

# **Your anaesthetic for heart surgery**

**This leaflet describes the care that you will be given before, during and after your operation.**

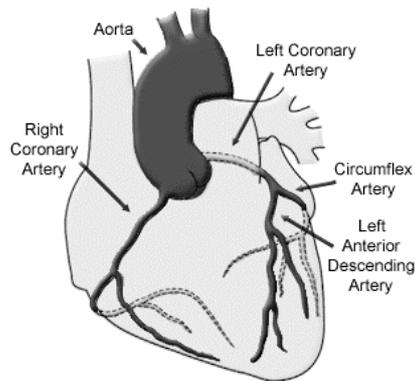
# Introduction

## The heart

Your heart is a pump that is made of a type of muscle that is designed to beat spontaneously and regularly throughout your life. When you are resting the heart beats around 60 to 90 times each minute (42 million times per year).

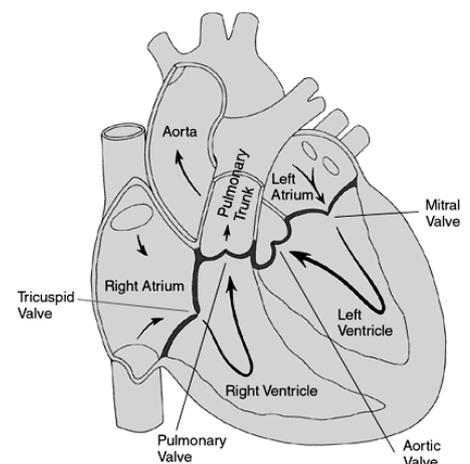
Every minute it pumps about 10 pints of blood around your body, carrying:

- oxygen and essential nutrients to the rest of the body
- carbon dioxide to the lungs which is released when you exhale and replaced by fresh oxygen when you inhale.
- other substances such as waste products for elimination.



The heart muscle needs its own blood supply and this is provided by the coronary arteries. There are two main coronary arteries – the left and the right. The left coronary artery supplies the main pumping chamber, the left ventricle, through its two main branches; the left anterior descending and the circumflex.

The heart has four chambers (two atria above two ventricles). These chambers have valves to ensure that the blood flows in a single direction from atrium to ventricle then out of the right heart to the lungs and out of the left heart to the rest of the body. The four valves within the heart are the: tricuspid, pulmonary, mitral, and aortic.



Problems with the heart for which surgery is often necessary:

1. **The Blood Supply to the Heart** - blocked or narrowed blood vessels that supply your heart with oxygen cause angina pain, breathlessness, or heart attacks.
2. **The Heart Valves** - leaking valves (regurgitation) or valves not opening enough to allow blood to be pumped through them (stenosis) need to be repaired or replaced.
3. **The Structure of the Heart** - e.g. a hole in the heart, or an abnormal arrangement of the large blood vessels entering or leaving the heart.

What operations are performed on the heart?

1. **Coronary Artery Bypass Grafts** – a vein taken from the leg, or an artery from the chest wall or forearm, is used to connect the aorta to the coronary artery after the point of any blockage. This improves the blood supply to the heart muscle.
2. **Repair or Replacement of a Heart Valve** – if the damaged heart valve cannot be repaired then it has to be removed and replaced by a new valve. Such valves are either made from high technology metal and plastic, or they are taken from pigs or human donors.
3. **Corrective surgery for structural abnormalities of the heart** – such as closing a hole in the heart (septal defect) present from birth, or the removal of a weakened area of muscle forming a bulge or aneurysm.

# Before the operation

## Before you come into hospital

### Getting fit for your operation

Preparing for your operation includes taking steps to improve your fitness. We should all take the following advice, but it is even more important before an operation on your heart, when the outcome of the operation can be improved:

**Smoking** If you smoke then you should consider giving up. The longer you can give up for - the better. After 6 weeks without a cigarette your blood will carry more oxygen around your body, and your lungs are less likely to develop an infection after the operation. If you need help to stop smoking then ask your GP, pharmacist, or telephone Quitline on 0800 002 200. ( website: <http://www.quit.org.uk> )

**Alcohol** If you are drinking a lot of alcohol it may be affecting the ability of your heart to function. Cutting down before you come into hospital will improve your overall health.

**Weight loss** Being overweight increases the chance of complications associated with anaesthesia and surgery. Sensible weight loss will help reduce such risks. Your GP practice should be able to help you diet to lose weight and reduce your cholesterol.

**Exercise** A regular walk at your own pace, without pushing yourself, will boost your stamina before surgery and help if you have a weight problem.

