Repairing your heart's leaking tricuspid valve by keyhole surgery (T-TEER)

Department of Cardiology

Information for Patients

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You are due to have a repair to your tricuspid valve. This booklet aims to help you learn what to expect before, during and after your procedure. If you have any questions that the booklet does not answer, please ask the nursing or medical staff looking after you.

What is tricuspid regurgitation (TR)?

You have a heart valve condition called tricuspid regurgitation. The tricuspid valve is 1 of 4 heart valves. They control blood flow in and out of the heart. It is between the right upper chamber (right atrium) and right lower chamber of the heart (right ventricle).

This valve manages blood flow from the right atrium into the right ventricle. The tricuspid valve is a tough, fibrous ring. It supports 3 leaflets or flaps. These leaflets open when your heart relaxes. They let blood flow from the right atrium into the right ventricle. They close when the heart contracts. This stops blood from flowing back into the right atrium.

Tricuspid regurgitation occurs when the valve does not close properly. Blood leaks back through the valve into the right atrium when it closes. This leakage

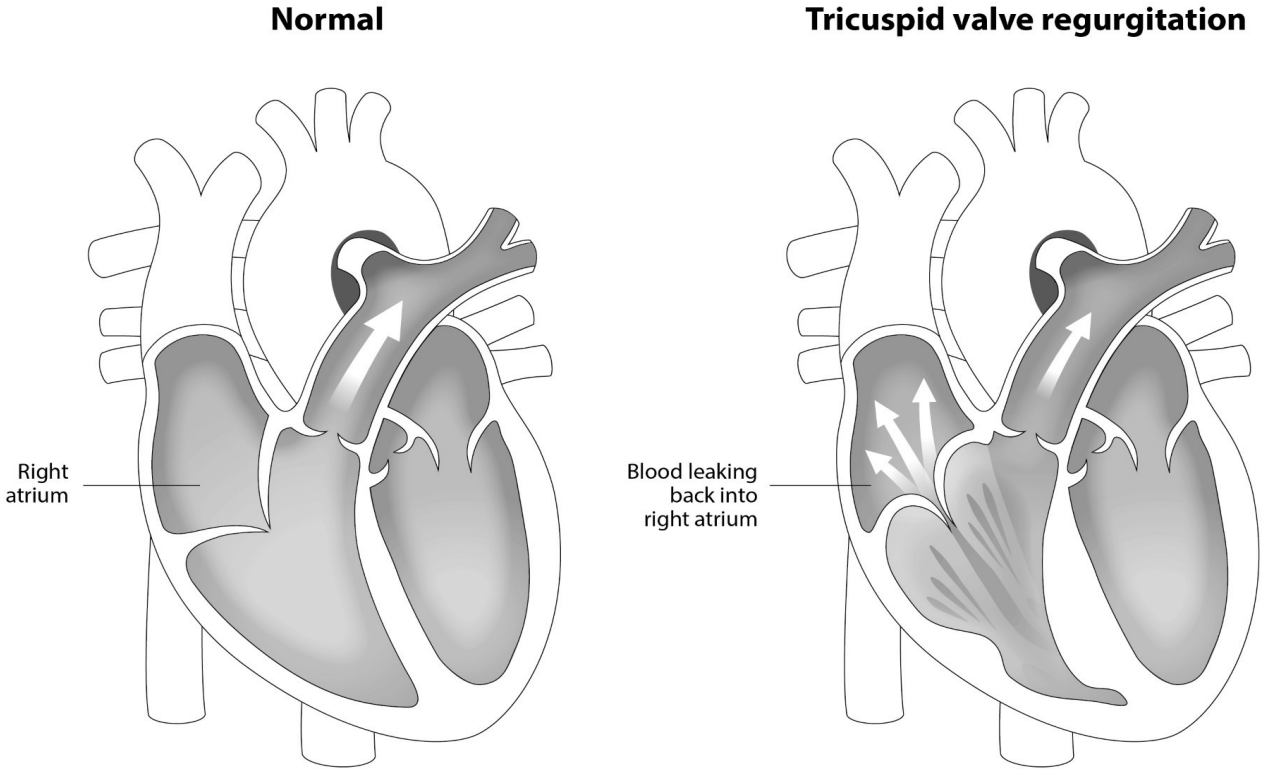
- reduces blood flow
- makes the heart work harder
- less blood reaches your lungs

Tricuspid regurgitation can get worse over time. You may not have symptoms until the condition becomes severe.

