Nano4Imaging

YOUR HEALTH - OUR VISION

MRI IS PIVOTAL IN PRESSURE MEASUREMENT

DETERMINING BLOOD PRESSURE AND FLOW IN THE HEART AND GREATER VESSELS IS ESSENTIAL FOR DIAGNOSIS AND MONITORING OF PATIENTS WITH PULMONARY HYPERTENSION AND CONGENITAL HEART DISEASES.

The MRI Suite as a one-stop-shop

Clinical studies in the German Heart Centre Munich, National Institutes of Health (USA) and King's College London (UK) have shown that performing a pressure measurement in MRI, combined with its capacity to measure flow, is a great step forwards in cardiac diagnostics. Whereas normally the patient would have another cathlab session after MRI, now complete hemodynamics could be assessed in one session.

Invasive pressure in MRI

In a clinical study in Munich 25 patients with different forms and stages of congenital heart disease were enrolled to test the one-stop-shop procedure. Pressures were measured with Berman catheters in the right ventricle, pulmonary artery, right atrium and various gradients such as in aortic coarctation and TCPC. Flow and pressure are directly measured: no assumptions needed.

Performing a one-stop-shop hemodynamics session in CMR saves cathlab time and resources

PROF. PETER EWERT - *GERMAN HEART CENTRE MUNICH*

Benefits of MRI guided pressure/ flow measurement:

- Pulmonary vascular resistance can be calculated from invasive pressure measurement and MRI-flow derived cardiac output. Fick's principle is not needed.
- One-stop shop hemodynamics is an alternative for cathlab diagnosis.
- Visibility of heart and vessel major advantage for both flow and pressure measurement.

Our vision of future imaging

Imposing vulnerable patients to repetitive doses of radiation and contrast-agent can be avoided. MRI guidance is therefore a sustainable approach, which offers a competitive advantage measuring flow, pressure and volumes simultaneously.

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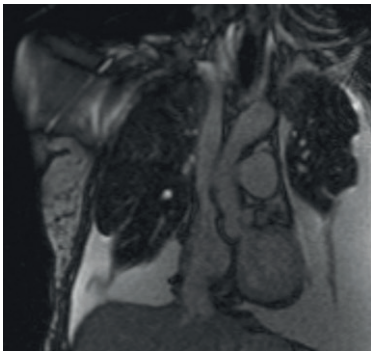
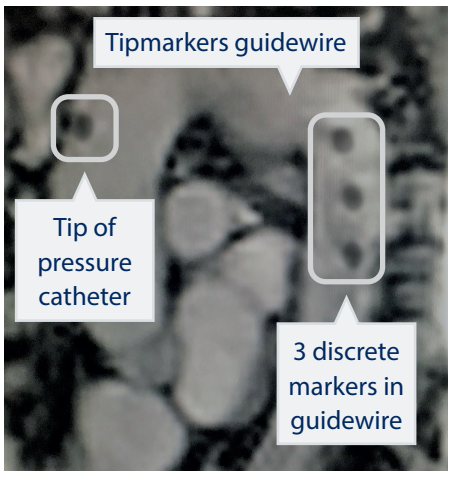
CASE: PATIENT (67) WITH SUSPECTED PULMONARY HYPERTENSION.



With permission:
Dr Toby Rogers (NIH) at SCMR, 2017

Invasive pulmonary artery pressure increased with 50/20 (30) mmHg, which is slightly increased but not very much. Patient had normal left and right ventricle function, but showed clear RV decompensation upon mild exercise. **Pulmonary vascular resistance** can be calculated from invasive pressure measurement and MRI-flow derived cardiac output. Based on MRI measurements (see Table) of pressure, a pulmonary vascular resistance index (PVRI) of 4.5 mmHg x min/l/m2 (360 dyn x sec x cm-5/m2) was calculated. The cardiac index was 2.1 L/min/m2.

Location	Pressure (mmHg)
Right atrium	11
Pulmonary artery	50/20
Pulmonary artery mean	30
Pulmonary artery wedge	20
Transpulmonary gradient	10
Aorta	142/60
Left ventricular end-diastolic	17



Screenshot of Siemens 1.5 T Avanto real-time scan of a patient, in which pressure gradient over the aorta is measured. Courtesy of the German Heart Centre Munich.

Emery Glide™

The MRI conditional Emery Glide ™ (MR Wire guidewire) supports the pressure catheter maneuvering, is visible through discrete passive markers and comes in both straight and angled-tip.

The discrete markers in the guidewire, enable visibility of the Emery Glide™ as well as to position the tip. The tip of pressure catheter is also visible (left panel) by filling with CO2.

The MRWire guidewires hold CE 0344 registration as class III device in Europe and a FDA 510(K) in the USA. Health Canada registration is also achieved.
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