Cutting edge technology set to benefit pacemaker patients

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A hi-tech improvement to the surgical implantation of pacemakers into patients with heart failure is being pioneered by specialists at Guy's and St Thomas', using software developed by clinicians and engineers at King's College London.

In collaboration with experts from Siemens Healthcare, doctors are able to process precise information from cardiac magnetic resonance images (MRI) and combine these with live X-rays during the implant procedure.

The integrated information from these diagnostic images is displayed on a screen, providing doctors with real-time data as they implant the pacemaker. Clinicians can see a 3D model of the patient's heart superimposed over the X-ray of their chest while they carry out the procedure.

This highly detailed fusion of two images means the team implanting the pacemaker can place the leads into the best possible position – improving the pacemaker's effectiveness.

Kawal Rhode, Professor of Biomedical Engineering at King's College London, says: "Heart disease is one of the most common illnesses and can have a considerable effect on the quality of life for patients.

"Our collaborative effort has meant that the development and testing of this new approach to pacemaker implantation has occurred within only two years of starting the project. The widespread use through commercialisation and the significant benefits for patients are now within reach."

Professor Aldo Rinaldi, consultant cardiologist at Guy's and St Thomas' and project lead, says: "This highly sophisticated technology gives us a much clearer image of the patient's heart and so enables us to carry out the pacemaker implantation with greater precision. Integrating the MRI and X-ray images boosts the accuracy of the implantation procedure and we believe it increases the likelihood of a successful pacemaker fitting."

There are 10,000 pacemakers fitted for heart failure in the UK each year. Guy's and St Thomas' has a dedicated specialist service for these patients and sees a broad of range of patients, involving both simple and complex cases. The Trust is using the new technology to assist with the implantation of cardiac resynchronisation therapy (CRT) pacemakers.

Pacemakers are small electrical devices surgically implanted into the chest. They send electrical pulses to the patient's heart to keep it beating regularly. CRT pacemakers resynchronise the beating of the heart's two ventricles, improving the overall efficiency of the heart. Having a pacemaker fitted can significantly improve a patient's quality of life and can even be lifesaving.

It is crucial to ensure the pacemaker leads are positioned correctly as studies have shown that bad positioning can negatively influence clinical outcomes. The specialist heart team at Guy's and St Thomas' has successfully used the technology to implant CRT pacemakers into 12 patients.

Robert Comber, 70, a part-time film actor and languages teacher from Kensington in west London, was the first patient to receive a pacemaker implant using the new technology.

Robert had a heart attack in 2013. Although he was taken to St Thomas' Emergency Department (A&E) and recovered, his heart began to beat irregularly and it was later recommended that he should receive a pacemaker implant.

Robert says: "I was initially wary of having a pacemaker fitted but the cardiologists at St Thomas' advised me that this was the best way of keeping my heart in good health over the long term.

"I only had a local anaesthetic while the procedure was underway, so I was completely aware of what was happening. I felt some pressure as the implant went in but no pain. The team around me were superb and knew exactly what they were doing. I received so much attention, care, and warmth – I can't praise them enough."

Robert's pacemaker was fitted successfully in August 2015. His heart condition has since improved and he has gained improved stamina for activities like walking and swimming.

The procedure takes place in the XMR suite at St Thomas' Hospital, a hybrid facility with an MRI scanner and adjacent cardiac catheter lab containing an x-ray generator. The XMR suite is run in partnership with King's College London and has become one of the world's leading centres for performing pacemaker implants using cutting-edge technology.

Provided by King's College London