There are 2 types of tricuspid regurgitation

1. Primary TR is also called degenerative. It is most often caused by an abnormality of the valve structure.
2. Secondary TR is also called functional. It is the result of right ventricle or right atrium abnormalities/disease.

Without treatment, it usually gets worse over time . Medications can help manage the symptoms of tricuspid regurgitation. But the leak in the tricuspid valve may continue to get worse. This could lead to heart failure symptoms such as breathlessness, fatigue, and fluid overload. When these happen you may need surgery or transcatheter tricuspid valve repair to deal with the leaking valve.



What causes tricuspid regurgitation?

- Wear and tear of the valve as you get older
- Damage to the valve after a bacterial infection
- Problems related to the heart muscles
- Enlargement of the right atrium due to irregular heart rate (atrial fibrillation)
- Congenital heart defect affecting the valve's function and shape
- Rheumatic fever. An immune response to infection. It can damage the tricuspid valve
- Chest injury. An injury to the chest, such as from a car accident, may cause damage that leads to tricuspid valve regurgitation.

What are the symptoms of tricuspid regurgitation?

- Shortness of breath
- Fatigue
- Dizziness

- Swelling in the ankles, feet and /or tummy
- Irregular heartbeat
- Less able to exercise

How is tricuspid valve regurgitation treated?

If you have mild symptoms, we can use medicine to manage them.

If the medicines do not work we may need to try to repair or replace the valve.

The available medication options for treating TR are limited and may not address the underlying causes of the condition.

What surgery options are available to repair the valve?

Open heart surgery

Until recently this was the most common way to repair the valve..

We make a cut through the breastbone to repair or replace the weakened valve.

Transcatheter edge-to-edge repair (TEER)

TEER is a less invasive way. It can be used with some patients who cannot have open-heart surgery. The process for tricuspid TEER involves the following steps:

- You have a general anaesthesia
- We insert a tube (catheter) through a small cut in the femoral vein. This tends to be in the crease on the right side of the groin
- We guide a special device to repair the valve through the tube to the tricuspid valve
- We use X-rays and ultrasound scans to guide the procedure
- We release the device when it is in the right place. It clamps onto a part of the tricuspid valve. It brings the edges together. It helps reduce the amount of blood that leaks through the valve.

What are the benefits of this procedure?

The procedure is carried out to:

- lower tricuspid regurgitation
- reduce shortness of breath and chest pain.
- improve quality of life
- improve heart failure symptoms
- It is usually the case that the amount of tricuspid regurgitation is reduced significantly. However this does not automatically translate into feeling better. Around 70 out of 100 of patients will have an improvement in symptoms after the procedure. The amount of

improvement varies from one patient to the next. The benefits may be personal to you. Please talk to your consultant about this.

What are the risks of the procedure?

Every medical procedure carries certain risks. These vary from person to person. It is important to think about these risks before consenting to a procedure. There are a number of risks linked with Tricuspid-TEER you need to think about.

Common risks:

- Bruising/discomfort at the place the tube is inserted
- 1 in 100 risk of stroke, heart attack or minor bleeding
- 5 to 10 in 100 risk of the valve repair not working well
- 1 to 3 in 100 risk of collecting fluid or blood around heart. You may need drainage or surgery
- 1 to 5 in 100 risks of major bleeding from the catheter site at the top of the thigh
- 1 to 5 in 100 risk of causing irregular heartbeat (arrhythmia)
- 1 to 4 in 100 risk of infection related to the procedure, including infection of the valve itself
- 5 in 100 risk of causing major Tricuspid regurgitation where the blood flows the wrong way in the heart as the tricuspid valve does not close properly.

Rare risks:

- Less than 1 in 100 risk of death
- Less than 1 in 100 risk of device moving out of position after the implant
- Less than 1000 to 10,000 risk of radiation induced cancer by using X-ray machine for the procedure
- Damage to teeth, throat or food pipe (oesophagus): During the procedure, the doctor will insert a flexible tube (a probe) down your throat into your food pipe (oesophagus). This is a transoesophageal echo (TOE), which provides imaging guidance for clip placement. Fewer than 1 in 1,000 people (0.1%) have serious complications from a TOE, such as damage to teeth, throat or oesophagus

Complications relating to general anaesthesia – these vary from patient to patient and will be discussed with you by your anaesthetist. In some patients who are frail and in poor general health recovery after anaesthesia can be slow, with delayed restoration of normal lung function, chest infection, confusion episodes, and kidney failure.