## Coming into hospital

### Your anaesthetist

An anaesthetist is a doctor who has specially trained in anaesthesia, the treatment of pain, and the care of very ill patients (intensive care). Your anaesthetist is responsible for your comfort and well-being before, during, and after your surgical procedure. A consultant anaesthetist will direct your anaesthetic care, and another qualified doctor, an anaesthetist in training, will often be looking after you as well.

## Pre-operative assessment

Some hospitals have a pre-operative assessment clinic (or pre-admission clinic) which you will be asked to attend. At this clinic you may be seen by a trained nurse, a junior doctor and an anaesthetist.

Additional investigations, such as blood tests and X-rays, may be necessary and these can be arranged at this stage, so that there will be no delays when you are called into hospital.

In addition to this clinic you will also be visited by your anaesthetist prior to your operation (pre-operative visit), at which time you will be able to discuss any further points, which may have arisen since the preoperative assessment clinic.

Some hospitals do not have pre-operative assessment clinics, or you may not be able to attend because of difficulties with travel and so on. This is not detrimental to your care but does mean the anaesthetist will need to spend more time with you at the pre-operative visit when you are admitted to hospital.

During the preoperative assessment clinic interview, your general health will be carefully evaluated along with your medical history in order to properly plan your care. You will be asked questions about the following areas:

**General health:** How well you have been in the last six-twelve months?

**Heart Problems:** Questions will be focused on your symptoms; how long you have been suffering from them, and what makes them better or worse. You will be asked about your blood pressure control, previous heart attacks, and strokes.

**Medical History:** Do you have additional medical problems such as: diabetes, epilepsy, symptoms of gastric reflux, or asthma? Have you undergone any operations in the past?

**Previous Anaesthetics:** Any problems or reactions that you or your family have had in relation to anaesthesia.

**Medications:** Tablets or preparations that you take whether prescribed by your GP or bought "over the counter". This includes herbal remedies and other complementary therapies. It is important to continue most medications up to the time of your surgery. Certain drugs, particularly those used to "thin the blood" and prevent clotting (eg: aspirin, clopidogrel and warfarin) may need to be stopped before your admission to hospital and you will be advised of this.

**Allergies:** Any reactions you have had to medicines, foods, or substances such as latex; contained in rubber gloves, balloons, and condoms.

**Dental Work:** It is necessary for your anaesthetist to know if you have any loose teeth, caps, crowns or bridgework so that damage can be avoided when breathing tubes, and monitor probes are placed in your mouth after you are anaesthetised.

In addition to asking you such questions, you will be examined. Particular attention will be paid to your heart and lungs, and assessment of your ability to open your mouth and move your neck. You should inform the anaesthetist if you have any pain or stiffness on moving your neck.

After the evaluation the anaesthetist will be able to tell you about the procedures associated with your surgery. The anaesthetic and any choices that are available will be discussed with you, with along with associated risks and benefits.. The anaesthetist will also discuss the following aspects of your care:

**Starvation:** It is necessary for your stomach to be empty when you are anaesthetised. This reduces the risk of anything regurgitating into your lungs as you lose consciousness. You will therefore be asked not to eat solid food for at least six hours prior to surgery. Water is usually allowed up until two hours before the operation.

**Pre-medication:** Sedative drugs may be given to you an hour or two before surgery either as an intramuscular injection or, more commonly, in the form of tablets. This sedation is termed the "pre-med" and it may help to relax you and alleviate anxiety.

**Routine medications:** Many of the medicines you take daily have a protective effect on your heart. It is important that this protection is continued during the operative period. Your anaesthetist will advise you as to which of your medications you should take before surgery and which of them (if any) should be stopped. Drugs can be taken with a sip of water right up to the time of surgery if necessary.

## During the operation

### Your anaesthetic

“Anaesthesia” means, from the Greek, "without feeling", and the term “general anaesthesia” means a state of controlled unconsciousness during which you will be completely unconscious, pain free and unaware of events..

We say “falling asleep” when we talk about anaesthesia, but in fact you are much more deeply unconscious when under an anaesthetic than when you are asleep at night.

Drugs that produce anaesthesia work by blocking the signals that pass along your nerves to your brain. When they wear off then you will begin to feel normal sensation again, such as pain. Anaesthetic drugs can be injected into a vein, or breathed into the lungs as gases. They are carried to the brain by the blood where they stop the brain from recognising messages coming from the nerves of the body.

