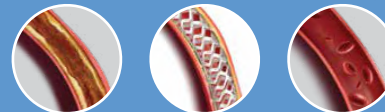


TREATMENT ZAROORI HAI.



Taking Care of your Precious Heart!
Know Your Heart Better



Issued in Public Interest and Education by Meril.

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Meril Life science Pvt. Ltd.

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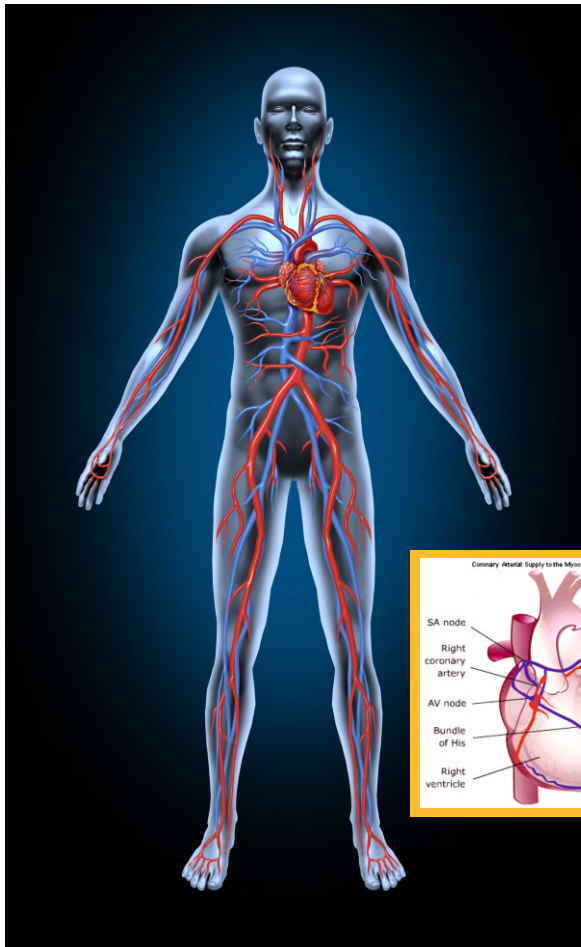
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1. Know Your Heart

Blood Circulation

The oxygenated blood flows out from the heart through the aorta, which is the largest artery in the body. All the major arteries, which supply blood throughout the body, arise from the aorta. Blood vessels called veins return the blood to the heart, which then pumps blood to the lungs. After picking up oxygen from the lungs, the blood is pumped out to the body again. The heart receives its own supply of blood from a network of arteries called the coronary arteries that also arise out of the aorta.



Anatomy And Function

The heart is a muscular pump that provides the force necessary to circulate the blood to all the tissues in the body. A normal adult heart pumps about 5 litres of blood every minute throughout life. Its function is essential as tissues need a continuous supply of oxygen with nutrients and metabolic waste products have to be removed. Blood is the transport medium and heart is the organ that keeps the blood moving through vessels.

Quick Facts:



The heart beats an average of 75 times per minute.



Average Size: 5" (12 cm) long and 3.5" (9cm) wide - about the size of an adult fist.



Weight: 9-12 oz (250-350 gm).



Your heart beats about 100,000 times in one day & about 35 million times in a year. During an average lifetime, the human heart will beat more than 2.5 billion times.

Coronary Arteries

Two major coronary arteries branch off from the aorta:

- o Right coronary artery (RCA) – Which supplies 20-30% of the heart's blood.
- o Left main coronary artery, which again branches into:
 - The Circumflex artery, which supplies 20-30% of the heart's blood.
 - The Left Anterior Descending artery (LAD), which supplies 50% of the heart's blood.

