Magnetic resonance imaging using ultrasmall superparamagnetic particles of iron oxide for abdominal aortic aneurysm: a risk prediction study

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Declared competing interests of authors: David Newby reports that a patent (US 9275432 B2) held by the University of Edinburgh has been filed relating to the registration of medical images that were generated as part of this study.

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Plain English summary

MRI using USPIO for abdominal aortic aneurysm

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Plain English summary

Abdominal aortic aneurysms (AAAs) are large swellings of the main blood vessel that carries blood throughout the lower half of the body. As AAAs grow, there are generally no symptoms or warnings but they can suddenly burst and if this happens it is usually fatal. Surgery to repair an AAA can prevent it rupturing and has the potential to save lives.

Population screening to identify the disease halves the death rate from AAAs and has led to the establishment of a national screening and surveillance programme for men. However, surveillance is complex because AAAs are unpredictable and what causes AAA growth is not fully understood. This makes it difficult to predict accurately if, and when, an AAA could burst, and how best to time major surgery. Therefore, a more accurate method is needed to predict these events so that better treatment decisions can be made about potentially life-saving surgery.

Ultrasmall superparamagnetic particles of iron oxide (USPIO) is a new class of compound that can be injected into the body to light up areas of inflammation and disease in AAAs. This requires a magnetic resonance imaging (MRI) scanner to see these areas of inflammation and damage. The Magnetic resonance imaging for Abdominal Aortic Aneurysms to predict Rupture or Surgery (MA^3RS) study set out to assess whether or not USPIO-enhanced MRI can predict how quickly AAAs grow and when they will burst or need surgery. A total of 361 patients who were in the AAA surveillance programme were recruited from three study centres in Scotland. Patients underwent this specialised scan (USPIO-enhanced MRI) and were monitored in the clinic with serial ultrasound scans for a minimum of 2 years.

It was found that USPIO-enhanced MRI could identify active AAA disease and predict AAA growth and was associated with AAA rupture and repair. This has the potential to identify those patients at risk, improve their selection for surgery and ultimately improve their outcomes.

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