Soft tissue evaluation in patients with Metal-on-Metal (MoM) hip prostheses

Contributed by Ben Heggelman, MD, radiologist, Meander Medisch Centrum, Location Baarn, The Netherlands
Patient history
Patient 1 is a 62-year-old female with Metal-on-Metal right hip prosthesis since 2009, left hip replacement with polyethylene liner (MoP) since one month. She is having some pain on the left side.

Patient 2 is a 64-year-old female, Metal-on-Metal right hip prosthesis since 2009, left: contralateral hip replacement with polyethylene liner since 2000. She is having pain on the right side.

Both patients received a Metal-on-Metal hip prosthesis on one side in 2009 and a Metal-on-Polyethylene prosthesis on the other side. For these MoM implants there is an increased risk of developing aseptic lymphocytic vasculitis-associated lesions (ALVAL), also known as “pseudotumors”, but also other soft tissue lesions. Patients are under surveillance, checking cobalt and chrome blood values, clinical status and MR imaging, of the soft tissues near the implant.

MR examination
Achieva 1.5T release R2.6.3 was used with the SENSE XL Torso coil. MMC has a special set of metal artifact reduction sequence (MARS) protocols in the database on scanner for these cases.
and enhances after administration of Gd. Contralaterally, a small anterior fluid collection at the left hip joint was present as well (not shown).

MRI helps visualize a large fluid collection in the right hip, possibly as a complication of a Metal-on-Metal total hip replacement. Further follow-up by fluid aspiration and analysis of cobalt and chrome content of the fluid, as well as blood serum metal levels was recommended. The cobalt serum value was 5.7 µgr/l (reference value smaller than 1.2 µgr/l) and the chrome serum value was 4.0 µgr/l (reference value is smaller than 3.0 µgr/l).

On cup revision of the right hip, the articular fluid was grayish with visual signs of metallosis. Pathologic examination revealed chronic non-specific inflammation. Bacterial cultures were all negative.

Clinical value of the MARS protocols
According to guidelines by the Dutch Orthopaedic Association (NOV, www.orthopeden.org), imaging is indicated for symptomatic MoM hip replacements. With the image quality improvements of dedicated MARS protocols, MRI can help to rule out soft tissue lesions in patients with these implants, and identify and locate processes that require follow-up.

We run a coronal and axial T1W TSE, coronal and axial T2W TSE, and coronal STIR sequence that were set up to minimize metal artifact. To this end we use thin 2.5 mm slices, a water-fat-shift of 0.5 pixels on all sequences, and avoid using SENSE or CLEAR. When needed, contrast agent is administered and an additional post-contrast T1W TSE is done. At this moment there is no consensus on the need of intravenous gadolinium contrast; we give it standard at the moment.

MR images and discussion
In the first patient, the coronal T2W and STIR images show a small fluid collection lateral to the trochanter, and some edema in the muscle and subcutaneously near the recently implanted left hip. No soft tissue lesions are seen near the Metal-on-Metal prosthesis in the right hip, hence it was concluded that this hip prosthesis is so far without complications.

In the second patient, a large fluid collection is apparent on the T2W and the T1W images, lateral of the symptomatic right hip, which can be traced to connect posteriorly to the joint-space. The tissue delineating the fluid collection is hypointense on both T1W and T2W, and enhances after administration of Gd. Contralaterally, a small anterior fluid collection at the left hip joint was present as well (not shown).