This vital organ acts as a reservoir and pump, for our oxygenated and deoxygenated blood. It is made up of four chambers, separated by the septum and valves, with its own oxygen supply coming from the coronary arteries in the cardiac muscle.



When the components of the heart fail to function normally, intervention is required to restore restoration of blood circulation followed by normal health. The most common problems of the heart are highlighted.

WHAT ARE THE COMMON PROBLEMS AFFECTING THE HEART IN ADULTS



1) **CORONARY ARTERY DISEASE OR ISCHEMIC HEART DISEASE** – is the one of the most common non-communicable diseases affecting people in the Indian sub-continent.

People with the following risk factors are more prone to coronary artery disease:

- Diabetes
- Hypertension
- High blood cholesterol levels
- Smoking
- Family history of coronary artery disease

2) **HEART VALVE DISEASE** – There are 4 valves in the heart, at the inlets and outlets of each cardiac chamber.

Mitral valve – Left ventricle inlet valve

Aortic valve – Left ventricle outlet valve

Tricuspid valve – Right ventricle inlet valve

Pulmonary valve – Right ventricle outlet valve

These valves ensure unidirectional blood flow through the chambers, lungs and out of the heart to the aorta. Valves in the heart can become blocked (stenosis) or leaky (regurgitation). In western countries heart valve disease is often due to age related degeneration. Whereas in developing countries like ours, valve disease can also be due to congenital defects from birth, or throat infection contracted during childhood. These problems, although present from childhood, may only cause issues late into adulthood.

3) **DISEASE OF THE AORTA** – The aorta is the major blood vessel which originates from the heart and supplies oxygenated blood to the whole body, through its branches. There can be weakening of the vessel wall, leading to swelling (aneurysm), or a tear in the vessel wall (dissection).

4) **HOLE IN THE HEART** – In this condition there is a defect in the septum, which is the muscle that separates different chambers of the heart. This leads to mixing of deoxygenated and oxygenated blood, and problems thereof. This condition is usually present from birth but may be detected late in adulthood.

WHAT ARE THE COMMON SYMPTOMS OF A HEART PATIENT?

Should you experience the following symptoms, please visit your doctor for a checkup.

CHEST PAIN - GRIPPING / CRUSHING

- Felt in the centre of the chest or back, usually spreads to the arms, neck or back
- May get worse on exertion (walking, taking shower, after food)

BREATHING DIFFICULTY

- on exertion
- requiring more than 1 pillow to sleep at night
- waking up at night with breathing difficulty
- associated leg swelling

PALPITATIONS – feeling the heart beat rise

SYNCOPE – dizzy spells or falling faint



WHAT ARE THE TREATMENT OPTIONS FOR COMMON HEART PROBLEMS?

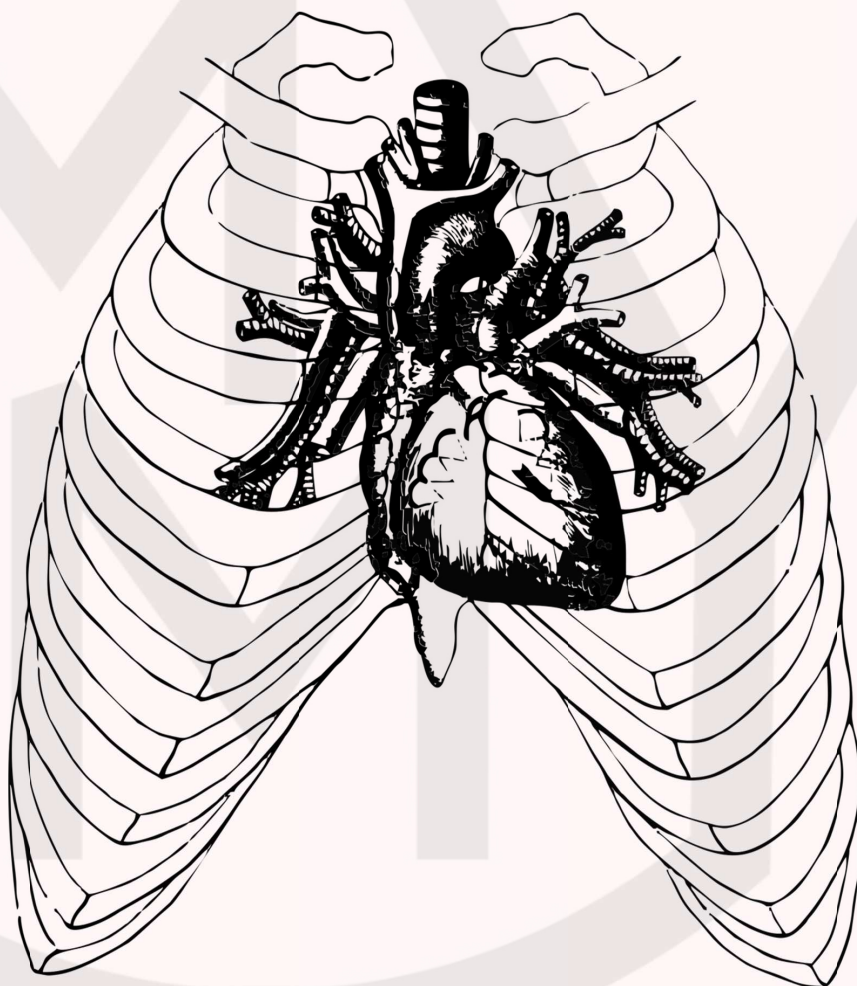
CORONARY ARTERY DISEASE (CAD) / ISCHEMIC HEART DISEASE