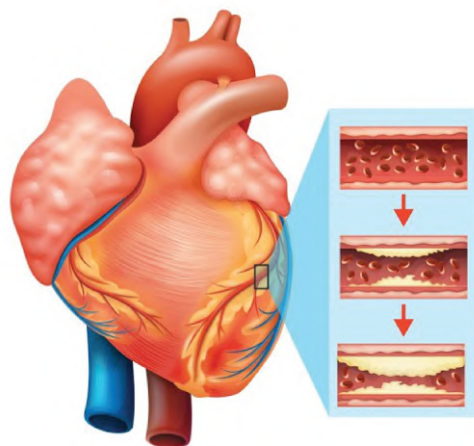
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<https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/heart-weight>
<https://www.webmd.com/heart/features/amazing-facts-about-heart-health-and-heart-disease>
for all of the above, as accessed on 20th January 2021



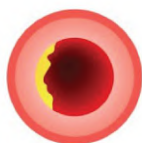
2. Coronary Artery Disease (CAD)

Blood Circulation

- Coronary artery disease is the narrowing or blockage of the coronary arteries caused by atherosclerosis.
- Atherosclerosis (sometimes called “hardening” or clogging” of the arteries) is the build-up of cholesterol and fatty deposits (called plaque) on the inner walls of the arteries that restrict blood flow to the heart.
- Without adequate blood, the heart becomes starved of oxygen and the vital nutrients it needs to work properly. This can cause chest pain (called angina).
- When one or more of the coronary arteries are completely blocked, a heart attack (injury to the heart muscle) may occur.



Healthy Artery



Initial Fatty Deposits



Plaque Obstructs Bloodflow



Near Complete Blockage

A. Watch out for these signs!!!

Angina is often referred to as chest pain: Also described as chest discomfort, heaviness, tightness, pressure, aching, burning, numbness, fullness, or squeezing. It can be mistaken for indigestion or heartburn. Angina is usually felt in the chest, but may also be felt in the left shoulder, arms, neck, back or jaw.



Pain or discomfort in other areas of the upper body including the arms, left shoulder, back, neck, jaw, or stomach



Difficulty in breathing or shortness of breath



Sweating or “cold sweat”



Fullness, indigestion, or choking feeling (may feel like “heartburn”)



Nausea or vomiting



Light-headedness, dizziness, extreme weakness or anxiety



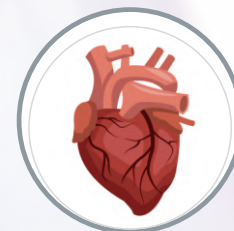
Rapid or irregular heart beats

Remember!

Learn to identify your symptoms and the situations that cause them.

Call your doctor, if you begin to have new symptoms or if they become more frequent or severe.

The content and information mentioned in this booklet is general information. Meril Life Sciences Pvt. Ltd. is not suggesting, advocating or promoting any medications. All the decisions will be finally taken by your Interventional Cardiologist only.



B. Risk factors

Risk factors are traits and lifestyle habits that increase your chance of coronary artery disease. The more risk factors you have, the higher your chances of having a heart attack or stroke.

Uncontrollable Risk Factors

Increasing age: The older you get, the more likely you are to develop heart disease or have a heart attack or stroke.

Gender: Males have a greater risk of heart attacks and may have heart attacks at a younger age in general than women do.

Previous heart attack or stroke: Patient with history of heart attack or stroke is at high risk of having second episode.

Family history of heart attack or stroke: The chance of a stroke is greater in people who have a family history of stroke.

Controllable Risk Factors

Certain risk factors can be modified or changed, these include:

- High Blood Pressure
- High Blood Cholesterol
- Cigarette smoking or exposure to second hand smoke
- Lack of physical activity
- Obesity
- Diabetes

Sources: <https://www.hackensackmeridianhealth.org/HealthU/2019/12/22/what-causes-a-heart-attack-at-a-young-age/>



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High Blood Pressure

- High blood pressure (hypertension) makes the heart work harder than normal. That means the heart & arteries can be injured more easily
- In 90 percent of cases, the cause of high blood pressure isn't known. However, several things increase the chance of having high blood pressure
- Age
- Family History
- Excess Weight
- Excess Alcohol
- Sodium (Salt)

Blood pressure category	Systolic	Diastolic
Normal	<120	<80
Pre-hypertension	120-139	80-89
Hypertension stage 1	140-159	90-99
Hypertension stage 2	>160	>100

High Blood Cholesterol

- Cholesterol is a soft, fat like substance found in the blood and in all the body cells. Some cholesterol is needed for the body to function normally. Having a healthy cholesterol level is important for everyone
- The best way to understand your cholesterol is with "lipo protein profile". This is a blood test that reveals total cholesterol, LDL (bad) cholesterol & HDL (good) cholesterol. It also measures triglycerides (blood fats).
- Certain fats you eat can help lower your cholesterol. Polyunsaturated and monosaturated fats help lower blood cholesterol, when eaten in place of saturated fats. Plant oils are often high in these. Instead of butter try to use vegetable oils in the foods you cook and eat.

