

MRI Metal Artifact Reduction Sequences for Improved Visibility Near a Mobi-C® Cervical Disc Prosthesis

Artifact from metal implants can be suppressed by selecting proprietary manufacturer sequences (MAVRIC-SL, SEMAC, O-MAR) and by manual modification of sequence parameters. While these proprietary metal artifact reduction sequences and methods for sequence modification are not specifically tailored to the Mobi-C Cervical Disc Prosthesis, patient imaging shows improved visibility of anatomy adjacent to Mobi-C (Figures 1 and 2), and bench-top research studies demonstrate reduction in metal artifact. Here we provide an overview of how to apply metal artifact suppression techniques to patients implanted with the Mobi-C Cervical Disc Prosthesis and Mobi-C's MR Conditional MRI Safety Information.

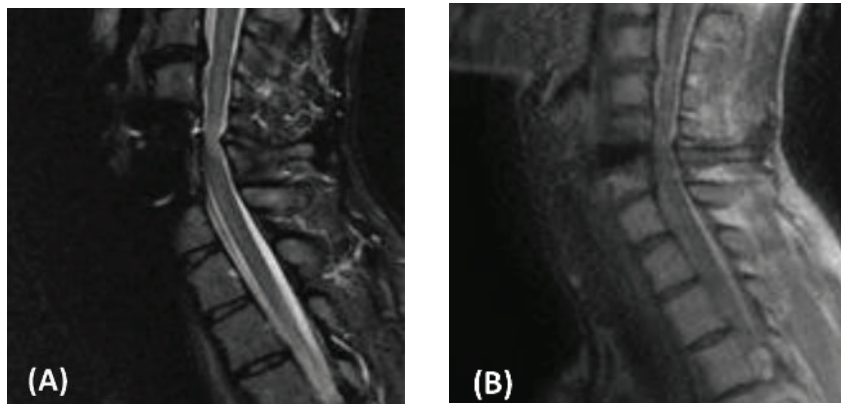


Figure 1.

MR images of the same patient with a Mobi-C prosthesis at C5-C6 acquired via:

- (A) T2 TSE
- (B) Metal artifact reduction (MAVRIC SL)

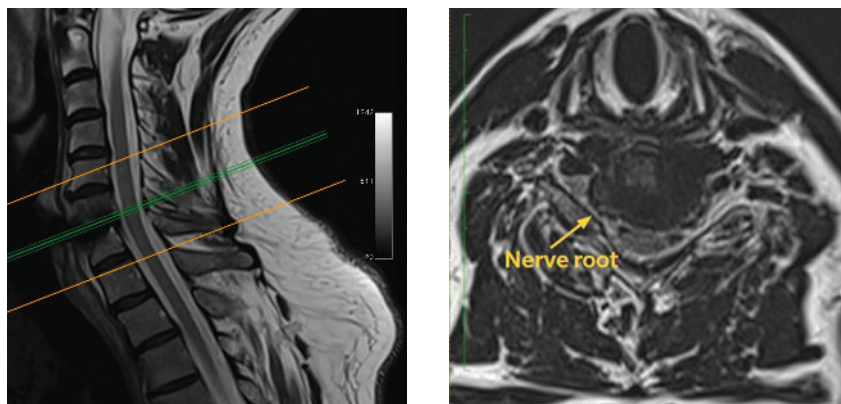


Figure 2.

MRI scan of a patient with a Mobi-C prosthesis at C6-C7 obtained with WARP sequence. Visibility of the nerve root is maintained on the true axial image (gold arrow).

Metal Artifact Reduction Sequences

| Manufacturer | Metal Artifact Reduction Sequences | Weblinks |
|----------------------|------------------------------------|---|
| GE Healthcare | MAVRIC SL | https://www.gehealthcare.com/products/magnetic-resonance-imaging/mr-applications/mavric-sl |
| Siemens Healthineers | WARP and SEMAC | https://content-pep.siemens-info.com/CMS/PDFs/55584be7-c310-4179-b547-45699b5c6cf4.pdf |
| Philips | O-MAR and O-MAR XD | https://philipsproductcontent.blob.core.windows.net/as-sets/20180315/747912f2871a472da8eba-8a400e4a95d.pdf |

Methods to Reduce Metal Artifact¹

A number of simple changes to the scan protocol can greatly reduce metal artifact. Examples are:

- **Lower magnetic field strength:** 1.5 Tesla rather than 3 Tesla
- **Increase bandwidth** during slice selection and readout
- **Increase matrix:** 512 pixel
- **Increase number of excitations** (NEX) to maintain good signal to noise ratio
- **Spin echo** instead of gradient echo where possible
- **STIR** for fat suppression (spectral frequency selective fat suppression performs better in a homogeneous field)
- **Shorter echo spacing**
- **Smaller water-fat shift**
- **Thinner slices**
- **View-angle-tilting** (VAT)

MRI Safety Information

MR Conditional

Non-clinical testing has demonstrated that the Mobi-C Cervical Disc Prosthesis is MR Conditional. A patient with this device can be safely scanned in an MR system meeting the following conditions:

- Static magnetic field of 1.5 and 3.0 Tesla only
- Maximum spatial gradient magnetic field of 970 Gauss/cm (9.7 T/m) or less
- Maximum MR system reported, whole body averaged specific absorption rate (SAR) of 2 W/kg (Normal Operating Mode)

Under the scan conditions defined above, the Mobi-C Cervical Disc Prosthesis is expected to produce a maximum temperature rise of less than 3° C after 15 minutes of continuous scanning. In non-clinical testing, the image artifact caused by the device extends approximately 29 mm from the Mobi-C Cervical Disc Prosthesis when imaged with a gradient echo pulse sequence and a 3.0 Tesla MRI system.

Artifact Information

MR image quality may be compromised if the area of interest is the same or relatively close to the position of the device, and it may be necessary to optimize the MR imaging parameters. In non-clinical testing, the shape of the expected image artifact follows the approximate contour of Mobi-C P&F and extends radially approximately 29 mm from this implant when imaged using a gradient echo pulse sequence and either a 1.5-Tesla or 3-Tesla MR system.

References:

1. Gerstenmaier J, Haouimi A, Bell D, et al. Metal artifact reduction sequence. Reference article, Radiopaedia.org <https://doi.org/10.53347/rID-22746>

For more information, visit highridgemedical.com