Treatment options are as below:

MEDICATIONS – Tablets (Usually for patients with minimal or stable symptoms)

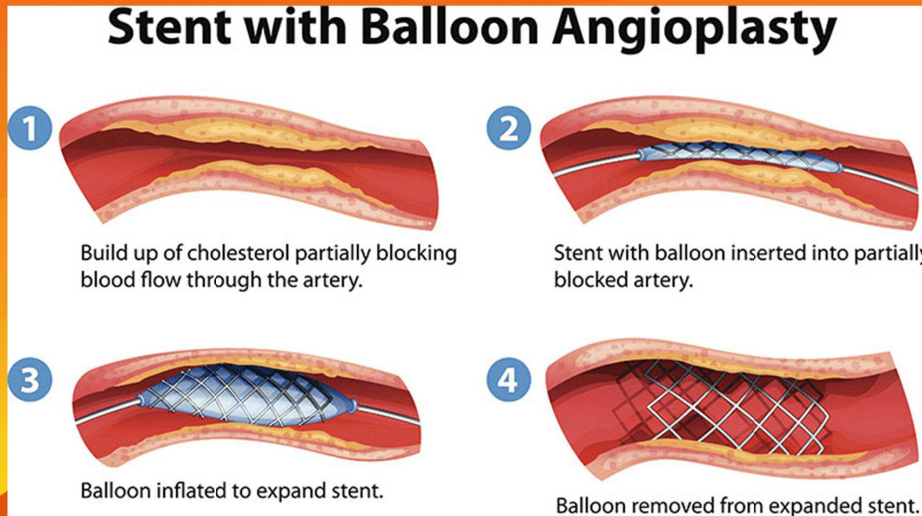
ANGIOPLASTY – catheter based Stent insertion

SURGERY – Open heart surgery or Minimally Invasive Robotic cardiac surgery



ANGIOPLASTY

INTRODUCTION



Angioplasty is a procedure during which, a fine tube known as a catheter is passed through a needle sized hole in the arm or the groin, into the patient's coronary artery. The catheter is then passed across the block in the coronary artery, through which a stent is fed. The Stent is then sprung open in order to widen the blood vessel and obtain near normal blood flow. Each block requires a specific stent depending on the nature of the block.

A stent is a medicated mesh tube that can be inserted into a blocked artery to keep it open and restore the flow of blood.

WHO IS IT FOR?

- Patients with minimal blockages.
- Non diabetic patients
- Patients with moderate or good heart function
- Syntax score < 22 (less complex, short segment blockages)

ADVANTAGES

- Less invasive, performed through a needle hole
- Short hospital stay – 2-4 days average
- Quick recovery to normal activity – 2-4 weeks average

DISADVANTAGES

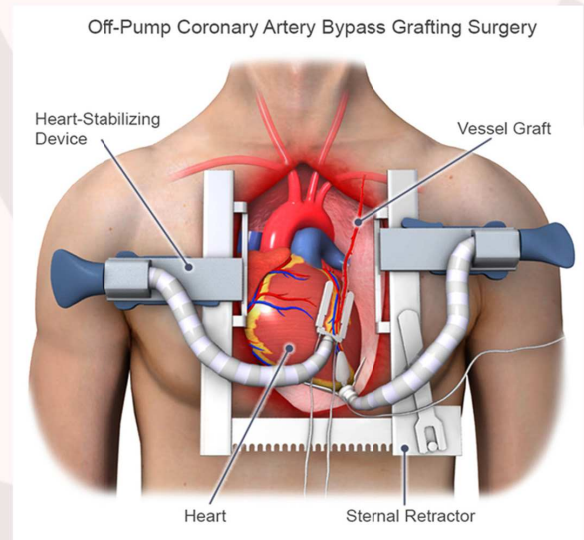
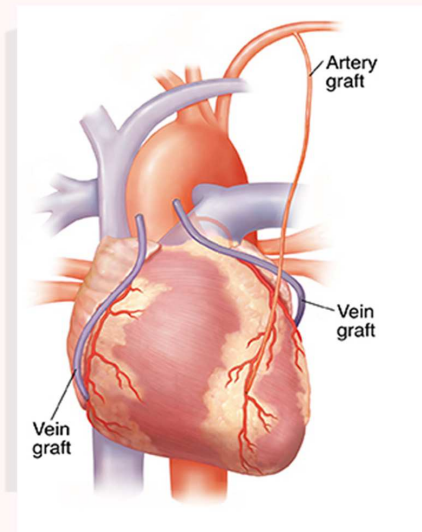
- Not suitable for patients with Multiple blockages, Diabetics and patients with reduced heart function.

CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY

INTRODUCTION

CABG surgery is a procedure where blood vessels are taken (artery from the chest / vein from the arm or leg) and used to bypass blockages in the coronary arteries. The blood vessels are sewn using fine, non-absorbable sutures, to the coronary artery beyond the blockage. This diverts blood flow to the normal path, hence the term 'bypass'.

HOW IS IT PERFORMED?



CABG surgery is traditionally performed by splitting the central chest bone (the sternum), and stopping the heart. The heart is stopped by connecting the patient to a Heart-Lung bypass machine. This procedure enables open access to the heart and sewing of the blood vessels to fine coronary arteries. Patients also have long cuts in the leg, to harvest the long saphenous vein. Recent advances enable performing CABG, without stopping the heart (beating heart surgery) and without the splitting of the central chest bone or long cuts in the leg (Minimally Invasive Cardiac Surgery).

