

Biventricular Pacemaker / Cardiac Resynchronization Therapy (CRT-P)

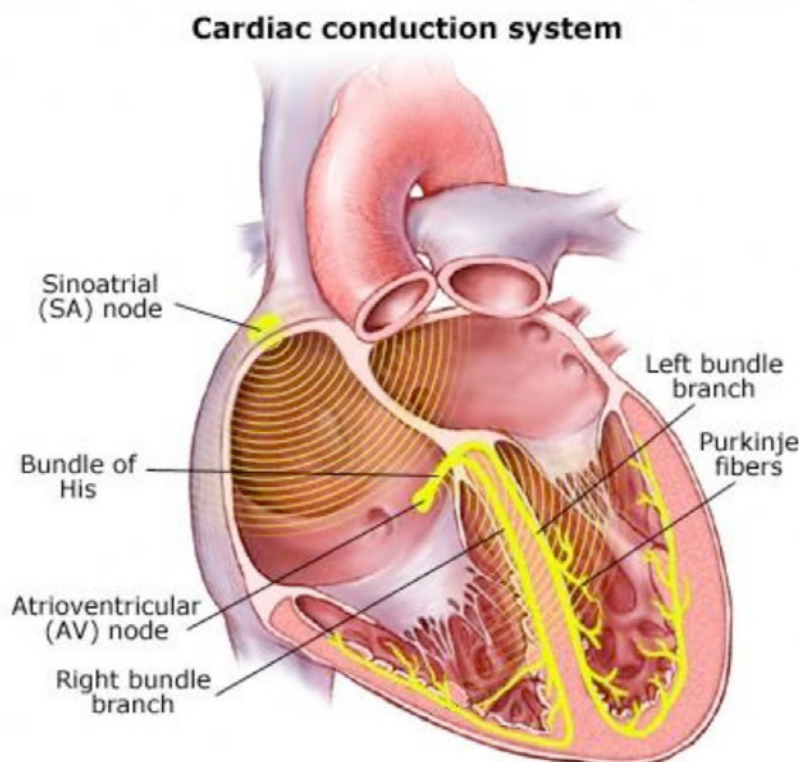
Cardiac Intervention Unit Patient information

How the heart works

The heart consists of two pumps side by side. One pump circulates blood around the lungs before emptying into the second pump. The second pump circulates blood around the body. Each pump consists of two chambers, the atrium (top) and the ventricle (bottom).

The heart needs an electrical impulse to generate a heartbeat. The electrical impulse starts in the heart's natural pacemaker called the Sino Atrial node (SA node). This is situated in the right atrium. The electrical impulse travels through the tissues of the conduction system causing the heart muscle to contract in sequence, the atrium before the ventricle.

There is a junction between the atria and ventricles called the Atrio-ventricular node (AV node), which allows communication between these chambers.



Courtesy of Boston Scientific

The contraction of the ventricles is what you feel as a heart beat. The heart normally beats 50-100 times at rest. The heart beats regularly and slowly at rest and faster during physical and emotional activity.

Heart failure

Heart failure occurs when the heart pump is weakened or damaged. If the heart muscle begins to fail the heart does not pump as efficiently as it should do and this can increase the strain on the heart.

In some people with heart failure, problems can develop in the ventricles of the heart causing a delay in the contraction of the right and left ventricle. When this occurs the walls of the left ventricle do not contract at the same time. This is sometimes referred to as dysynchrony. As a result the heart has less time to fill with blood and is not able to pump enough blood to the rest of the body. This can lead to an increase in heart failure symptoms such as:

- breathlessness
- swelling of the ankles or legs
- lack of energy and feeling tired
- difficulty sleeping at night due to breathing problems.

What is a biventricular pacemaker?

A pacemaker is a device that sends tiny electrical impulses to the heart muscle to stimulate the heart to contract. This is called pacing.

Pacemakers consist of a pulse generator (the pacemaker) and one or more leads. The pacemaker is composed of a battery and a sophisticated timer, which is enclosed in a small metal case. Leads are used to connect the generator to the chambers of the heart. The leads are very fine, flexible wires that are connected by a small hook or screw into the heart muscle.

Conventional pacemakers can have one lead, which is placed in either the top or the bottom right chamber. Or they may have two leads, which are placed in the top and bottom right chambers of the heart. A biventricular pacemaker is a specialised pacemaker which has an additional lead positioned in the bottom left chamber of the heart.

A biventricular pacemaker delivers small electrical pulses to both of the lower chambers of the heart (the ventricles). This allows them to beat together in a more synchronised, coordinated pattern, therefore causing the heart to pump blood to the rest of the body more efficiently. This is why this treatment is also known as cardiac resynchronisation therapy and it can help to reduce the symptoms that can occur with heart failure.

