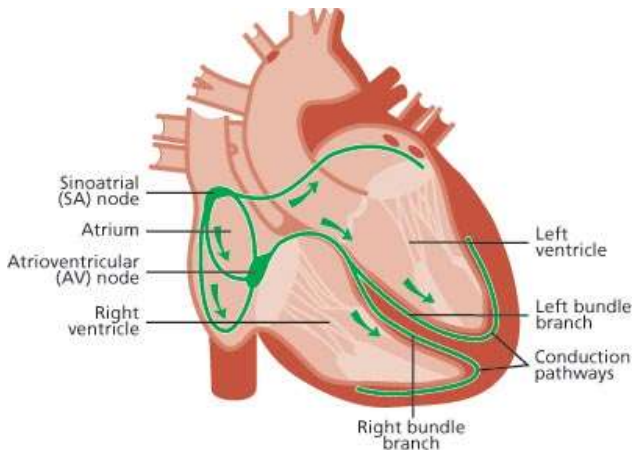


What is atrioventricular block and what does it mean? Information for young people

Atrioventricular (AV) block is a type of arrhythmia or abnormal heart rhythm. The passage of the electrical message travels at a different speed which can make the heart beat more slowly. There are different levels of AV block – first degree, second degree, third degree. This information sheet from Great Ormond Street Hospital (GOSH) describes AV block, what causes it and how it needs to be treated.

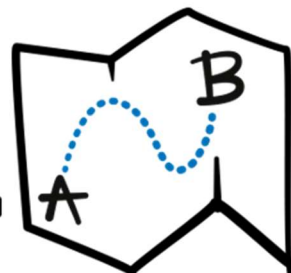
The heart has an electrical system that makes it pump. The normal electrical impulse starts in a specialised area of heart tissue in the right atrium called the SA Node. It then passes from the right atrium through to the ventricles via the AV node.

As the impulse passes through the atrium it contracts pumping blood into the ventricle. It has the same effect when it passes through the ventricle pumping blood to the body. This electrical impulse travels through the heart each time it beats. It is something that happens naturally – you can't feel it.



AV block is where there are different levels of slower communication between the SA and AV node. This can cause the heart to beat more slowly, and has different levels of reduced communication – first degree, second degree and third degree.

First degree AV block is a lengthening of the time it takes for the signal to pass between the SA node in the right atrium and the AV node. 1st degree AV block is usually picked up during a routine ECG and doesn't usually cause any problems. Most people do not feel any symptoms and do not require any treatment.



Second degree AV block is where some of the atrial beats from the SA node don't get through to the AV node. There are various subtypes of second degree AV block:

- **Mobitz Type 1 (Wenkebach):** There is progressive delay in conduction between the SA node in the right atrium and the AV node. This delay lengthens until there is a dropped beat. This then resets and the pattern repeats itself.

This rhythm creates a regular pattern which is safe. For many people, it is common during sleep, but sometimes occurs while awake too. Most people don't have symptoms so it doesn't need any treatment. Monitoring is needed though but if you don't have any changes, you may be discharged from GOSH.



- **Mobitz Type 2:** There is no delay in conduction between the SA node in the right atrium and the AV node. There are regular beats from the SA node, but at irregular intervals there is failure in the communication to the ventricles and so ventricular beats are dropped.

People with this type of heart block require additional monitoring and follow up to ensure that there are no changes to heart function or that the heart block is not getting worse.

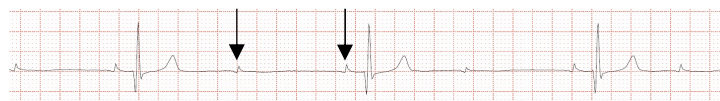
Sometimes people with this type of heart block experience symptoms such as: dizziness, light headedness (pre-syncope), fainting (syncope), tiredness, and reduced exercise tolerance. Mobitz II can

sometimes be classed as higher degree AV block.



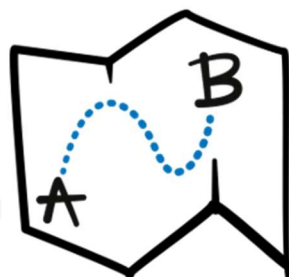
- **High grade AV block** – There are regular beats from the SA node but they do not all conduct to the AV node. There is a fixed ratio of conducted beats to non-conducted beats – this might be for example a ratio of 3:1 or 2:1

This results in slow ventricular contractions and a slow heart rate. This can progress further to fewer conducted beats until there is complete heart block. People with this type of heart block sometimes experience symptoms such as: dizziness, light headedness (pre-syncope), fainting (syncope), tiredness, and reduced exercise tolerance.



Third degree AV block (complete heart block) is where there is no relationship between the conduction of the SA node and the ventricles contracting. The SA node continues to fire but there is no communication to the AV node. The AV node then sends out its own beat, however, this is always slower than that of the SA node. It is also less able to respond to the body's needs, such as to speed up with exercise. This causes a significantly slower heart rate and requires treatment.

People with this type of heart block can experience symptoms such as: dizziness, light headedness (pre-syncope), fainting (syncope), tiredness, and reduced exercise tolerance. For some patients a pacemaker may be required to help support their heart beat and respond to their



body's demands, ensuring the ventricles beat in coordination with the top of the heart.



What causes AV block?

