University Hospitals Birmingham NHS Foundation Trust



Mitral Balloon Valvuloplasty for Mitral Stenosis

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Contents

Background – the Mitral Valve	3
Mitral Stenosis	4
Treatment for Mitral Stenosis	4
What is a Mitral Balloon Valvuloplasty?	5
How often is the procedure successful?	5
How long will the Mitral Balloon Valvuloplasty last?	6
What are the risks and complications of having this treatment?	6
Details about your procedure	8
Before your Mitral Balloon Valvuloplasty - at home	8
Before your Mitral Balloon Valvuloplasty -in hospital	9
The Mitral Balloon Valvuloplasty Procedure	10
After the Mitral Balloon Valvuloplasty – in hospital	11
After the Mitral Balloon Valvuloplasty – at home	12
What can I do after discharge from the hospital?	12

Background – the Mitral Valve

The mitral valve is one of the four heart valves that control the flow of blood in and out of the heart. The mitral valve separates the upper left heart chamber (left atrium) from the lower left heart chamber (this is the main pumping chamber called the left ventricle). The mitral valve has two flaps, called leaflets. The leaflets open widely to let blood flow from your lungs into the main heart pumping chamber of your heart.



Figure 1: Drawing of a heart with close up of mitral valve. This has thin normal leaflets and opens fully.



Figure 2: Abnormal mitral valve: here the leaflets are thickened and do not open fully, restricting flow.

Mitral Stenosis

If the leaflets become thickened, stiff or fused at the edges, blood flow through the valve is reduced, and because blood cannot drain from the lungs as easily, this usually causes breathlessness, particularly on exertion.

The process of valve narrowing is very gradual and progressive. It usually occurs as the late consequence of a childhood throat infection called 'rheumatic fever'. However for many patients, this initial childhood infection might not have caused any significant symptoms and so might not have been noticed at all. Either way, patients usually present in adult life with progressive breathlessness as the valve begins to narrow. More sudden onset breathlessness can occur in certain circumstances such as a change in heart rhythm, or in pregnancy.

Treatment for Mitral Stenosis

Medication

There are two aspects to medical therapy. The first is to prevent blood clots forming in the upper chamber (left atrium) that increase the risk of stroke. Warfarin (an anticoagulant, or 'blood thinner') is usually used to stop these clots forming.

The second aspect is to improve symptoms of breathlessness. This usually involves tablets that reduce heart rate, such as calcium channel blockers, beta blockers or digoxin (particularly if the heart rhythm has changed to one called atrial fibrillation, which is a common rhythm associated with mitral stenosis). In addition diuretics (also called water tablets) can reduce congestion the lungs and so improve breathlessness.

Mitral Valve intervention

If in spite of medications, breathlessness persists, then the valve itself need to be fixed. The two options are mitral valve replacement surgery or mitral balloon valvuloplasty, and are explained below.

What is a Mitral Balloon Valvuloplasty?

Before the advent of mitral valvuloplasty in the 1980s, open-heart surgery was the only treatment available to fix a narrowed mitral valve. However since the 1990's, a minimally invasive balloon dilatation is now the preferred mode of treatment for most patients. This is called a 'Mitral Balloon Valvuloplasty'. The procedure involves positioning a deflated balloon across the valve, and then briefly inflating the balloon to stretch open the narrowed valve.



Figure 3: Balloon on catheter in position across mitral valve, being inflated to stretch the valve open.

If successful, the procedure improves blood flow through the heart valve and so reduces your breathlessness.

While the procedure is usually performed to reduce breathlessness, it is also sometimes used to prevent anticipated problems (such as complications that might occur during pregnancy).

How often is the procedure successful?

The procedure is almost always successful, but the degree of relief of valve narrowing varies according to the characteristics of your mitral valve. A good result is achieved in over 85% of patients.

How long will the Mitral Balloon Valvuloplasty last?

The procedure offers immediate relief from symptoms and improves blood flow, but is not a cure for mitral valve disease, which must be managed with regular follow-up checks, medication and good lifestyle practices.