Blood transfusion: Very unlikely

Other procedure: Urgent support related to the flow of blood within the organs and tissues in the body or emergency heart surgery.

Your pre-admission appointment

Eat and drink as normal for this appointment .

Before your admission, you need to attend an appointment at Clinic D in Glenfield Hospital. You will stay for about 2 hours.

- You will have a simple test to check your heart's rhythm and electrical activity (ECG) (electrocardiograph) and blood tests.
- We will take swab samples your nose, between your legs (perineum) and visible skin wounds to check for MRSA.
- If you have been hospitalised in the UK or abroad in the last 12 months, we will take an extra swab from your back passage (rectum) to test for CRO infection
- A nurse will look at your health problem. They will review your medical history. During this appointment, you will get more information. You can also ask any questions you may have.
- If you are taking any blood-thinning medications or have diabetes, the nursing staff will tell you which medications you need to stop before the procedure. Please remember to bring all your regular medications to your pre-assessment appointment and on the day of admission.
- It is very important to tell us of any known allergies, whether to medications or other substances

Giving your consent for the procedure

You need to give your legal consent. You will sign a consent form during your outpatient appointment with the heart consultant or when you are admitted.

It is important that you ask any questions or raise any concerns before signing.

Admission to hospital

- We will admit to the hospital either the day before your procedure or early on the day of the procedure
- In the admission ward, we may take some blood tests again

What happens on the day?

- You cannot have solid food for 6 hours and water for 2 hours before the procedure. The ward staff will tell you when you need to stop eating
- If there is too much hair growth in the groin area (catheter incision site), it may be shaved off.
- You will need to shower with an antibacterial wash. You will then put on a gown
- An anaesthetic doctor and your cardiologist will check you. You are asleep (general anaesthesia) for this procedure

How is the trans-catheter edge to edge repair (Tricuspid-TEER) done?

It can be done in the cardiac catheter laboratory or in theater by a cardiology team under general anesthetic.

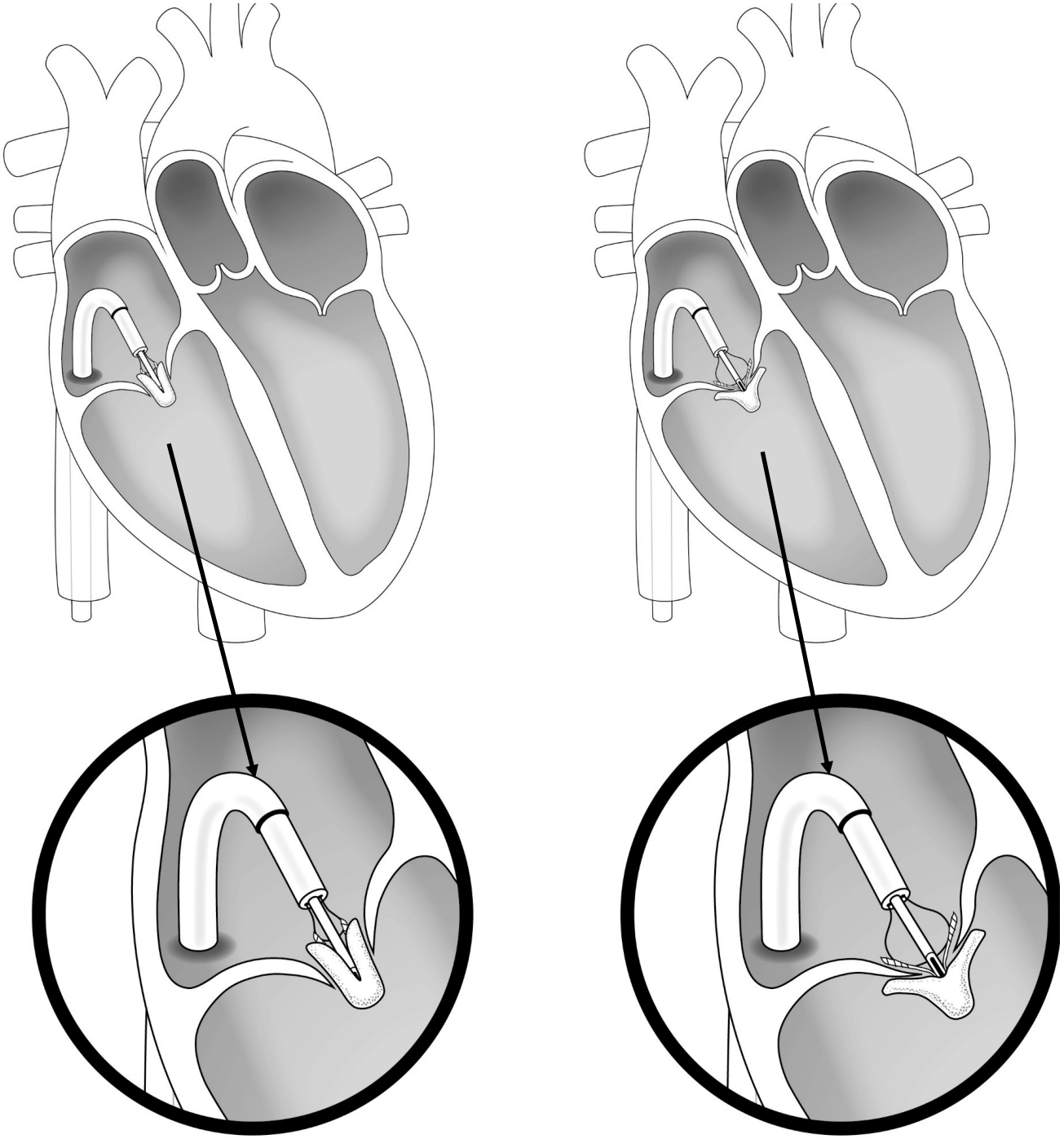
When you arrive in the catheter room or in theater;