Sources: The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High blood Pressure. and <https://www.nhlbi.nih.gov/health/health-topics/>



Physical Activity

Make time in your life for daily physical activity. It helps control blood cholesterol, diabetes and obesity. It also helps lower blood pressure and reduces your stroke risk.

Total cholesterol level	Category
Less than 200mg/dl	Desirable Level - Low Risk
200-239mg/dl	Borderline to High - Mid Risk
240mg/dl or greater	High blood cholesterol - More than twice the risk as someone with a desirable level

LDL cholesterol level	Category
Less than 100mg/dl	Optional for people with diabetes or heart disease
100-139mg/dl	Near Optimal
130-159mg/dl	Borderline High
16-189mg/dl	High
>190mg/dl	Very High

HDL cholesterol level	Category
<40mg/dl	Low HDL - Higher Risk
40-59mg/dl	Medium Risk
>60mg/dl	High HDL - Lower Risk

Triglyceride level	Category
Less than 150mg/dl	Low HDL - Higher Risk
150-199mg/dl	Medium Risk
200-499mg/dl	High HDL - Lower Risk

Obesity

People who have excess body fat are at a higher risk of health problems, especially if a lot of fat is in the waist area. People with excess body fat are at a higher risk of stroke.

The body mass index measures a person's body weight relative to their height. You can measure BMI using the online BMI calculator at www.americanheart.org/BMI-Calculator.

Stress

Everyone feels stress but people react differently. Over time, unhealthy responses to stress may create health problems. Find ways to address the cause of your stress and be sure to make time for things you enjoy.

Excessive Alcohol Intake

Drinking too much alcohol raises blood pressure and can cause heart failure or stroke. Avoid alcohol consumption or do so in moderation. Alcohol is high in calories and low in nutrients. Moreover it can be addictive.

Illegal drug Use

Intravenous/Illicit drug use carries a high risk of infections of the heart (endocarditis) & stroke. These events can be fatal and affect even first time users.

Smocking

Exposure to tobacco smoke increases your risk for heart disease, stroke, cancer and other serious illnesses.

Sources: The seventh report of the joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, and <https://www.nhlbi.nih.gov/health/health-topics/>



C. How will I know I have CAD

- A doctor may use various methods to diagnose CAD, like Electrocardiograph (to evaluate the electrical activity generated by heart), echocardiogram test, stress tests etc. Echocardiogram involves a use of transducer which use sound wave to detect the problem with your heart; sound waves produced by the transducer are reflected back from the chest surface which are received and sent to a computer to generate a report.



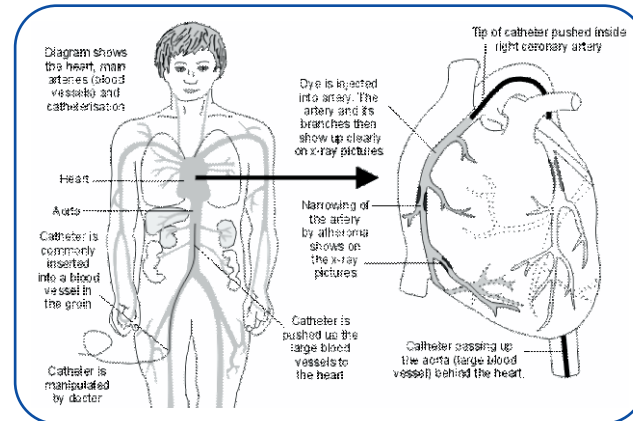
Electrocardiograph Test



Exercise Stress Test



Cardiac Catheterization Lab - (Cath Lab)