WHO IS IT FOR?

- Patients with multiple blockages (diffuse, triple vessel disease)
- Diabetic patients
- Patients with blockages in the left main coronary artery
- Patients with poor to moderate heart function
- Patients with recurrent blockages after previous stent insertion
- Syntax core > 22 (complex, long segment blockages)

ADVANTAGES

- Longer durability due to usage of arteries from the chest wall (Internal Mammary Artery)

DISADVANTAGES

- Traditional CABG has a longer recovery.
- Patients can take up to 3 months to resume full normal activity.

BENEFITS OF USING INTERNAL MAMMARY ARTERY OVER LONG SAPHENOUS VEIN IN CABG

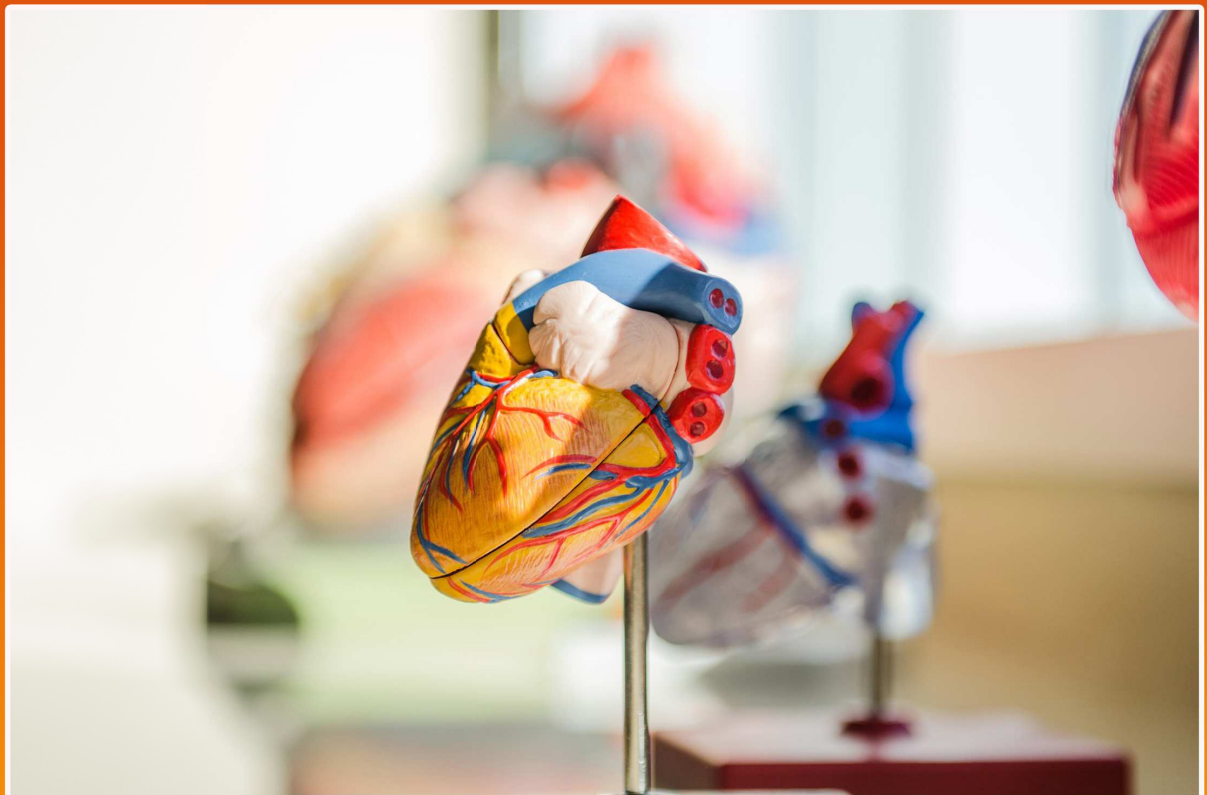
WHAT IS THE DIFFERENCE BETWEEN USING INTERNAL MAMMARY ARTERY (IMA) AND THE LONG SAPHENOUS VEIN (LSV) IN CABG

The Internal Mammary Artery is taken with its native flow from the chest wall. We have 2 of these arteries. One on each of the left and right sides, of the chest wall. Scientific evidence shows using these arteries in CABG surgery has the best long-term durability, proving to last more than 20 years in over 90% of patients.

The Long Saphenous Vein (LSV) is taken from either one or both legs. Durability of the vein from the leg is a lot less in comparison to the Internal Mammary Artery (IMA). For this reason at least one internal mammary artery, usually the left (LIMA), is used to bypass the blockages in the main, left coronary artery (left anterior descending artery). This is true for almost all patients, irrespective of age.

WHAT IS THE ADVANTAGE OF USING BOTH (BILATERAL) INTERNAL MAMMARY ARTERIES?

The internal mammary artery has the longest durability. Therefore, in younger patients (below 60 years) and in diabetics, using both internal mammary arteries is recommended to bypass the left sided coronary arteries (left anterior descending artery and left circumflex artery). This provides the best long term outcomes for the patient.