If a good initial result is obtained, then about 8 out of 10 (80%) patients will be free of significant symptoms at 5 years, and 60% to 75% still feeling well at 10 years, and 30% to 40% at 20 years. However there is quite a lot of variability with long term outcomes dependent on features of the valve and your age.

If the condition recurs, then there are several treatment options. These include repeating the balloon treatment, mitral valve surgery, or other transcatheter mitral treatments.

What are the risks and complications of having this treatment?

Every medical procedure has some risk. The risks of a mitral balloon valvuloplasty include:

Mitral regurgitation (severe): about 5 in 100 (5%). The balloon used to open the valve usually causes it to re-open up along the edges that have become stuck together. However, sometimes the valve re-opens along a different line causing a tear into the leaflets. Though the narrowing will have been relieved, when the valve closes it will leak causing some blood flow back from the lower pumping chamber into the upper chamber (left atrium) with each beat. Under these circumstances a cardiac operation to replace your mitral valve may be the best option and this would usually happen at a later date.

Stroke: less than 1 a in 100 people (1%) have a stroke while having the procedure.

Death: Less than 1 in 100 people (1%) die while having the procedure. This can be due to an underlying heart problem or due to complications of the procedure.

Bleeding: about 5 in 100 people (5%) have bleeding from the puncture site/s after the procedure. This is managed with manual pressure and/or a pressure device. Bleeding usually resolves within a few hours.

Collection of blood around the heart requiring drainage: about 1 in 100 people (1%) have a collection of blood around the heart. The blood may need draining using a small tube inserted below the breastbone, or with an operation.

Damage to the blood vessel requiring surgical repair: Less than 1 in 100 people (1%) have damage to the blood vessel that is used to insert the catheter that requires repair through surgery.

Atrial septal defect: Less than 1 in 100 people (1%). This is the creation of a persistent communication between the top 2 chamber of the heart due to the puncture hole in the septum not closing within a few weeks (as it normally should). This usually requires no treatment, but if needed this can be repaired with a different procedure.

Damage to teeth, throat or oesophagus: About 1 in 10,000 people (0.01%). During the procedure, the doctor will put a flexible tube (a probe) down your throat into your swallowing tube (oesophagus), which very rarely can cause damage teeth, throat or oesophagus.

Details about your procedure

Before your Mitral Balloon Valvuloplasty – at home

Hygiene

Hygiene is very important both before and after your procedure. Have a shower the night before your admission and the morning of your procedure. Pay special attention to washing under skin folds such as under the breasts, the groin and genital area. Do not shave or remove hair from your chest, arms, legs or groin before your procedure. If needed, shaving will be done in hospital just before your procedure.

Food and drink

If you are admitted on the day of the procedure, then make sure not to eat anything after midnight on the day of your procedure. If you are admitted the day before, the ward staff will make sure that you do not eat after midnight. You may drink clear fluids only, up to two hours before the procedure.

Medication

Most medications should continue as usual on the day of your procedure, but some need to be omitted. Please bring all your usual medications into hospital.

What if I am taking a 'gliflozin'(also called an SGLT2 inhibitor)?

Canagliflozin, dapagliflozin, and empagliflozin must be discontinued three days before your procedure and ertugliflozin should be stopped at least four days prior to your procedure.

What if I am diabetic?

- Do not take Metformin on the morning of your procedure
- Do not take other tablets for diabetes on the morning of your procedure

• Do not take insulin on the morning of your procedure. The doctors may use a dextrose and insulin (given through a vein in your arm as an infusion) to control your sugar levels if necessary

What if I am taking warfarin or other anticoagulants?

Usually you must stop taking anticoagulant medication three days before your procedure. Anticoagulant medications include:

- Warfarin
- Apixaban
- Rivaroxaban
- Edoxaban
- Dabigatran

In most cases this temporary discontinuation is safe. However, if you have an artificial (mechanical) heart valve, or other strong reason to be taking one of these drugs, your consultant may have arranged for you to come into hospital two days earlier in order to switch you to an alternative blood thinning medication such as heparin. If you have any doubts, please ring your consultant's secretary before stopping your anticoagulant drug.