- you will see that there is a lot of machinery. This can be overwhelming. Do not be alarmed. This is special monitoring and X-ray equipment
- you will need to lie on your back on a X-ray table. We will attach heart monitor wires will to you
- the anaesthetic doctor will insert a small needle in your hand
- you will get some oxygen from a mask
- the anaesthetist will give you injections to make you sleep. We will give you 1 dose of antibiotics, just before the procedure to prevent infection.
- once you are asleep, we will put a tube in your windpipe. This will let the anaesthetist support your breathing during the procedure.
- we will then put an ultrasound probe (transoesophageal probe) into your food pipe (gullet). We can then study the tricuspid valve during the procedure. This will help your consultant in positioning the catheters and repair device.

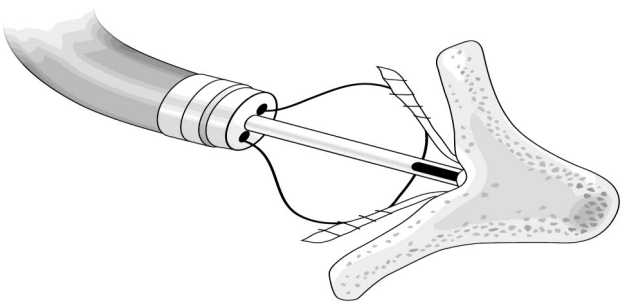
To begin the procedure, the cardiologist will

- clean your left and right groin areas with a cold antiseptic liquid
- they will then cover you with sterile sheets to maintain a sterile working area.
- We will inject you with local anaesthetic in the correct groin area to numb (freeze) the area
- your doctor will make a small cut in your groin to access your femoral vein
- the repair device is prepared and inserted in to a tube-like device called a delivery catheter. The tube (catheter) will be put into the blood vessel and guided into the right atrium
- using imaging equipment, the catheter with the repair device will be guided to the tricuspid valve. The cardiologist will then attach the repair device to the valve. They will place it to clasp the tricuspid leaflets together. This will help reduce the blood leak. After checking the final position of the repair device, your doctor will release it from the delivery system.
- the doctor may use one or more devices to repair the leak. Once the valve leaking is reduced enough, the catheter will be removed.
- the doctor may close the catheter insertion site using a closure device that uses stitch (suture). It will stay in place and never need removing. Sometimes there will be a visible stich that will be remove before you go home.
- to aid closure one of the team members will apply pressure to your groin. This will normally be done whilst you are asleep,
- we will put a small sterile dressing on the area once the bleeding has stopped.