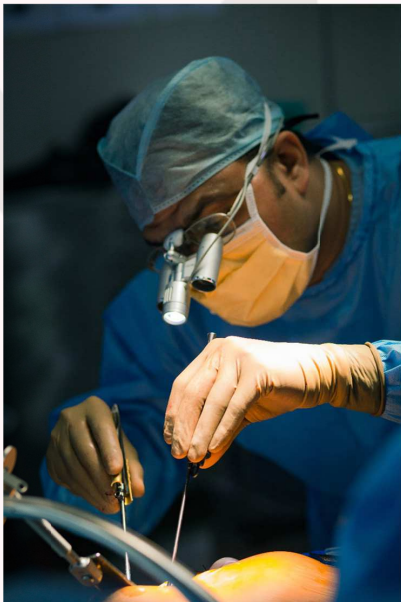


MINIMALLY INVASIVE - CABG SURGERY

INTRODUCTION

Minimally Invasive Cardiac Surgery (MICS) CABG, is performed through small cuts between the ribs. Unlike traditional open-heart surgery, MICS - CABG avoids splitting the central chest bone (sternotomy) and is performed on the beating heart without using a Heart-Lung machine to stop the heart. MICS - CABG requires a high level of skill and training, hence is performed by very few surgeons in the country.

HOW IS MICS - CABG PERFORMED?



A 5 to 7 cms cut is made in the left side of the chest, between the ribs (as seen above). The Da Vinci Robotic system is often used to take the Internal Mammary Artery (IMA) from the chest wall. This technique avoids rib spreading, thus reducing postoperative pain and wound related complications.

WHO IS IT FOR?

Most patients with coronary artery disease can be treated by MICS-CABG with few exceptions. Patients with coronary artery disease (CAD) should be carefully assessed by a surgeon specialising in Minimally Invasive Cardiac Surgery, only then should they undertake MICS - CABG procedure.

BENEFITS:

Use of arterial conduits increases durability of the bypass grafts

Minimal trauma and pain

Minimal blood loss and related complications

Minimal risk of wound infection

Short hospital stay - 2-4 days average

Quick recovery to normal activity - 2-4 weeks average

ROBOTIC CARDIAC SURGERY

INTRODUCTION

Robotic cardiac surgery is heart surgery performed through very small cuts, of only 2 cm, in the chest. With the use of tiny instruments and robotically controlled tools, surgeons are able to perform heart surgery in a way that is far less invasive than open-heart surgery, or even minimally invasive surgery. Robotic surgery can be performed for a number of different heart-related procedures; including valve surgery, coronary artery bypass surgery, repairing holes in the heart and tumor removal. This surgical technique requires years of training and practise, and is currently performed by only a handful of surgeons in the world. Dr M M Yusuf and his team specialise in Robotic Cardiac surgery, performing them routinely with excellent outcomes.

BENEFITS

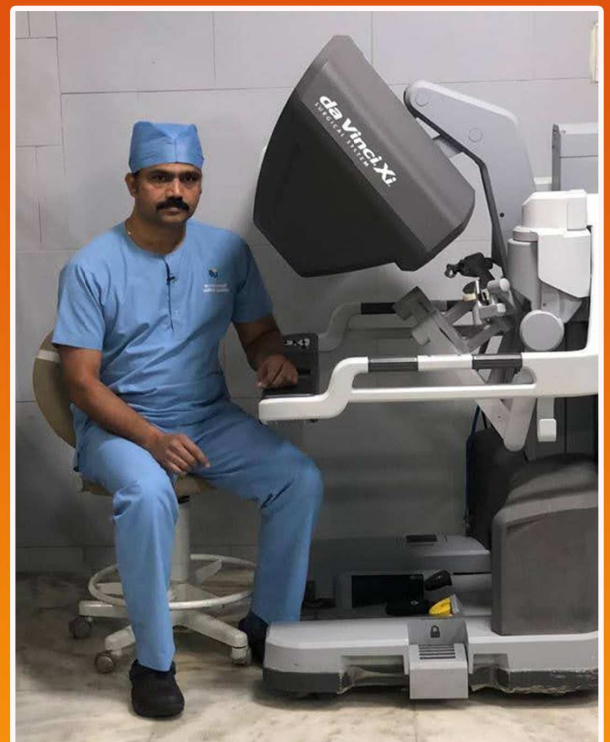
Use of arterial conduits increases durability of the bypass grafts

Least trauma, pain and wound infection risk

Negligible blood loss

Extremely Short hospital stay – 48-72 hours average

Very Quick recovery to normal activity – 2 weeks average



MINIMALLY INVASIVE - HYBRID CORONARY REVASCULARISATION SURGERY (MIHCR)

INTRODUCTION

Minimally Invasive Hybrid Coronary Revascularisation is a combination of Minimally Invasive Coronary Artery Bypass Graft surgery (MICS-CABG) and Angioplasty (stent insertion). This innovative procedure is used to treat patients with multi-vessel coronary artery disease, who may otherwise require conventional open CABG. This Minimally Invasive approach avoids splitting of the central chest bone (sternotomy) and long cuts in the legs. Minimally Invasive - Hybrid Coronary Revascularisation (MIHCR) surgery is now increasingly performed in the western world.

Dr M M Yusuf and his team are the only unit in India routinely performing this surgery, through a unique 2 stage approach. The consistent support between surgeons and cardiologists that this procedure demands, has been pivotal to the success achieved by Dr M M Yusuf and his fellow cardiologists.

THE 2 STAGE APPROACH

During this procedure MICS-CABG is performed first, followed by Angioplasty (stent insertion), after 24-48 hours.