Coronary Angiography Steps

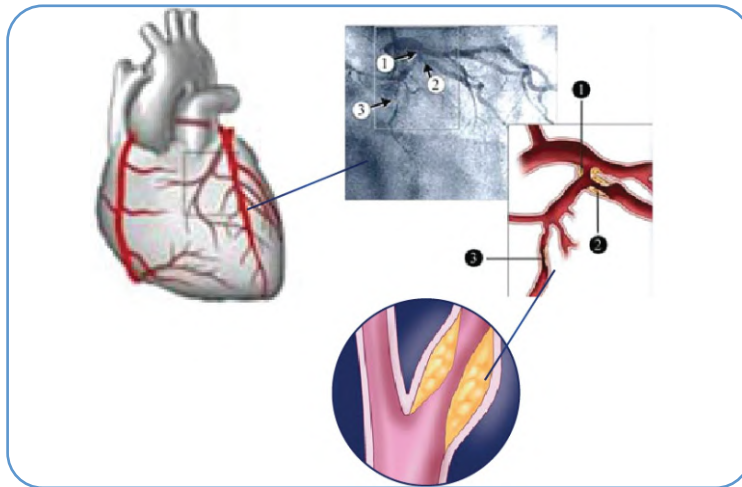
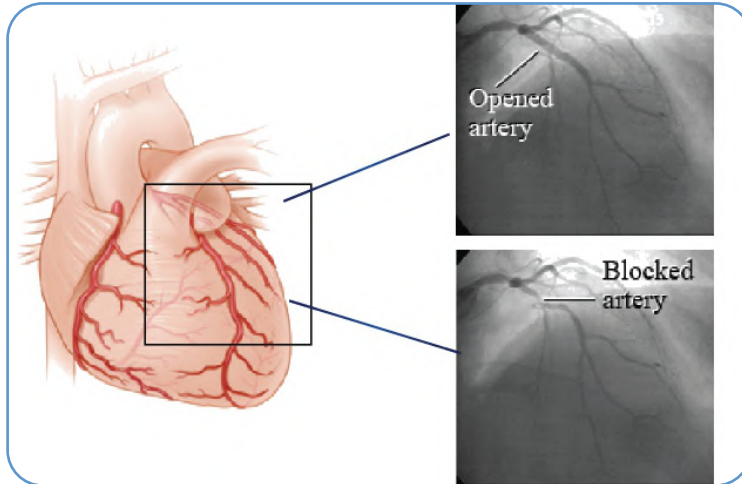
- Coronary angiography performed by an Interventional Cardiologist in a cardiac catheterization lab (Cath lab); involves inserting catheters into the blood vessels of the heart in order to get a closer look at the coronary arteries (most reliable confirmatory test among all).



- Laboratory test: These include a number of blood tests used to diagnose & monitor treatment of heart disease.
- These tests help your doctor decide how to treat you.



C. How will I know I have CAD



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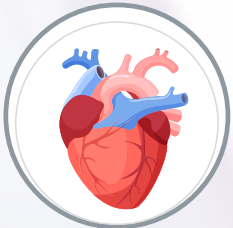
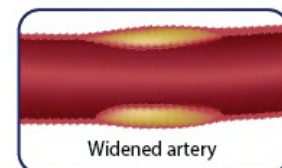
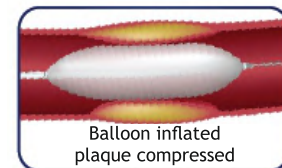
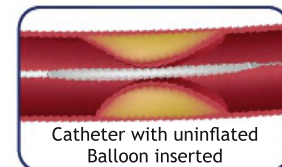
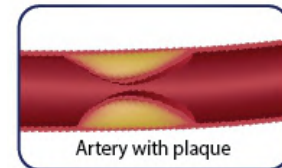


3. Your Treatment Options

- Treatment of coronary artery disease is aimed at controlling symptoms and slowing or stopping the progression of disease.
- The method of treatment is based on many factors determined by your symptoms, a physical exam, and diagnostic testing. You may be asked to adopt lifestyle changes, take up physical activity and control your diet.
- Depending on the extent of blockage and severity of disease, the doctor may advise on different treatment options: Medication and/or Angioplasty and/or CABG.

