QUIZ 21st March 2018 (answers below)

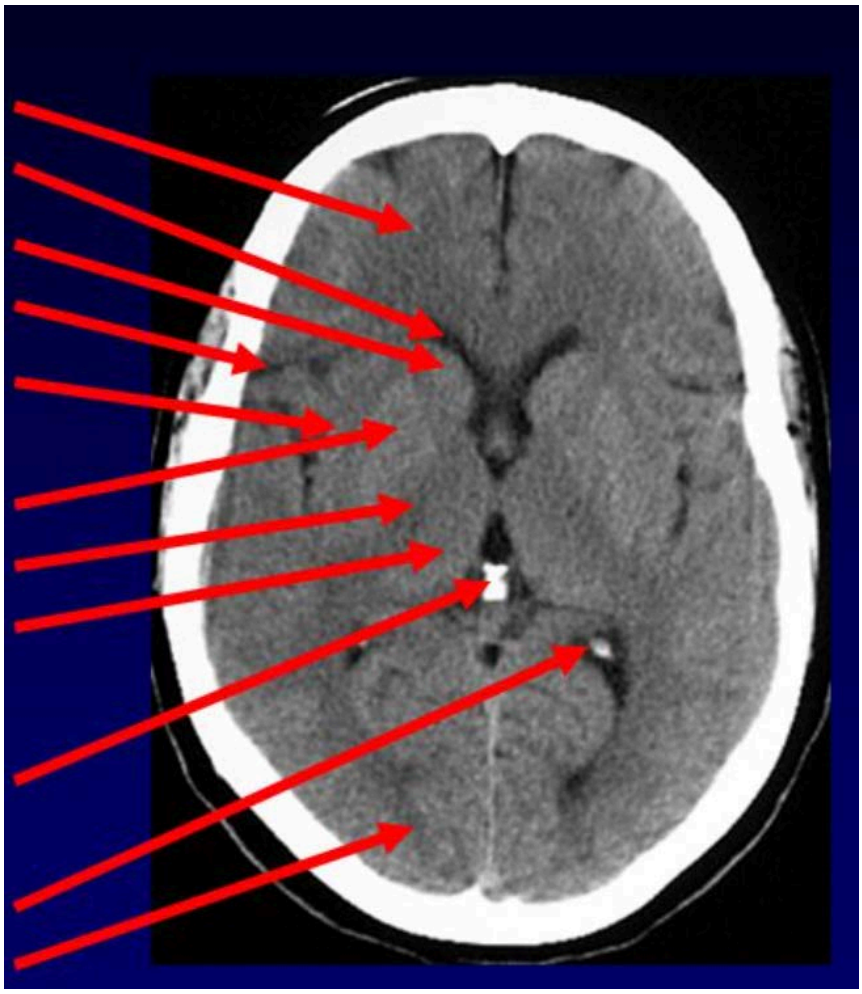
1. **What is biventricular pacing?**

2. **What is pacemaker-mediated tachycardia?**

3. **What is overdrive pacing?**

4. **Why might you place a magnet over a patient's pacemaker?**

5. **Label the following normal non-contrast CT head slice.**



QUIZ answers 21st March 2018

1. **What is biventricular pacing?**

Left bundle branch block can cause decreased left ventricular function because the left ventricular lateral wall contracts later than the septum and right ventricle. Biventricular pacing, also known as cardiac resynchronisation therapy, aims to correct this by placing a lead in both ventricles and pacing them simultaneously.

A biventricular pacemaker is inserted the same way as a standard pacemaker via the subclavian vein with a right atrial lead and a right ventricular lead. The left ventricular lead is inserted through the coronary sinus in the right atrium and fed posterior toward the left ventricle.

2. **What is pacemaker-mediated tachycardia?**

Pacemakers can cause inappropriate ventricular tachycardia for a number of reasons, such as over sensing, but the term pacemaker-mediated tachycardia refers to the re-entrant tachycardia that can occur in dual chamber pacing.

In pacemaker-mediated tachycardia, the pacemaker senses atrial depolarisation and paces the ventricle. This depolarisation travels back up the AV node (retrograde) and is then sensed again as atrial depolarisation and the ventricle is paced, and around it goes.

It is often triggered by a ventricular ectopic beat that travels retrograde to the atria, or else a failure to capture the atria with a paced beat, followed by a paced ventricular beat that travels back up the AV node.

It can be avoided or treated by adjusting the programming, namely increasing the post ventricular atrial refractory period.

3. **What is overdrive pacing?**

Patients that require an Automatic Implantable Cardioverter-Defibrillator (AICD) often have episodes VT, or have a period of VT preceding ventricular fibrillation (VF). Even though it can be lifesaving, delivery of a shock via an AICD is painful and distressing for the patient. Delivery of multiple shocks is very traumatic, and if the person is conscious, or the shocks are inappropriate, the patient can develop a posttraumatic stress disorder and require significant psychological support.

Monomorphic VT due to prior myocardial infarction is due to a reentrant circuit. Viable myocardium is interlaced with non-viable myocardium and two circuits can form a loop with different rates of conduction so that one circuit can travel back up the other and arrive at the beginning just in time for the refractory period to be over again and so the excitable myocardium depolarises down the faster circuit again.

Overdrive pacing depolarises the excitable myocardium before the current can get back to it – so it is at a faster rate than the VT – "overdrive pacing". This means that the excitable "bridge" is no longer there to continue the circuit, and it stops.

This is a simple 2 dimensional description of what is happening, whereas the heart is obviously 3D and a bit more complex. This is why it only works 80 – 90% of the time. There is a risk of actually accelerating the VT. If ATP doesn't work after a predetermined set of attempts, or the rate accelerates or goes into VF, the AICD will shock the rhythm.

ATP offers the potential for painless termination of VT, potential avoidance of VF and increases the life of the AICD. An AICD can now be thought of as an ATP device with defibrillation as back up. All AICDs also have bradycardia demand pacing potential in addition to anti tachycardia pacing.

4. Why might you place a magnet over a patient's pacemaker?

A magnet placed over AICD/PPM will stop the sensing function while it is there. It does not cause any permanent change to the device. Removal of the magnet will put the device back to its former state.

An AICD will not fire unless it senses VF/VT. With a magnet placed over it, an AICD will not fire – no antitachycardia pacing and no defibrillation will occur. It is "turned off" while the magnet is placed over it. It will restart when the magnet is removed. Inappropriate firing is a reason to place a magnet over an AICD.

A magnet stops the sensing function of the pacemaker and it commences pacing at a mandatory pre-set rate (usually 80 – 100/min) "factory settings". If there is dual chamber leads, AV pacing will occur at a fixed interval. It is called "asynchronous pacing" as it no longer synchronises with the patient's intrinsic activity. Over or under sensing may be a reason to place a magnet on a pacemaker as all sensing related issues are immediately removed and a safe rate of pacing can occur while the pacemaker is interrogated and reprogrammed.

5. **Label the following normal non-contrast CT head slice.**