ADVANTAGES:

Minimally Invasive approach, combining the best of both long term outcomes from surgery and angioplasty

Patients with multi-vessel disease, poor heart function, additional medical problems and the elderly can avoid conventional open CABG, and complications thereof

Use of arterial conduits increases durability of the bypass grafts

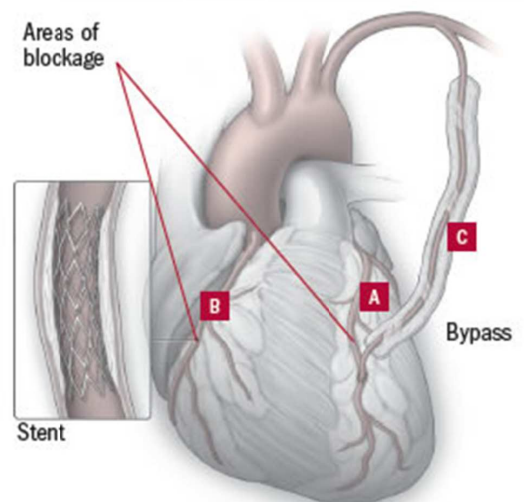
Minimal trauma and pain

Minimal blood loss and related complications

Minimal risk of wound infection

Short hospital stay - 3-4 days average

Quick recovery to normal activity - 2-3 weeks average



- A** Left anterior descending artery
- B** Right coronary artery
- C** Left internal mammary artery

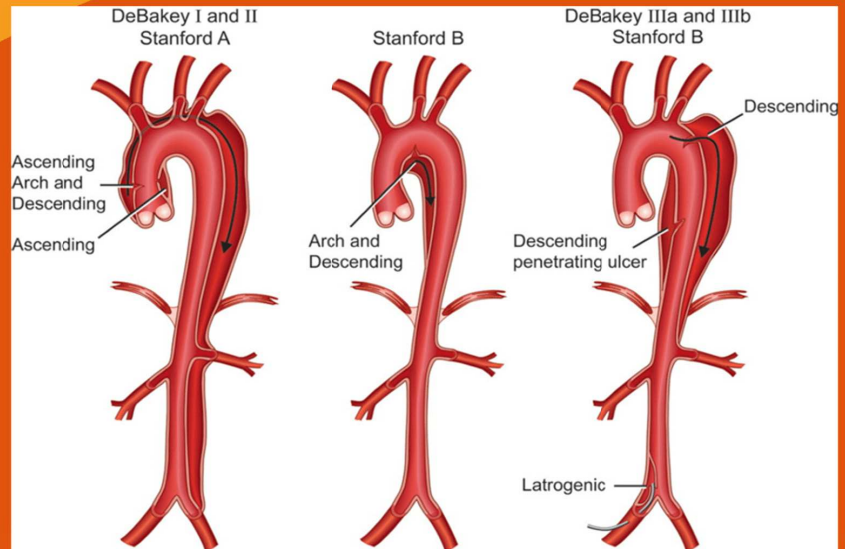
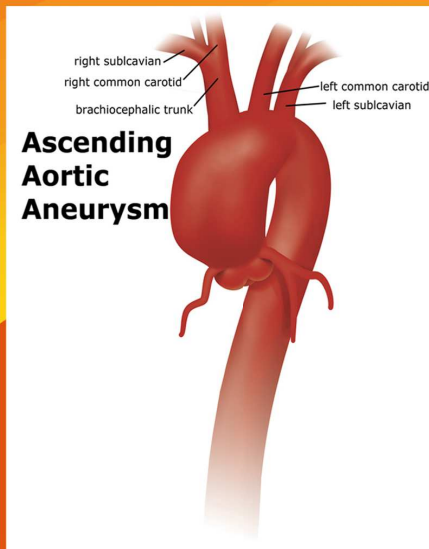
AORTIC ANEURYSM AND DISSECTION

INTRODUCTION

The aorta is the major blood vessel which originates from the heart, and supplies oxygenated blood to the whole body, through its branches.

AORTIC ANEURYSM

An aortic aneurysm occurs when a weak spot in the wall of the aorta begins to bulge; this can occur anywhere in the aorta. An aortic aneurysm will need to be monitored, so that a timely surgery can be performed if the size of the aneurysm exceeds certain defined measurements, as per surgical guidelines.



AORTIC DISSECTION

Aortic dissection is when a tear occurs within the lining of the aorta. This commonly arises in an already bulged (aneurysmal) part of the aorta; therefore an aneurysm increases the risk of an aortic dissection. Aortic dissection is an emergency where each hour is a golden hour, and any delay can increase the risk of the aorta rupturing, which could lead to death of the patient.

SURGICAL REPAIR OF AORTIC ANEURYSM OR DISSECTION – HOW IS IT PERFORMED?

These procedures are usually performed through a conventional approach, where the central chest bone is split (sternotomy) and the heart is stopped using a Heart-Lung machine. The aneurysmal or torn segment of the aorta is cut and replaced by a Dacron (textile mesh) tube. In cases where the tear or aneurysmal segment involves the base/mouth of the aorta (aortic root), coronary arteries and the aortic valve may also be surgically re-stabilised.

Aneurysms and dissections involving the arch or distal part of the aorta, can be repaired by minimally invasive cardiac surgery (MICS).

Surgical repair of aortic aneurysms or dissections are complex, high risk procedures that need to be tailored to the specific needs of each patient. Hence, such surgeries are only performed by a few highly trained surgeons, with a multidisciplinary team approach; such as Dr M M Yusuf and his team.

AORTIC VALVE REPLACEMENT

INTRODUCTION

Aortic valve replacement is a procedure performed to treat a disease, in the valve between the left ventricle and base of the aorta (aortic valve). If the aortic valve does not close properly, blood does not maintain a one way flow, leaking back into the heart from the aorta. This is called aortic regurgitation. However if the valve does not open fully, blood cannot flow out of the heart into the aorta properly; this is called aortic stenosis.