a. Balloon Angioplasty

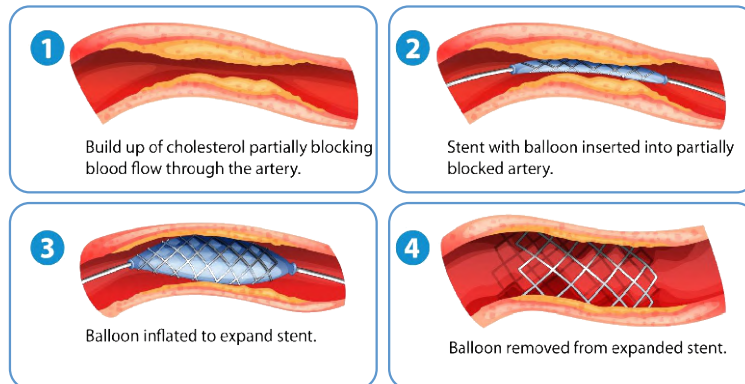
- The angioplasty procedure may sometimes be performed without stent deployment, a technique that is now referred to as plain old balloon angioplasty (POBA).
- A balloon catheter is a type of soft catheter with an inflatable balloon at its tip which is used during a catheterization procedure to enlarge a narrow opening or passage within the body.
- The deflated balloon catheter is positioned, then inflated to perform the necessary procedure, and deflated again in order to be removed.



b. Angioplasty and Stenting

- Procedure in which a thin tube known as guiding catheter is inserted through the groin or the wrist & is then moved towards the site of the blockage in the concerned coronary artery. A small balloon at the tip of the balloon catheter is inserted through the guiding catheter near the blocked or narrowed area of the coronary artery.
- When the balloon mounted with the stent is inflated, the fatty plaque or blockage is compressed against the artery walls and the diameter of the blood vessel is widened (dilated) to increase blood flow to the heart.
- Once the plaque is compressed and the artery is opened sufficiently, the balloon catheter is deflated and removed.
- The stent will remain as a permanent implant in the coronary artery.

Stent Angioplasty

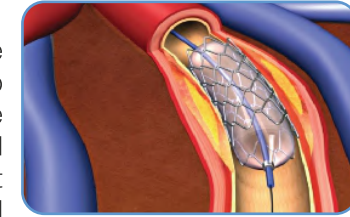


This is just a graphical representation of an angioplasty for general awareness

c. What is a Stent?

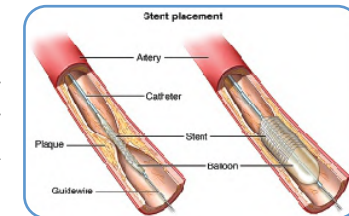
Coronary Artery Stents:-

A stent is a small, metal mesh tube that acts as a scaffolding to provide support inside the coronary artery. The shape and material of the stent gives it great flexibility, and it can be expanded by a balloon to adapt to the shape and curves of the artery.



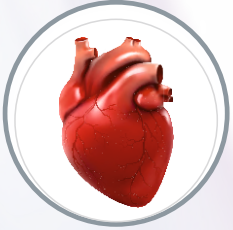
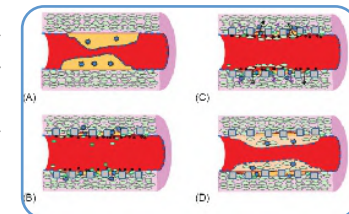
Stent Implantation:-

Stent is introduced into the blood vessel through the femoral or radial artery on a balloon catheter and advanced to the blocked area of the artery. The balloon is then inflated, which causes the stent to expand until it fits the inner wall of the artery. The balloon is deflated & withdrawn. The stent stays in place permanently, holding the vessel open and improving the flow of blood.



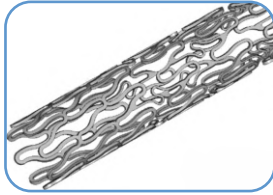
Restenosis:-

Re-narrowing of a coronary artery after it has been treated with either balloon or with the stent. The re-narrowing can be caused by vessel recoil and tissue growth in the treated area.



1. Bare Metal Stents (BMS)

- Bare Metal Stents are made up of a biologically inert and biocompatible metal material.
- It is deployed at the lesion site in the artery to enable greater blood flow to the heart.



2. Drug Eluting Stents (DES)

- Drug Eluting Stents System is a metal mesh tube coated with medication which is deployed at the blockage site in the diseased artery
- The medication helps prevent stenosis.