It can be difficult to know why heart block has developed and sometimes no cause is found to explain why this has happened. Some medications can cause types of heart block.

Other causes can be: infection and inflammation, cardiac surgery, muscle disease, channel ion disease, and electrolyte imbalance. Although some of these causes are more serious they are also very rare, you will have tests at the hospital to investigate these – usually these causes are investigated with blood tests.

Some people are born with complete heart block this is called 'congenital complete heart block'. In some people it can be related to an abnormality in the structure of the heart, which affects how the electrical impulses can travel through the heart.

In other cases, however, the mother is found to have specific antibodies in her blood. These antibodies are called 'anti Ro' and 'anti La', and are often found in association with autoimmune conditions (where the immune system mistakenly attacks itself – such as in arthritis, Sjogrens, or lupus). During pregnancy these antibodies cross the placenta and react with the tissue through which the impulses pass – this is called the conduction system. It is thought that this reaction damages the conduction system, which is usually permanent.

What are the symptoms of AV block?

Symptoms can include dizziness, palpitations, tiredness, reduced exercise tolerance, feeling your heart miss a beat, fainting (syncope) or almost fainting (pre-syncope). If you are having episodes

of fainting or collapse you need to let your doctor know.

If you are experiencing symptoms in the red flags box below you should seek immediate medical attention. In younger children and babies who are unable to say what they are feeling they may have symptoms such as reduced feeding, tiredness, or breathlessness. Depending on the degree of heart block you may never experience any signs and symptoms.

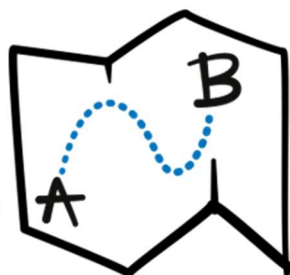
Red flags

- Changes in behaviour, lethargy, irritation
- Dizziness or feeling faint (pre-syncope)
- Collapse (syncope)
- Changes in circulation: colour change such as dusky or pale skin, clamminess or cool hands and feet
- Breathlessness or breathing difficulties

How is it diagnosed?

A variety of tests will be performed to check how your heart's electrical system is working as well as cardiac function. Our routine screening includes:

- An **ECG** records the electrical signal as it is conducted through the heart. It is a simple test performed by placing sticky electrodes on the child's chest, legs and wrists. An ECG is entirely safe, takes a few minutes and causes no pain, although the child may be anxious about the stickers and connecting wires.
- An **Echo** is an ultrasound scan of the heart. A picture of the heart is produced from which an accurate assessment of the size and function of the heart can be made. The scan takes from 30 to 40



minutes. As before this test is not painful, but children sometimes find the jelly on the probe a bit uncomfortable. Children can watch their favourite videos during the scan.

- An **exercise test** is a specially modified test that assesses the rhythm and function of the heart at a faster rate, while the child is on an exercise bicycle or a treadmill. Blood pressure and breathing are also monitored during the test. This test is usually only performed on children over the age of eight years due to their size.

Exercise testing also provides us with an objective measurement of improvement, stability or worsening of heart function over time. The test takes approximately 45 minutes and allows symptoms not obvious at rest to become apparent when the heart is working harder. We recommend children to wear loose comfortable clothing for the test.

- A **24-hour ECG** recording (or holter) uses a small box similar in size to a mobile phone, from which three leads are attached by sticky pads to your child's chest. This is an ECG monitor that continuously records the heartbeat over 24 to 48 hours. Children wear the monitor under their clothes and can continue with their normal daily life including sport and exercise.

You and your child will be asked to document your child's activities during the 24 to 48 hour period to match with the recording when the box is analysed. When the test is finished, you will be required to return the monitor to GOSH so that the results can be analysed.

- Blood tests are taken to look for electrolyte changes and infection markers.

- An **MRI scan** uses a magnetic field rather than x-rays to take pictures of your child's body. The MRI scanner is a hollow machine with a tube running horizontally through its middle. Your child will lie on a bed that slides into the tube. An MRI scan usually lasts between 20 minutes and an hour



How is AV block treated?

Depending on the degree of AV block there may be no treatment required and you will be discharged.

Some types of AV block are at risk of progressing or getting worse and it is therefore important to keep you under monitoring. You should make any medical teams know in the future that you have had these investigations.

Some patients will require a pacemaker – we will discuss this with you as the team review the ECG traces. It is unusual for this to need to be done as an emergency and this can be planned with plenty of time for preparation.

Any questions?

You can get in touch with the Arrhythmia Service on 020 7405 9200 extension 5298, email them on gosh-ecg.tr.gosh@nhs.net or contact them via MyGOSH once you have registered. More information about MyGOSH is at www.gosh.nhs.uk/your-hospital-visit/mygosh

Arrhythmia Alliance – call 01789 867 501 (24 hour helpline) or visit their website at www.heartrhythmcharity.org.uk

British Heart Foundation – call their Heart Helpline on 0300 330 3311 or visit their website at www.bhf.org.uk

Can I drink caffeinated drinks?

Tea and coffee can be consumed within recommended guidelines unless you have been advised otherwise. Energy drinks contain high levels of caffeine and should be avoided.

Can I exercise?

Exercise limitations will be discussed with you in clinic, most patients are able to exercise as they would normally unless you have experienced syncope or pre-syncope. Sometimes an exercise test will be advised to understand what happens to your heart rhythm as you exercise.