HOW IS IT PERFORMED?

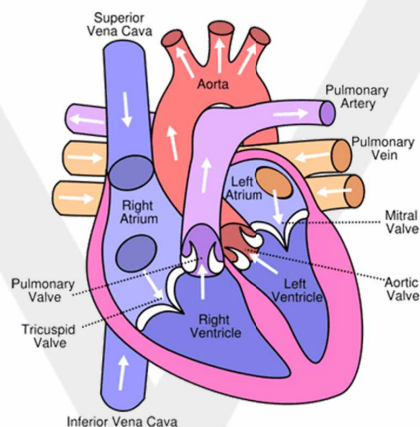
Traditionally, the central chest bone is split (sternotomy) and the heart stopped using a Heart-Lung bypass machine. The diseased valve is then replaced using either kind of artificial valve. The sternum is closed using steel wires that can remain in the body. Valve replacement can also be done through a minimally invasive approach, this is discussed in detail overleaf.



Mechanical Valve



Tissue Valve



THE 2 TYPES OF ARTIFICIAL VALVES

1) MECHANICAL VALVE - Made of pyrolite carbon. Hinges in these valves to enable the leaflets to open smoothly. These valves are usually used in young patients.

Advantage:

- Usually lasts throughout the patient's life.

Disadvantage:

- Patients need to take anti-coagulation tablets, to keep blood thinner than normal. This prevents clot formation in the valve's hinges or leaflets. Anti-coagulation levels need to be monitored closely and maintained within specified limits. Improper blood thinning can lead to major complications, such as stroke or fatal bleeding within the body.

2) TISSUE VALVE - made from specially prepared animal's heart tissue. These valves are usually used in older patients.

Advantage:

- No anti-coagulation medication required; all anticoagulation related problems are thus alleviated.

Disadvantage:

- Animal tissue degenerates with time. Most patients will need a repeat surgery to replace the valve again in 10-20 years. The time taken for the tissue valve to degenerate, depends on the valve used and the age of the patient.

MINIMALLY INVASIVE AORTIC VALVE REPLACEMENT

Minimally Invasive Aortic valve replacement can be performed through Minimally Invasive Cardiac Surgery (MICS) or through a catheter based Trans Aortic Valve Implantation (TAVI).

MICS VALVE REPLACEMENT

HOW IS IT PERFORMED?

There are two approaches to perform minimally invasive aortic valve replacement:

MINI STERNOTOMY - is performed through a small cut in the upper part of the chest bone (sternum). This avoids a full split of the sternum, enabling a much quicker recovery than traditional full sternotomy. Almost all patients requiring aortic valve replacements can be operated through this approach.

RIGHT ANTERIOR THORACOTOMY - is when valve replacement is performed through a small 5-7 cm cut, made in the right side of the chest. Recovery is even quicker than a mini sternotomy, since it avoids the splitting of any bone. However, not all patients have the favourable anatomy required to undergo this procedure.

BENEFITS

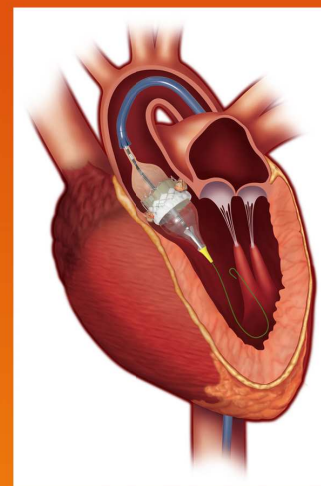
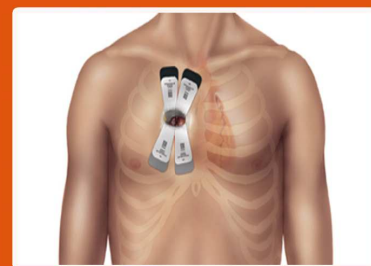
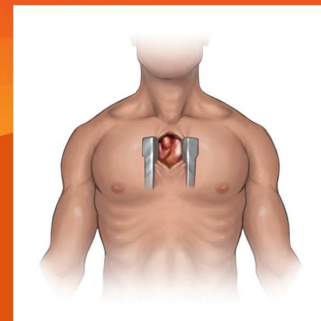
- Minimal trauma and pain
- Minimal blood loss and related complications
- Minimal risk of wound infection
- Short hospital stay – 2-4 days average
- Quick recovery to normal activity – 2-4 weeks average

TRANS AORTIC VALVE IMPLANTATION – TAVI

HOW IT IS PERFORMED?

This is the least invasive method to treat patients with aortic valve stenosis (blockage). This procedure is recommended for patients with multiple medical problems or for the elderly, who may be at a high risk for surgical valve replacement.

During this procedure, a tissue valve is passed through a catheter (fine tube) into the heart. The valve is then implanted over the native existing aortic valve of the patient.



