Transcatheter Aortic Valve Implantation

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1) What is aortic stenosis?

The aortic valve controls the flow of blood leaving the heart. In some people, as they get older, the leaflets of the valve become calcified (hardened like limescale) and because they therefore do not open properly, the valve becomes narrowed (this is called aortic stenosis). This narrowing reduces the flow of blood leaving the heart and causes the main pumping chamber (called the left ventricle) to work harder. Around 6–8% of patients aged 80 and over have symptoms due to aortic stenosis. These symptoms may be very limiting and include breathlessness, chest pain on exertion, light-headedness, blackouts, breathlessness when lying flat in bed and ankle swelling. Aortic stenosis can be present for some years before it causes symptoms.

Once aortic stenosis causes symptoms (even if mild) the condition is serious and progressive. In addition to affecting the quality of life it significantly reduces life expectancy. Unfortunately, medications only partially relieve the symptoms and do not change the progression of the narrowing. In the past the only treatment available was open heart surgery to replace the narrowed valve. There is now an alternative treatment called TAVI.

2) What is TAVI and why have I been referred for this?

TAVI stands for Transcatheter Aortic Valve Implantation. It is still a relatively new treatment for severe symptomatic aortic stenosis and is an alternative to open heart surgery. TAVI is less invasive than open heart surgery and therefore usually leads to a much shorter stay in hospital and a shorter recuperation period. You have been referred to the TAVI Team at the Queen Elizabeth Hospital Birmingham because it is felt that you may benefit from TAVI rather than conventional open heart surgery. TAVI involves implanting a new biological aortic valve, suspended within a stent, to treat the narrowed aortic valve (see figures). Usually, this can be undertaken via a small procedure through the top of the leg (transfemoral TAVI). However, if leg arteries are unsuitable, the new valve may require implant via a small operation through the chest wall (transaortic, transapical or trans-subclavian TAVI). TAVI is currently reserved for patients who are considered unsuitable or at high risk from open heart surgery.
3) What tests will I undergo to assess whether I am suitable for TAVI?

To determine your suitability for TAVI, you will need to undergo a number of tests. These will include:

1) Echocardiogram
2) Coronary angiogram
3) Carotid Doppler
4) Spirometry
5) CT aortogram

**Echocardiogram** – in this test an ultrasound probe is passed over the chest wall to look at the heart and its valves. The test uses sound waves like sonar, is painless and harmless. Occasionally a transoesophageal echocardiogram will be needed to give more information. This test uses the same technology (sound waves) but this time the probe is passed down the food pipe (the oesophagus). This allows a better view of the aortic valve. The procedure is done under light sedation and can be performed as an outpatient.
II: Coronary angiogram – a coronary angiogram involves placement of a small tube, either via the wrist or the artery at the top of the leg, to look at the arteries supplying the heart in more detail. The test is usually done as an outpatient.

III: CT aortogram – this test is a CT scan which looks at all of the vessels leading from the artery at the top of the leg right up to the aortic valve. It allows us to decide if the valve can be implanted through the artery in the leg or through the chest wall.

IV: Carotid Doppler – this test is a painless ultrasound scan of the arteries in the neck to determine whether or not they are narrowed.

V: Spirometry – this is a simple blowing test to assess your lung capacity and to determine the risks of anaesthesia (if needed). The tests above will usually be done as an outpatient.

4) What are the risks and benefits of TAVI?

TAVI leads to an improvement in the symptoms described above and also prolongs life expectancy, compared with no treatment. Although TAVI is a much smaller procedure than open heart surgery, it nevertheless involves risks. The most important risks that you should be aware of are the following:

1) Overall the risk of not surviving TAVI at Queen Elizabeth Hospital is in the order of **4% (around 4 out of every 100 patients will not survive)**. The exact risk depends on several factors, such as how the TAVI procedure is performed (through the artery in the leg or through the chest wall) and also on a number of medical factors known as co-morbidities. These are other illnesses which you may have that can increase the risk of a TAVI procedure.

2) There is a small risk of a stroke during or shortly after a TAVI in the order of **2–3%**.

3) There is a risk that you may need to have a pacemaker implanted as a result of the TAVI procedure. This would usually be undertaken immediately after the procedure and before discharge. The chance of needing this depends on the type of TAVI valve implanted and is between **5–30%**. The doctors will decide on the best type of valve to use in your case.
4) There is a 5% risk of complications related to the site where the valve is inserted into the body. This may mean that a small operation is required to repair the damage.

5) There is a small risk that you may temporarily require kidney dialysis after the procedure. The risk of this is increased if your kidney function is abnormal prior to TAVI. The doctors will explain more regarding this particular risk, which will also be dependent on some other factors relating to your health.