- The procedure takes 2 to 3 hours. You will be asleep for most of this time. Once you wake up, the recovery team will assist you.



Repair device



After the procedure

- We take you to the recovery unit until you wake up.
- Once you have fully recovered from the anaesthesia, your nurse from the cardiology ward will collect you from the recovery area
- When you return to the ward, the nurse will check your blood pressure, pulse and pulses in your feet (called 'pedal pulses'). We will also do an ECG (electrocardiograph) or heart tracing. These are all normal checks. They are needed in case you start having any issues.
- You remain on bed rest for a period up to 4 hours to prevent any potential bleeding.
- If you have short-term loss of feeling (numbness) or weakness in your leg, we will take special steps to make sure you are safe when you first get up.
- If you need to pee and your leg is numb, it may not be safe to walk to the bathroom. You will use a urinal or bedpan instead.
- You can go home when your doctor says it is okay. Tell your nurse right away if you have
    - a fever
    - chest pain
    - swelling at the groin
    - pain in your groin or leg
    - bleeding at your groin site

If you have any specific worries about any of these issues, please talk to your consultant.

Before discharge

On the evening of the procedure we will check your medications. They will be started again.

Sometimes you will be asked to do a repeat scan of your heart (echocardiogram) before discharge.

Discharge

If there are no issues you will be able to go home 24 to 48 hours after your procedure. The doctors will speak to you about your results. You will need to have someone to drive you home.

Going home after the procedure

You should do as little as possible for 3 days this means,

- **no heavy lifting**
- **no heavy cleaning**
- **no heavy shopping**
- **no heavy gardening**

- You must not drive for 4 weeks. You do **not** need to contact the DVLA unless you hold a PSV/HGV license.
- It is likely that you will get a painful bruise over the puncture wound in your groin. This is due to bleeding under the skin. If a painful lump does develop, especially if the groin becomes painful when walking, please ask for medical help.
- Following the procedure, you may notice bruising and discoloration above and below the groin, potentially extending to the knee. This discoloration can be blue-purple at first. It will slowly change to yellow over the course of a week, which may look quite unpleasant. It is important to note that this often does not cause pain and is not serious. If you have minor pain, you can take paracetamol for relief
- Avoid baths, hot tubs, or swimming pools for the first 5 days or until the wound is closed. Showers are okay after 24 hours. Do not let the spray hit the site.
- Avoid bending or squatting or any intense activity such as running, or lifting anything over 20 pounds for 1 week.
- Take short walks (5 to 10 minutes) 4 or 5 times a day and build up slowly.

If in the 1st week of going home you have any doubt or problem with your groin wound, please contact your GP.

You can go back to work when your consultant say its okay.

It is not common to have serious bleeding from the wound site once you are home. If bleeding does happen you must lie down:

- do not panic
- lie down on the floor (not the bed), where you are less likely to faint.
- ask a relative or friend to apply pressure with the flat of the fingers of both hands or a clenched fist over the groin wound for 30 minutes
- ask someone to call 999.

You should get urgent medical advice if you feel unwell after the procedure with symptoms of:

- Chest pain
- Dizziness
- Fainting
- Shortness of breath

Follow-up

We will send a letter to your GP when you leave hospital. It will explain what you have had done It will list your medications.

After 6 to 8 weeks, you will have an ultrasound scan of your heart. You will see the cardiologist. The doctor will then decide about any future appointments.

How long will the procedure take?

The length of the procedure can vary. It tends to take between 2 to 3 hours..

How long will I stay in the hospital after the procedure?

You will stay in hospital for 24 to 48 hours. Before you leave, your doctor will discuss your aftercare plan with you to help your recovery.

What can I expect after the procedure?

You must have tegular check-ups with your doctor. After your procedure, you might be asked to return for a follow-up appointment to have your heart valve checked.

When can I resume my regular activities?

It is important to carefully follow your doctor's instructions, especially if you need to take any medications. Ask your doctor about when you can safely resume medications, travel, exercise, and other medical procedures such as dental work.

Is it safe for me to have an MRI scan?

Tricuspid-TEER devices are MRI-conditional. They can be safely scanned under certain conditions. Please tell your doctor that you have a tricuspid–TEER device if you are need an MRI.