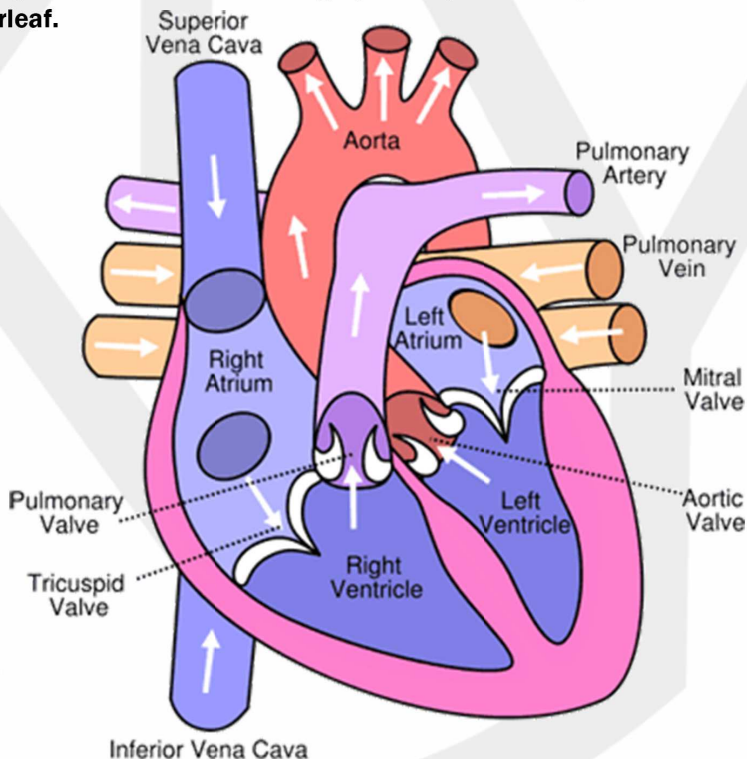
MITRAL VALVE SURGERY

INTRODUCTION

The mitral valve, is the valve located between the left atrium and left ventricle (shown); disease of the mitral valve can be due to regurgitation (leak) or stenosis (blockage). Mitral valve regurgitation, is when the flaps (leaflets) of the mitral valve do not close fully and blood does not maintain a one way flow; leaking back into the atrium from the ventricle. On the other hand mitral valve stenosis, is when the leaflets prevent blood from flowing through the valve; due to abnormal thickening, stiffness or even fusing together. Mitral valve disease can be treated by either repairing or replacing the valve.

HOW IS IT PERFORMED?

Both mitral valve repair and replacement can be surgically performed. This can be done through a conventional, open sternotomy or through Minimally Invasive Cardiac Surgery (MICS). Conventionally, the central chest bone is split (sternotomy) and the heart is stopped using a Heart-Lung bypass machine. The diseased valve is then either repaired or replaced using an artificial valve (ref. to page 14 for more about artificial valves); and the sternum closed using steel wires that can remain in the body. However, Minimally Invasive mitral valve surgery is the preferred option around the world, which is discussed in detail overleaf.



TREATMENTS

Treatment for mitral valve disease depends on the severity of your condition. Doctors may recommend surgery to repair or replace mitral valves. Repair or replacement can be performed through open sternotomy, or minimally invasive (MICS) procedures.

In open surgery the central chest bone is split - sternotomy - and the heart stopped with support of a heart-lung bypass machine. The diseased valve is then replaced using artificial valves. The sternum is closed using steel wires that can remain in the body. However, minimally valve surgery is the preferred option around the world.

MINIMALLY INVASIVE MITRAL VALVE SURGERY

INTRODUCTION

Minimally Invasive mitral valve surgery is generally preferred over open mitral valve surgery, for patients requiring intervention. Both repair and replacement of the mitral valve can be performed through a minimally invasive approach.

REPAIR VS REPLACEMENT

Whilst replacement surgeries are often much easier for a surgeon to perform, mitral valve repair, where possible, is much more beneficial for the patient. Repairing the patient's own valve means that the implantation of an artificial valve is completely avoided, therefore the patient does not require any anti-coagulation (blood thinning) medication. Mitral valve replacement also helps maintain strong function of the left ventricle (main pumping chamber of the heart). Where replacement of the valve would require the implantation of a mechanical or tissue valve (ref page 14), repair is simply the surgical correction of the patients own, existing valve.

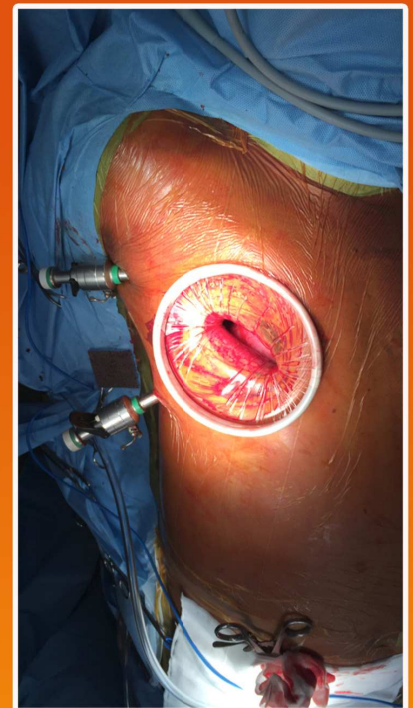
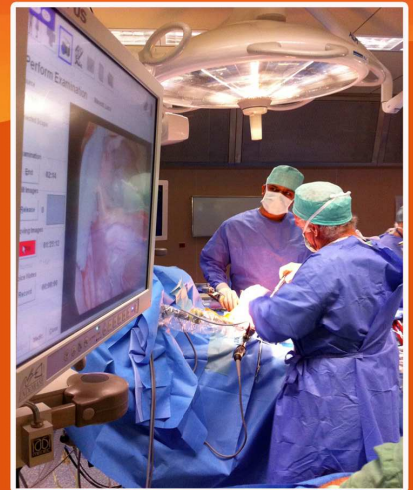
Performing Minimally Invasive mitral valve repair surgery requires high levels of training and experience, with only a handful of surgeons across India having mastered this procedure. Dr M M Yusuf & his team are well experienced in performing Minimally Invasive Mitral valve repair surgery, with consistently good outcomes.