If you are unsure about taking any of your medication before admission to hospital, please seek advice from hospital staff at the preadmission clinic.

Before your Mitral Balloon Valvuloplasty – in hospital

Arriving at hospital

A bed will be reserved for you on Ward 304, which is located on the 3rd Floor at the Queen Elizabeth Hospital Birmingham.

You must ring the ward on the morning of admission and they will tell you what time to come in: **Ward 304 phone number 0121 371 3049**.

On arrival at the Queen Elizabeth Hospital Birmingham, go to the Information Desk on level 0, where the receptionist will direct you to your ward.

On the ward

When you get to the ward, a nurse will show to your bed. Unfortunately, we cannot guarantee a time that your procedure will take place. There may be delays if other patients need to be seen in an emergency, but staff on the ward will keep you informed.

Your anaesthetist

On the ward or in the Cardiac Catheterisation Suite (also called the cath lab), you will see an anaesthetist. Anaesthetists are doctors who specialise in pain relief and look after patients who have operations and procedures. Your anaesthetist will ask about your general health and the medications you are taking, and any allergies and previous anaesthetics.

Please tell your anaesthetist/doctor/nurse if you are taking:

- Anticoagulants (medicines to prevent blood clots)
- Diabetes medication

The anaesthetist will plan your pain relief, and your care and recovery immediately after your procedure.

The Mitral Balloon Valvuloplasty Procedure

This procedure uses both X-rays and ultrasound to give us the best possible imaging of your heart valve. It is therefore performed under a general anaesthetic, in the catheterisation laboratory (cath lab).

Before you are taken to the cath lab, you will be asked to change into a hospital gown and will have a cannula, (a small plastic tube), inserted into a vein in one of your arms so we can give medication to you.

When you arrive at the cath lab you will be asked to lie comfortably on the x-ray table. Staff will check your identification and explain which procedure you are having. The anaesthetist will then give you sedation to make you go to sleep. A ventilator (artificial breathing machine) will help you breathe during the procedure. Machines will also be used to monitor your heart rate, blood pressure and oxygen levels.

Once asleep, a thin probe will be gently passed into your swallowing tube (oesophagus). This will allow us to see very detailed ultrasound (echo) images of your heart to guide the procedure. The cardiologist will then insert a thin tube into the artery at your wrist (radial artery), and in the vein at the top of your right leg (femoral vein).

The cardiologist then uses both X-ray images and images from the echo probe to guide a thin tube from the vein at the top of your leg, up through the veins to your heart, and then into the correct heart chamber. Once in place, this tube is used to manipulate a balloon into position across the narrowed mitral valve. The balloon is then inflated, so widening the narrowed valve by re-opening the stuck-together leaflets (see figure 3).

All the equipment is then removed before you wake up

You may notice a slightly sore throat (from the anaesthetic and echo probe), and you will have a pressure dressing on your wrist and at the top of your right leg.

After the Mitral Balloon Valvuloplasty – in hospital

When you feel ready the nurses will let you know when you can eat and drink. You may feel tired from the anaesthetic, but you can get out of bed and walk around later the same day or the next day. We expect you to get up, dressed and moving as soon as possible after your procedure because being active will help you to recover more quickly. The area around the top of your right leg and right wrist may have some bruising and may feel a little tender. A member of the team will discuss the results with you before you go home. You will usually be discharged the day after the procedure, and will be given a follow up appointment.

After the Mitral Balloon Valvuloplasty – at home

Once you are home, you can gradually return to your normal activities. You can do gentle exercise, but you need to avoid strenuous exercise or heavy lifting for a week.

Keep the area around your groin and wrist clean and dry.

If the area becomes red, or starts to itch, ooze or swell, please contact the Sister on the Ward from which you were discharged.

What can I do after discharge from the hospital?

If there have been any changes to your medication, this will have been explained to you before discharge, and details will be in your copy of your discharge letter.

Gradually increase your activity levels to normal over the next two or three days.

There are no restrictions to driving.

If you require this information in another format, such as a different language, large print, braille or audio version please ask a member of staff or email **patientexperience@uhb.nhs.uk**.

Cardiology

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