3. BioResorbable Scaffolds (BRS)

- The bioresorbable vascular scaffolds are the latest development in interventional cardiology. Research has shown that the support of a coronary stent is only needed for a few months after implantation while the artery wall is healing. While stents which are made of metal remain permanently, scaffolds are known to be resorbed allowing for healing of arterial wall.
- The scaffold keeps the artery open after angioplasty, but gets resorbed by the body over a period of time.



Resorb - remove by gradual breakdown into component materials and dispersal in the circulation

What is a Dissolving stent or Bioresorbable Scaffold ?

Dissolving stent or Bioresorbable Scaffold (BRS) are considered as the latest advancement in the stent technology to treat blocked or diseased arteries. BRS are similar in function to a metallic stents but they are non-metallic, non-permanent mesh tube which is used to treat a narrowed artery, it slowly dissolves over a period of time once the blocked artery starts functioning naturally and can stay open on its own.



How a BRS is different from a metallic Stent ?

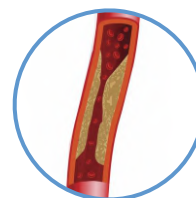
Bioresorbable Scaffold is similar in function to a permanent metallic stents but it is a non-metallic, non permanent mesh implant which gets resorbs naturally over a period of time approximately in 2-3 years and allows the artery to regain its natural state. The use of BRS aims to reduce the risk of late adverse events which are often seen with permanent metallic stents.



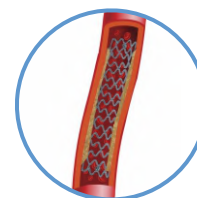
What are the potential advantages of Bioresorbable scaffolds over current metallic DES?

- It avoids permanent metallic caging of the stented artery, which helps the artery to regain, its natural state.
- A possible reduction in long term adverse events as post healing BR resorbs completely thus leaving no foreign material in the artery which can act as irritant to the artery and trigger long term adverse events
- Potentially there would be no restriction on any future angioplasty or bypass surgery if required in the same artery which was previously treated with BRS.
- A reduction in bleeding complications. Once bioabsorption of the BRS has been completed, there will potentially be no requirement for powerful blood thinners.
- Allowing the use of noninvasive imaging techniques such as computed tomography (CT) or magnetic resonance imaging for follow-up. Presently, metallic Stents can cause a blooming effect with these imaging modalities, making interpretation more difficult.
- Elimination of the concern that some patients have at the thought of having an implant in their bodies for the rest of their lives.

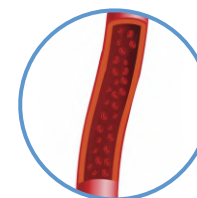
Artery with Plaque



Deployment of Bioresorbable Stent



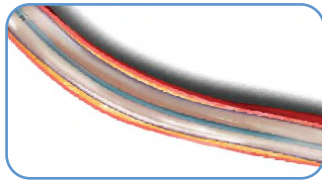
Artery regains its natural state*



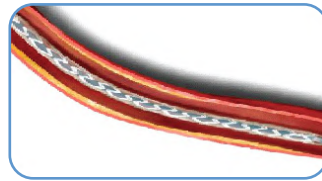
*Post Healing MeRes 100 dissolves completely in 2 to 3 years (approx.) leaving the artery in its natural state.



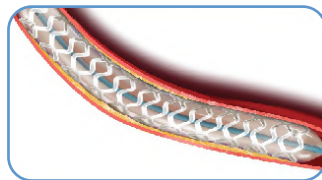
4. Undergoing BRS Deployment



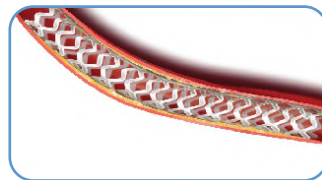
Diseased coronary artery is predilated to push the plaque against the wall



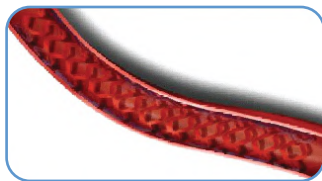
BRS deployed inside the predilated artery at the lesion site



The scaffold is then inflated allowing greater blood flow to the lesion site



Drug released from the scaffold at the lesion site to prevent regrowth



BRS begins to bioresorb



In a span of little more than 2 years biodegradable polymer scaffold resorbs, uncaging the vessel



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5. What Happens After The Angio-Plasty procedure?