A biventricular pacemaker is not a replacement for drug therapy but is designed to work in conjunction with your medications. It is important that you continue taking all of your medications as prescribed by your doctor.

Why do I need a biventricular pacemaker?

Despite taking regular medication you may still be limited by your heart failure symptoms. A biventricular pacemaker is designed to assist your medication in improving these symptoms by synchronising the heartbeat and improving the pumping function of your heart. This should hopefully then lead to an improvement in your quality of life.

Preparation for the procedure

The procedure will be fully explained to you before signing a consent form. If you are unsure of anything, ask the doctor or the arrhythmia nurse specialists before signing the consent form.

If you take warfarin you will be given specific advice regarding this. If you take DOAC's (direct oral anticoagulants) once a day you should miss one dose; if you take DOAC's twice a day please omit two doses prior to the procedure.

X-rays are used during the procedure so it is important to inform the team looking after you if you think there is a possibility you may be pregnant.

You should not have anything to eat or drink for at least four hours before your procedure. You may take your tablets with a few sips of water. If you have a bath or shower before the procedure please do not use any oils or body moisturiser.

You will be given a hospital gown to wear, a needle (cannula) will be inserted into a vein in your arm, some blood will be taken and antibiotics will be given using this cannula.

what happens during the procedure?

The procedure is performed in one of the cardiac catheter laboratories in the Cardiac Intervention Unit (CIU). These are special x-ray rooms that look like an operating theatre. You will be taken into the room and greeted by the team looking after you, consisting of a doctor, a cardiac physiologist, a radiographer and two nurses. Sometimes there may be other people in the room observing for teaching purposes. Please inform the staff if you have any objection to this.

Once you are lying on the x-ray table, the Cardiac Physiologist will place ECG stickers on your chest, a blood pressure cuff on your arm and a probe on your finger. This will enable your heart rate, blood pressure and oxygen levels to be observed throughout the procedure. An oxygen mask will also be placed on your face.

You will be lightly sedated during most of the procedure. The sedation will make you feel relaxed and sleepy. Before the procedure starts your chest wall will be cleaned with iodine tincture (brown) and sterile towels will be draped over you. The bi-ventricular pacemaker is usually implanted on the left side of your upper chest. If you are uncomfortable at any time during the procedure, or if you are very anxious, please let the nurse or doctor know.

Local anaesthetic will be injected just underneath your collarbone, which will cause a stinging sensation for a few moments before the area feels numb. The doctor will then make a small cut here. The pacing lead is passed down a vein into the bottom right chamber of the heart (right ventricle). A second pacing lead may be inserted through the vein and placed into the top chamber of the heart (right atrium). The third pacing lead is sited in the bottom left chamber (the left ventricle) via a vein positioned at the back of the heart. It is necessary to locate a suitable branch of this vein in order to site this third lead in a satisfactory position.

The leads are moved into position using x-ray. The Cardiac Physiologist will then perform some tests on the leads to check they are in a good position. They are secured into position with a few stitches.

A pocket is made, usually between the skin and muscle for the biventricular pacemaker. Sometimes the device will be positioned under the muscle. The leads are connected to the pacemaker, which is then inserted into the pocket. The Cardiac Physiologist will perform some more checks to ensure that the biventricular pacemaker will function as intended. The cut will either be closed with glue or dissolvable stitches and a dressing will be applied.

Are there any risks with having a biventricular pacemaker fitted?

As with any procedure there are risks involved and all measures are taken to minimise the chances of complications. However it is important to be aware that occasionally complications do occur due to this procedure. These include:

- bruising to the chest area, which should get better on its own. This is more likely if you are taking blood thinning medication. Sometimes blood can collect under the skin and lead to swelling referred to as a haematoma. The risk of this occurring is approximately 1 in 500 (0.2%)
- the possibility of puncturing the lung causing air to be trapped between the linings of the lung (pneumothorax). This may need to be corrected by inserting a drain into the chest (1:100 risk)
- rarely fluid can accumulate around the heart (pericardial effusion) and reduce the hearts ability to pump (cardiac tamponade) (1:500 risk)
- infection (1:100 risk)
- the leads from the biventricular device to the heart chambers become displaced such that a further procedure is required (1:50 risk)

X-ray screening will be used during your procedure. This means that you will be exposed to ionising radiation. Such exposure carries a very small risk of tissue damage in the long term.

Please be reassured that all of these risks are extremely small. If you have any further concerns please discuss it with your doctor.

What happens after the biventricular pacemaker is fitted?