Epidural anaesthesia is also used for a small number of heart operations. A small tube is placed in the space in your back behind the spinal cord. The nerves from your spine must pass through this space and so when anaesthetic drugs and painkillers are injected into it, the nerve signals will be blocked. If the use of an epidural is possible for your anaesthetic; then your anaesthetist will discuss it with you in detail.

## The operating department

When you arrive in the Operating Department, (“theatres”), you will be met by one of the operating department assistants who works with the anaesthetists. They will check through your details and paperwork with you again.

Following this you will be transferred into the anaesthetic room or the operating theatre itself. The team will then prepare you for the anaesthetic and the operation.

## Monitoring

Before you are anaesthetised the following monitoring will be established to assist the anaesthetist during the course of your operation:

**ECG**                      Sensors will be attached to your limbs and chest to monitor your heart rate and rhythm.

**Pulse Oximeter**      A clip will be placed on your finger to measure the amount of oxygen your blood is carrying.

**Blood Pressure Cuff**      This will be used to check your blood pressure before the insertion of an arterial cannula.

**Arterial Cannula**      Your anaesthetist will insert a cannula into the artery in your wrist, first infiltrating the skin with local anaesthetic to prevent you feeling pain. This cannula is connected to an electronic device which continuously

measures your blood pressure during and after the operation. The arterial cannula also enables samples of blood to be taken for testing during the operation.

**Central Venous Line** This is a large cannula, or drip, that is placed in a vein in the neck. Some cannulae have several compartments through which the pressure of the blood entering the heart can be measured and various drugs administered during the operation.

**Pulmonary Artery Catheter** A special monitoring device that is some times used to measure the heart function and the pressures inside the heart.

These monitoring lines may be put in before or after you are asleep, either way there is no discomfort from having this done.

Other monitoring may be instituted after you are anaesthetised. This includes the following:

**Transoesophageal Echocardiogram (TOE)** You may have had an echocardiogram before you came into hospital. Unlike the probes that are placed on the chest wall; this probe is designed to be placed in the oesophagus (gullet), via the mouth, to scan the heart and assess its function during the operation. It is essential when you are having an operation on one of your heart valves.

**Urinary Catheter** This is placed in the bladder to collect urine to assess how well the kidneys are working during the operation.

## Induction of Anaesthesia

Once all the necessary monitors and “drips” are in place, your anaesthetist will administer oxygen via a facemask, as a safety measure. Anaesthetic drugs are then injected slowly through one of the “drips” in your arm. These drugs may make you feel a little dizzy at first, and can cause your arm to feel very cold and stiff as they pass through your veins. You may also feel the urge to cough. These sensations are all normal. They only last a few seconds as you drift off to sleep under the anaesthetic.

Once you are completely asleep, and deeply anaesthetised, the anaesthetist will place a breathing tube (endotracheal tube) into your airway. Placement of central venous lines and a urinary catheter (see above) complete the initial preparation for surgery.

## Maintenance of Anaesthesia

During the operation your anaesthetic will continue to be given either through your drip, or as a gas that you breathe into the lungs. Most operations take approximately 4-6 hours, and your anaesthetist(s) will ensure your safety throughout - until you are transferred to the Intensive Care Unit or Recovery room.

Many patients worry about the possibility of being awake during the surgery (ie: able to re-call events during an operation). This is termed being "aware". This risk for general anaesthesia is approximately 1 in 1,000 procedures, although the risk of being "aware" during heart surgery is higher than this. Newer monitoring techniques for measuring the level of anaesthetic agents and the activity of the brain during anaesthesia are likely to reduce the risk of being "aware" in the future.

## Blood transfusion

During most operations, some blood will be lost. If necessary, your anaesthetist can usually make up for this blood loss by giving you other types of fluid into a vein through a drip.

It may be possible to collect your blood during the operation and return it to you ('blood salvage' or 'cell saving').

It may also be possible to take blood from you before or during your operation and store it so that it may be returned to you towards the end of your surgery (autologous transfusion).

There is a possibility, however, that you may need a blood transfusion during or after your operation. Blood used for transfusion (donor blood) is extensively screened to prevent the transmission of disease, and modern transfusion practice is very safe. You can be assured that your doctors will keep the extent of blood transfusion to the minimum required for your safety.

# After the operation

## The Intensive Care Unit

After your operation you will be transferred from the operating theatre to an intensive care unit (ICU) or high dependency unit (HDU). Here, other anaesthetists (Intensivists) will keep you heavily sedated, for a further period of time, to enable you to recover from the operation.