Blood Circulation

- After the Angioplasty Procedure, you will be taken to an intensive care unit with special monitoring equipment. Blood pressure, pulse monitoring and ECGs are performed routinely after Angioplasty procedures and do not signify any special problems. You may be asked to stay in hospital for a maximum of 4 to 5 days depending upon the speed of your recovery.
- Angioplasty is not a cure, but a treatment to reduce the effects of Coronary Artery Disease. It is extremely important to follow your medication regimen exactly and control your risk factors.
- Dual Antiplatelet Therapy (DAPT): Drug-eluting stents are intended to have lower rates of late restenosis than bare-metal stents through inhibition of neointimal proliferation. However, drug-eluting stents are at higher risk for in-stent thrombosis because of delayed endothelialization, incomplete healing, hypersensitivity and underlying atherosclerotic disease. This risk is greatly reduced with DAPT, typically with aspirin & a thienopyridine (e.g. clopidogrel). The ACC/AHA/SCAI guidelines recommend 12 months of DAPT therapy.



Medication



Follow up with your doctor

Source: ACC/AHA/SCAI guidelines
 The information mentioned herein is from the above mentioned sources. All treatment decisions will be finally taken by your Interventional Cardiologist. Kindly do not stop consuming the medications without the consent of your doctor.



ACC - American College of Cardiology
 AHA - American Heart Association
 SCAI - Society for Cardiovascular Angiography and Intervention

Resorb - remove by gradual breakdown into component materials and dispersal in the circulation



6. Managing Your Medications

After angioplasty your physician will prescribe you with certain medicines. Its easier to follow a treatment plan when you know its importance to your overall health.

Make sure that you have the following information about your medication:

- What is it supposed to do?
- What symptoms will it help reduce?
- How will I know its working?
- What tests, if any, may be needed?
- What are the risks if any?
- What side-effects may occur?
- What is the correct medicine dosage & at what time should they be taken?
- How do I take it?
- Should I take it with food or on an empty stomach?
- Should I avoid any food supplements or Over-the-Counter drugs?
- Should I avoid alcohol, caffeine or other beverages while taking this medicine?

Tell your physician:

- If you have had allergic reactions or side-effects from any medicine.
- Be sure to mention, if you are taking medicines prescribed by a different physician.

Do's and Don't's

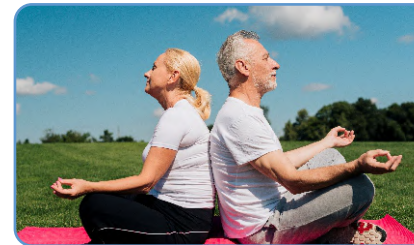
- Inform your physician right away, if you've had any problems with your medicine.
- Don't stop taking a prescribed medicine just because your symptoms go away.
- Don't take medicines prescribed for someone else or give your prescription to anyone else.
- Don't drink alcohol while taking a medicine unless your doctor says it's ok.
- Always store medications under the proper storage conditions. Unless you are told otherwise keep them away from heat, light and moisture.

7. Prevention is Better Than Cure

Your lifestyle, eating habits and environment all influence how well your heart and body works and how you feel. Remember that you are in charge of your own well being.

Be Physically Active

For most healthy people, at least 2½ hours of moderate intensity physical activity per week is recommended, such as brisk walking.



Maintain Healthy Diet



Eat a variety of nutrients rich foods



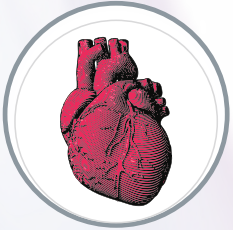
Vegetables and fruits



Whole grain high-fibre foods



Fish



Limit saturated fat, trans-fat and cholesterol. You should consider the nutrition information on the product packaging when making purchases



- Choose lean meats and poultry without skin and prepare them without added saturated & trans fat.
- Switch over to fat-free, 1% fat & low fat dairy products.
- Cut back on foods containing partially hydrogenated vegetable oils to reduce trans fat in your diet. Avoid processed foods and deep fried snacks etc.