Once you have returned to the ward you will remain in bed for a couple of hours depending on how sleepy you are. The wound may feel sore once the local anaesthetic has worn off. It is important you inform your nurse who can give you painkillers.

You should not lift your arm on the same side as the pacemaker above shoulder level for at least one week. This is because there is a small risk that the leads can move out of position.

Several hours following your procedure you will have a chest x-ray to check the placement of the leads. You will be given a pacemaker identification card, this will either be given to you before discharge or sent to you several weeks following your admission. Please ask the nurse if you have any questions or concerns about the device.

Getting back to normal

You are encouraged to get back to normal as soon as possible after having the biventricular pacemaker inserted. After an initial convalescence period you will be able to return to your normal daily activities. The pacemaker will not prevent you from undertaking physical activity as before and there is no reason for the device to affect your sex life. You may travel as normal with a biventricular pacemaker fitted.

When will I be able to drive?

The Driving and Vehicle Licensing Agency (DVLA) have guidelines in relation to patients who require a pacemaker and whether they are safe to drive. There will be some restrictions but these will vary according to why you had the device implanted. Generally people cannot drive for one week following the procedure. If you drive for a living or hold a Group 2 (bus/lorry) licence please check with the arrhythmia nurses or DVLA what restrictions apply.

You can access the DVLA guidelines www.gov.uk/driving-medical-conditions. You must inform the DVLA and your insurance company that you have had a device implanted. Failure to do so may invalidate your insurance.

When can I return to work?

There are no hard and fast rules about when to return to work as everyone is different. Speak to your doctor about returning to employment and discuss your biventricular pacemaker with your Occupational Health Department or Health and Safety Advisor if necessary.

Do I still need my drugs when I have the device?

In general you will still need your drugs with your biventricular pacemaker as they are designed to work together to improve your symptoms. Never discontinue any drugs without consultation with your doctor.

Is there any equipment that may affect my device?

Equipment that uses electricity and magnets has electromagnetic fields around them. These fields are usually weak and will not affect your pacemaker. Strong electromagnetic fields can cause electromagnetic interference (EMI) and affect the functioning of your pacemaker.

The majority of everyday mechanical and electrical devices will not affect its function as long as they are properly maintained. Household appliances such as radios, cookers, computers, dishwashers and microwaves can all be used as long as they are in a good working condition.

It may be necessary to discuss your working environment, but precautions may need to be taken with certain pieces of equipment.

Further information regarding electro-magnetic interference will be provided before you go home.

Follow up care

It is important that you attend the follow-up clinics. The first biventricular pacemaker check is about four weeks after the device has been implanted and then, if there are no problems, once yearly. The pacemaker clinics are held in the Cardiac Department, Royal Bournemouth Hospital. These clinics are managed by cardiac physiologists.

A biventricular pacemaker is only one part of management for heart failure patients. Close follow-up with a heart failure specialist, medications, diet and life-style change will also help decrease symptoms and aim to improve quality of life.

Changing the biventricular pacemaker battery

The battery life of a biventricular pacemaker is approximately five to 10 years. The battery life is checked at every follow-up appointment. It will NOT be allowed to run down.

Having the battery changed is a similar procedure to having the biventricular pacemaker inserted although new leads will not usually be put in.

Further support and advice

Before you go home, the arrhythmia nurse specialist will come and spend some more time with you. They will provide you with a discharge booklet, which contains further information for you to take home. Further information will be provided regarding convalescing after the procedure, looking after the wound and practical issues of living with a biventricular pacemaker.

If you or your family would like to speak to someone about your biventricular pacemaker please contact the arrhythmia nurses on:

Tel: **0300 019 6154** 9am until 5pm, Monday to Friday

Email: **uhd.rrhythmia.nurses@nhs.net**

Please leave a message as the answerphone is checked frequently for messages and your call will be returned as soon as possible.

The above number should only be used for general enquiries. If you have an unrelated medical concern please contact your GP, or in the event of an emergency please dial 999 and ask for an ambulance.

Information on the internet

The following are web sites that provide information for patients. Whilst we recommend these sites, we cannot be held responsible for information that you collect from them. To locate the site connect to the addresses below:

www.rrhythmiaalliance.org.uk

www.bhf.org.uk

www.dvla.gov

www.guidant.com

www.medtronic.com

www.sjm.com

To read this leaflet in a different language,
please visit our website: **www.uhd.nhs.uk/visit/patient-information-leaflets**
and use the language and accessibility function available along the top of the site.

To ask for this leaflet in larger print, please contact the patient experience team on **0300 019 8499**
or email **uhd.patientexperienceteam@nhs.net**.

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