

New techniques in medicine

Laser balloon for heart surgery

For the first time, surgeons can see what is happening inside a patient's heart during operations to correct an abnormal rhythm. **Judy Hobson reports**

ALASER BALLOON with a tiny camera inside is enabling cardiologists for the first time to see exactly what is going on in a patient's beating heart while they burn tissue to correct an abnormal rhythm.

As well as the camera, the balloon also has a laser delivery fibre that can be moved up and down and rotated as required. This pioneering surgery is the very latest development in a treatment known as atrial fibrillation ablation.

Atrial fibrillation ablation is a treatment during which patients who have a rapid irregular heartbeat in the upper chambers of their heart – the atria – have their abnormal heart rhythms mapped, isolated and then ablated. Until now this has been done using radiofrequency energy via a catheter inserted in the groin.

The balloon technique takes the procedure 'out of the dark', allowing doctors to achieve much greater accuracy. As a result, around 80 per cent of patients being treated with it do not need repeat ablations. With other ablation techniques, half of patients need to have a second and sometimes a third procedure.

Cardiofocus in the USA developed the laser balloon, which is already in use in other European countries. In August the Heart Hospital in London became the first in the UK to use it to treat patients with intermittent atrial fibrillation.

Every year more than 200,000 patients in this country are diagnosed with this condition, caused by an electrical abnormality within the heart which can put them at increased risk of having a stroke. Symptoms include palpitations, breathlessness, chest pain, fainting and tiredness.

Drugs such as beta-blockers, Flecainide

and Amiodarone are often used to try to restore the heart's normal beat. It is when the heart fails to respond to these that atrial fibrillation ablation is considered.

The aim of the treatment is to block the rogue electrical impulses entering the heart and triggering the abnormal rhythm. This is done by creating a barrier of small burns in the tissue – ablations – around the entrance to the four pulmonary veins in the heart. Doing this creates a barrier of scar tissue that will then block the rogue impulses.

Consultant cardiologist Dr Oliver Segal from the Heart Hospital says: "The biggest advantage is that the miniature camera and light source within the balloon allow us to see exactly what's happening inside the chambers of the heart. This means we can direct the laser beam as accurately as possible and not leave any gaps in the barrier we create. When we've performed atrial fibrillation ablation in the past, we've had to rely upon 3D computer models to track the catheter delivering the radiofrequency energy that burns the tissue around the pulmonary veins. The computer image is still while the actual heart and catheters are constantly moving, so it doesn't offer the same degree of accuracy. Patients' hearts don't stay still. They beat and move with every breath taken.

"In 50 per cent of cases where radiofrequency ablation is used, a gap is left in the barrier or a small area later recovers from the damage and this allows rogue impulses to still get through. This means the patient will continue to have atrial fibrillation and will need to undergo a repeat procedure. The laser balloon enables us to actually see where we are

ablating so that we do not leave any gaps."

He adds: "We manipulate the catheter containing the laser balloon in a similar way as we would if we were doing radiofrequency ablation. The catheter is inserted through the patient's groin and passed up into the heart. Then a balloon at the end is inflated and advanced into the entrance of each pulmonary vein in turn, creating a blood-free zone so that we can use the camera to see what's going on inside the heart. The laser beam is set at a frequency so that when it is switched on it is only absorbed by the tissue we need to ablate.

"The laser balloon is slightly more expensive than other ablation techniques but its success rate is much better."

Treatment with the laser balloon is suitable for patients with intermittent atrial fibrillation, who represent around half of those with the condition. It costs about £7000 on the NHS compared with £6000 for other ablation procedures.

Although incidence of atrial fibrillation goes up with age – ten per cent of all people over 65 have it – Dr Segal says the condition is increasingly being seen in younger people. Indeed, the first person he treated with the laser balloon in the UK was in his thirties.

Dr Segal says: "As yet we don't know why some people develop the condition and others don't. The commonest risk factor is having high blood pressure. It can also be the result of thyroid problems, alcohol consumption or be related to other heart problems. In