How long will my repair device last?

The repair device should not need to be replaced. Your cardiologist will regularly check it regularly.

Does tricuspid-TEER cure tricuspid valve disease?

This procedure may ease many of the symptoms of valve disease. Some patients may continue to need medications even after a successful procedure.

Interpreters

Please tell a member of staff if you need an interpreter. We are committed to preventing discrimination and promoting equality and diversity.

Glossary of terms

Cardiac catheterisation: A test is done to see how well your heart is working. It finds out if there are any diseases affecting the heart muscle, valves, or coronary arteries. Doctors insert a long, narrow tube called a catheter into a blood vessel in your arm or leg. They guide it carefully to your heart using a special X-ray machine. They inject contrast dye into the blood vessel through the catheter. This lets us take X-rays of your heart's valves, coronary arteries, and chambers.

Catheter laboratory (Cath Lab): An examination room in a hospital or clinic. It has diagnostic imaging tools to see the heart's arteries and chambers. We can do any the treatment of any heart problems.

Congenital heart defect: Congenital heart defects are heart problems you are born with. Some of these can affect the shape and how the tricuspid valve works. In children, tricuspid valve regurgitation can be linked with a rare condition called Ebstein anomaly. This condition occurs when the tricuspid valve does not form correctly. The valve is lower than normal in the lower right chamber of the heart.

Contrast dye: A solution to show organs and tissues more clearly in X-rays, MRI, and CT scans.

Carbapenem resistant organisms (CRO): There are certain germs that normally live in the bowel. They tend to be harmless. They can aid in digestion. They stay harmless because the immune system of a healthy person keeps them in check. It stops them from spreading to other parts of the body. In some cases, these germs can become antibiotic-resistant. This means that certain antibiotics no longer work against them. In specific situations, they can lead to infections. Some of these germs may develop into Carbapenem Resistant Organisms (CRO). They have become resistant to powerful antibiotics known as carbapenems.

Electrocardiogram (ECG): A test used to check your heartbeat and electrical activity. We attach sensors to the skin. They find the electrical signals produced by your heart each time it beats.

Echocardiogram (echo): Uses sound waves (ultrasound) to create a moving picture of your heart. It shows the structure and function of your heart valves and heart chambers. It takes around 20 minutes

Haemodynamic support: We use medications and fluids to keep your blood pressure and heart rate within the normal range.

Methicillin-resistant staphylococcus aureus (MRSA): An infection caused by a type of staph bacteria. It has become resistant to many of the antibiotics used to treat ordinary staph infections.

Percutaneous: checks the inner organs through a needle puncture of the skin.

Rheumatic fever : it is a complication of strep throat that can cause permanent damage to the heart and heart valves. When this occurs, it is referred to as rheumatic heart valve disease.

Transoesophageal echocardiogram (TOE): a test is sometimes done to take clearer pictures of the heart. It uses a probe down your throat. You lie down and swallow the thin tube. We may give you some drugs to help you relax before we do this.

Further information

www.nice.org.uk/guidance/ipg352

British Heart Foundation – www.bhf.org.uk

The British Heart Foundation funds research into all heart and circulatory diseases and the things that cause them. The website contains a lot of helpful information, including:

- Tests for heart conditions
- Heart valve disease
- Caring for someone with a heart condition
- Cardiac rehabilitation

British Heart Valve Society – www.bhvs.org.uk

This is a group made up of medical staff with an interest in heart valve disease. It includes patient representatives. It is linked to the British Cardiovascular Society. It aims to improve the care of patients with valve disease by education and training programmes, literature and web information. It also aims to set standards of care for individuals, services and hospitals.

Heart Valve Voice – www.heartvalvevoice.com

Heart Valve Voice is a collection of people with real experiences of heart valve disease, including a group of experts in the field (cardiologists, cardiac surgeons, GPs), cardiac patient societies, and patients themselves. Leaflets include “Recovering from treatment”, “Post-treatment checklist”, and “10 surprising things you may not be able to do right after your treatment.”

Contact details

Structural Heart valve Specialist Nurse-07950 870 853 (Monday to Friday 8am to 4pm)

Structural co-ordinator-0116 258 3361 (Monday to Friday 8am to 4pm)

If you have any questions, write them down here to remind you what to ask when you speak to your nurse/doctor/consultant:

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