6) There is around a 1% risk of an urgent open heart operation being performed should a serious complication occur.

5) How will my TAVI procedure be performed?

Most TAVIs at QEHB are undertaken via the arteries at the top of the leg (around 90%). The CT scan is used to determine if this is possible. Nearly all TAVI procedures done via the leg are undertaken with conscious sedation. This means you will be awake but relaxed during the procedure.

Sometimes the leg arteries are unsuitable and a TAVI operation through the chest wall will be needed. This will require a general anaesthetic but is much less invasive than an open heart operation. The doctors will choose one of three different routes when going through the chest wall (transapical, transaortic or trans-subclavian) and will use the route best for your situation.

6) How long can I expect to be in hospital for the procedure?

You will usually come in the evening before your procedure. Patients who undergo a transfemoral TAVI with conscious sedation are usually able to go home the day after the procedure. This means you will usually be in hospital for two nights only.

If the TAVI is undertaken via a small operation through the chest wall, the recovery period is a little longer but in an uncomplicated procedure you can expect to go home around 4–5 days after the procedure.
7) Other frequently asked questions:

**Will I need warfarin?** No. All the TAVI valves consist of a metal frame within which is suspended a valve made from animal (usually cow) tissue. This type of valve does not require you to take Warfarin. You will normally be advised to take Clopidogrel or Aspirin indefinitely after the procedure.

**Will I need to take any anti-rejection treatments?** No. This type of valve does not require any anti-rejection treatment.

**What type of valve will I have?** The team will choose a TAVI valve best suited to your particular situation. Currently, four different types of valve are used at QEHB (see figures)

- Edwards Sapien 3™
- Boston Scientific Lotus™
- Boston Scientific Acurate Neo™
- Medtronic Evolut R™

**Will I definitely be a candidate for TAVI?** The final decision on whether TAVI is appropriate for you will depend on a number of factors. A multi-disciplinary team meeting will be held in order to discuss your case in detail and to work out the best treatment for you. This will be attended by a variety of specialists, including interventional cardiologists, cardiothoracic surgeons, cardiac anaesthetists and cardiologists with specialist imaging expertise. All the information we have obtained about you will be assessed. In the end, some patients will be recommended to undergo conventional open heart surgery and others who are considered too high risk for conventional surgery will be offered TAVI. Some patients will be left to continue on medical treatment. Unfortunately not everyone referred for TAVI is suitable for this procedure.

**Am I too old for TAVI?** TAVI is generally undertaken in patients who are elderly and considered high risk for conventional open heart surgery. The average age of patients treated in the UK is about 84, and to date the oldest patient successfully treated at QEHB was 95.
How long will my TAVI valve last? Because this is still a relatively new development, there is no definitive data on how long your new valve will last. Our best estimates at this stage are that its longevity will be similar to surgically implanted biological valves, which we know is up to 20 years.

How many TAVIs have been performed at the QEHB? At the time of writing of this information leaflet (January 2018), the TAVI team at the QEHB have undertaken over 560 procedures and are considered an experienced centre.

How long does the TAVI operation take? The TAVI procedure normally takes around 90 minutes.

What happens next? After you have been referred we will normally wish to see you in clinic. It is a good idea if someone close to you comes along. If you are keen to be considered and if the doctor feels TAVI is the right treatment for you, then we will arrange the investigations mentioned above. After all the test results are known, we will discuss you in a TAVI multidisciplinary meeting. All the information will be looked at and the team will decide if is technically possible to perform TAVI and if this is the right treatment for you. We will write to you after this with the opinion of the team. If the decision is to perform TAVI, we will undertake this as quickly as possible.

What happens after the operation? Most patients go to the coronary care unit after the procedure. A few who undergo TAVI through the chest wall may go to the critical care unit (ITU). After a transfemoral TAVI you will usually be able to walk 4–5 hours after the procedure and go home the next day. TAVI procedures through the chest wall are more invasive and take a bit longer to recover from.

How mobile will I be at discharge? As TAVI is less invasive than open heart surgery and recuperation faster, most patients are self-caring at discharge and able to return to their homes without special care arrangements.

How soon can I drive after TAVI? The DVLA stipulate that you may resume driving one month after the TAVI procedure.

Who should I contact if I have further questions? If you have further questions, please contact Mrs Anne Morris (secretary to Dr SN Doshi) on 0121 371 4613.
The Trust provides free monthly health talks on a variety of medical conditions and treatments. For more information visit www.uhb.nhs.uk/health-talks.htm or call 0121 371 4957.

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