HOW IS IT PERFORMED?

A 5-7 cm inch cut is made in the right side of the chest (right thoracic cavity, shown). Surgery is performed using the assistance of either a video thoracoscope or Davinci Robotic system. If the valve is significantly damaged or thickened (with calcification), it may not be repairable. In these circumstances, a replacement using a tissue or mechanical valve, would be necessary.

MINIMALLY INVASIVE MITRAL VALVE REPAIR/ REPLACEMENT - ADVANTAGES

- Minimal trauma and pain
- Minimal blood loss and related complications
- Minimal risk of wound infection
- Short hospital stay - 3-4 days average
- Quick recovery to normal activity - 2-3 weeks average



HEART TRANSPLANT

INTRODUCTION

A heart transplant (also known as a cardiac transplant), is performed on patients with end-stage heart failure or severe coronary artery disease. For patients with coronary artery disease, heart transplant is often a last resort after other medical or surgical treatments have failed.

HOW IS IT PERFORMED?

During a heart transplant, the patient's own diseased/failed heart is removed and replaced with a donor heart. The functioning, donor heart is taken from a recently deceased organ donor (brain death is the standard) and implanted into the patient.

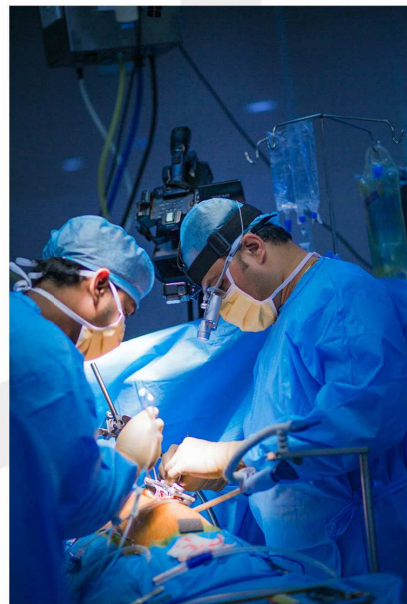
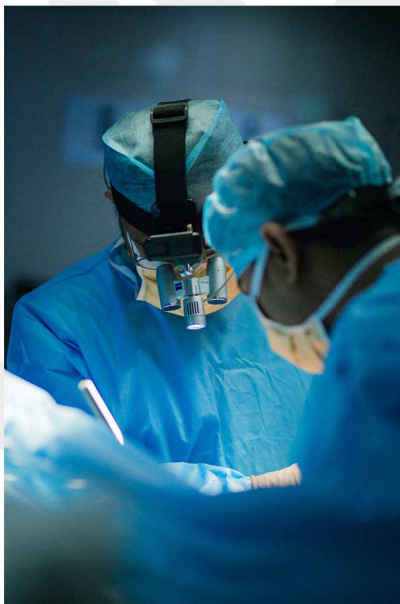
WHO IS IT FOR?

Patients with extreme case of:

- Heart muscle weakening (cardiomyopathy)
- Coronary artery disease
- Heart valve disease
- Heart problems they are born with (congenital heart defect)
- Dangerous, recurring, abnormal heart rhythms (arrhythmias)
- Metabolic disorder (amyloidosis)
- Previous heart transplant failure

ADVANTAGES

The only definitive treatment for end stage heart failure.



ABOUT THE AUTHOR

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Consultant – Cardiac Surgeon.

Specialising in:

Minimally Invasive & Robotic cardiac surgery,

Aortic aneurysm surgery,

Mitral valve repair surgery,



Dr. M M Yusuf gained his MBBS at the Stanley Medical College, Chennai, India. He then went to the United Kingdom and completed Basic Surgical Training by passing the FRCS exam in General Surgery. He underwent his training at prestigious hospitals such as the Leeds General Infirmary, St Bartholomew's Hospital and the London Chest Hospitals. Further, Dr M M Yusuf undertook his Higher Surgical Training at the University Hospitals of Wales, in Cardiff and Swansea. He completed this with an FRCS in Cardiothoracic Surgery, awarded by the Intercollegiate Speciality Board – Royal College of Surgeons, United Kingdom. He advanced his speciality with a Fellowship in Minimally invasive and Robotic Cardiac Surgery at the world renowned OLV Hospital in Aalst, Belgium. He also gained experience as a Senior Registrar/ Consultant at Bristol Heart Institute and King's College Hospital, London.

Dr M M Yusuf specialises in the following Minimally invasive Cardiac Surgery procedures:

Minimally Invasive CABG

Robotic Assist CABG / Valve Surgery

Port Access Mitral Valve Repair / Replacement

Minimally Invasive-Hybrid Coronary Revascularisation

Minimally invasive Aortic Valve Replacement

He also performs the following procedures through a conventional sternotomy approach:

- Beating heart, CABG – Total Arterial Revascularisation

- Major Aortic Surgeries, such as:

Aortic root replacement

Ascending aorta repair

Emergency aortic dissection repair

- Redo cardiac surgery – CABG and valve surgeries

- Heart Transplant

Dr M M Yusuf strongly believes that patient wellbeing is always the first priority. He takes special care in ensuring clear communication between himself, the patient and their families. This begins from the decision making process, and continues on to the treatment of the patient, through the actual surgery, discharge, and till post-operative follow up care.

Every Patient is Someone's

Father / Mother

Son / Daughter

Brother / Sister

I Care.....

M. M. Yusuf

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