Your heart rate, blood pressure, breathing and kidney function will be closely monitored and all the fluids and medication you receive will be carefully controlled. Your breathing will be assisted by a machine (a ventilator) until it is appropriate, and safe, to turn off the sedation and to let you wake up completely. The breathing tube will then be removed and oxygen administered via a clear plastic facemask. This awakening process usually takes place 4-6 hours after the end of the operation, but can be considerably later than this (even days) in some patients depending on age, medical condition and type of surgery.

When you awaken all of the drips and monitors that the anaesthetist placed prior to surgery will still be present. In addition to this you will have tubes in the chest that help drain blood and fluids from the operation area. You may also have some wires attached to the heart (pacemaker wires) that can be used to control the heart rate and rhythm after surgery.

## Pain Control

After the operation your anaesthetist will ensure that you receive strong pain killing drugs to keep you comfortable. Pain killers are given in the following ways:

**Infusions:** Powerful pain killing drugs (eg: morphine) are usually given intravenously (ie: into a vein via a drip). This infusion may be controlled by the nurses but often a patient-controlled system (PCA) is used whereby, once awake, a patient can press a button to deliver a dose of pain killer when he/she feels the need for it. Safety features are built into this system to prevent overdose

**Suppositories :** These can be given into your back passage (rectum), often before you are awakened from your anaesthetic

**Tablets:** Administered when you are able to eat and drink,

**.Epidurals:** Can be used to prevent pain after surgery. These are always put in place before the operation.

If you are experiencing pain and discomfort after you operation it is important to let the nurses and doctors know. They will certainly ask you, on a regular basis, anyway! If they know your pain relief is not optimal they can change your treatment to improve matters. Many hospitals have pain relief teams to supervise this aspect of patient care.

## Physiotherapy

It is very important that you can breathe deeply and cough effectively, to help you avoid a chest infection or pneumonia. A physiotherapist will explain

breathing exercises to you and help you to cough vigorously. The intensive care nurses will also encourage you to do these exercises regularly.

## Returning to the ward

When the anaesthetists, surgeons, and intensive care unit staff are satisfied that you are recovering well, you will return to the surgical ward. For 90% of patients this will be within 2 days of the operation.

On the ward you will continue to be cared for by your surgical team, specialist nurses and physiotherapists. Blood tests, x-rays and scans are often repeated to monitor the progress of recovery of your heart, lungs, kidneys and other organs in this period.

# Risks and complications

## What are the risks?

Any heart surgery represents a major operation. But for coronary artery bypass surgery, for example, approximately 98 out of 100 people will survive the operation.

The risks of surgery and anaesthesia need to be assessed in relation to the risk "of not having an operation". In most cases the risk associated with not having surgery are far greater. Your cardiologist and cardiac surgeon will discuss this in detail with you before the operation.

Modern anaesthesia is very safe and for heart surgery the risk of the whole procedure far outweighs the risk of anaesthesia (by itself). It is this overall risk which is important to a patient. We are not all the same and therefore the risks will be different for different people. The risk increases depending on many factors, particularly the following:

Age

General health problems such as smoking and obesity

Serious medical problems such as diabetes, kidney disease, liver disease and heart failure.

Type of operation

Serious complications after heart surgery include:

|                                     |                             |
|-------------------------------------|-----------------------------|
| Stroke                              | 1 to 3 patients in 100 (3%) |
| Kidney Failure (requiring dialysis) | 1 to 2 patients in 100 (2%) |
| Re-operation for bleeding           | 2 to 3 patients in 100 (3%) |

Of the above complications stroke is perhaps the most serious. Many patients will, however, recover function to a great extent following their stroke. More generalised brain dysfunction is much more common than stroke after heart surgery. This manifests itself in several ways. It may, for example, affect a patient's memory, concentration, ability to learn and/or carry out fine manual tasks.

These disabilities have been linked to the use of the heart-lung bypass machine during heart surgery, but also occur when this is not used and after other major operations. These problems with brain function diminish with time, so that six months after surgery most patients will be back to normal.

## Further information

There are many sources of information that are available to patients scheduled for heart surgery. Most hospitals produce their own information leaflets about heart surgery and many of these contain information about anaesthesia.

The British Heart Foundation (BHF) produces a series of booklets on heart disease and its treatment. These can be downloaded from the BHF website: <http://www.bhf.org.uk> The Society of Cardiothoracic Surgeons of Great Britain and Ireland (SCTS) also have patient information on their website at: <http://www.scts.org> Finally, extensive information on all aspects of anaesthesia can be found on the Royal College of Anaesthetist's website: <http://www.rcoa.ac.uk> Click "patient information" - "your anaesthetic" on the right hand side of the Home Page.

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