Quit smoking



Avoid Use Of Tobacco Products

- Exposure to tobacco smoke increases your risk for heart disease, stroke, cancer & other serious illnesses.

Avoid Drinking Alcohol



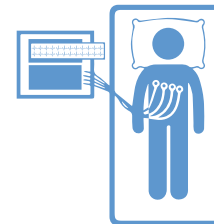
KEEP YOUR HEART IN CHECK. GET REGULAR CHECK-UPS.



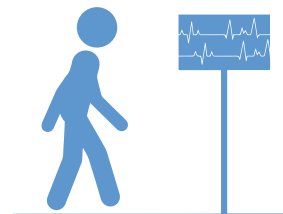
ECHOCARDIOGRAM



BLOOD TEST



ECG TESTS



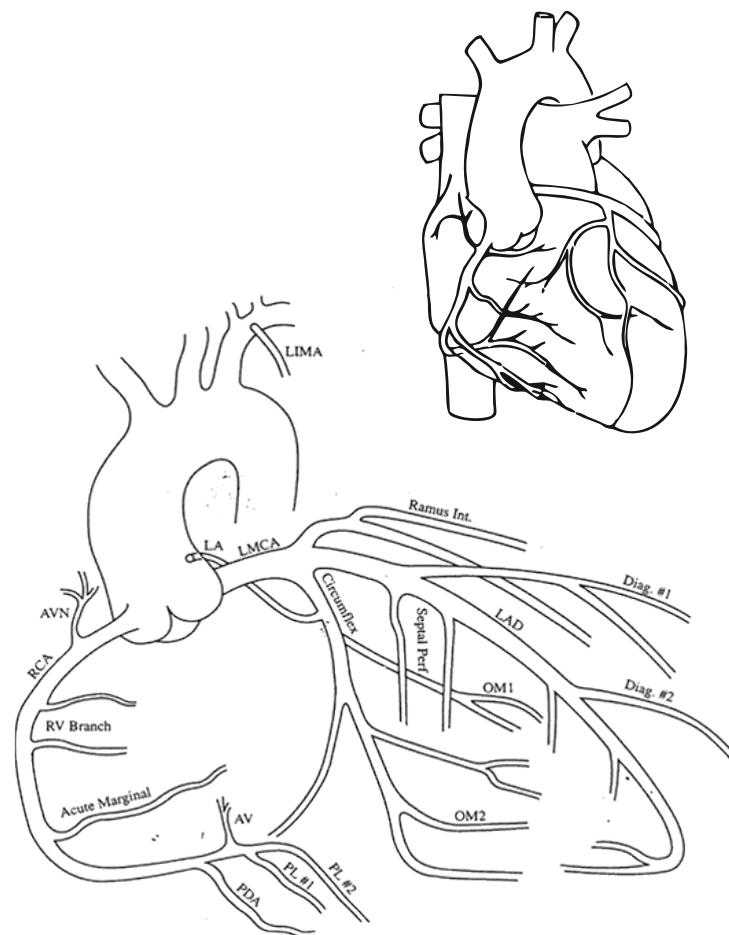
STRESS TEST



8. FAQs

- Q. How long will the scaffold stay in my body?
 A. Scaffold is expected to stay for a little more than two years and then resorb*, uncaging the vessel.
- Q. When can I resume my regular activities?
 A. Your doctor will advise you. Many patients can return to work & follow their normal routine about a week after the procedure.
- Q. Will my scaffold set off the metal detector at security checkpoints?
 A. No, your scaffold implant will not trigger alarms at security points.
- Q. Will I be able to feel the scaffold inside me?
 A. No, you will not be able to feel the scaffold once it has been implanted in your artery.
- Q. How can I help prevent a recurrence of symptoms?
 A. The risk of recurrence can be reduced through exercise, not smoking and a healthy diet.
- Q. Can the scaffold move?
 A. Once BRS is positioned in the body by your physician, it does not move on its own.

This diagram can be used to map the blockage in the coronary under your doctor's supervision



Notes:

A series of horizontal dotted lines for taking notes.



HEART KI HEALTH KE LIYE,

**TREATMENT
ZAROORI HAI.**

