Guidelines for the Management of the Post-Operative (Post-Op) Patient Referred for an MRI Examination

Frank G. Shellock, Ph.D., FACR, FISMRM
Adjunct Clinical Professor of Radiology and Medicine
Keck School of Medicine, University of Southern California
www.MRIsafety.com

There is often confusion regarding the issue of performing a magnetic resonance imaging (MRI) examination during the post-operative period in a patient with a metallic implant or device. Studies have supported that, if the metallic medical product is a “passive implant” (i.e., the implant serves its function without supply of electrical energy or any source of power other than that directly generated by the human body or gravity) and it is made from nonferromagnetic material, the patient may undergo an MRI exam *immediately* after implantation using an MR system operating at 3-Tesla or less. Notably, there are numerous reports that describe placement of vascular stents, coils, filters, and other metallic implants or devices using MR-guided or interventional procedures that include the use of 1.5- and 3-Tesla scanners, illustrating that patients with certain implants may immediately undergo MRI exams. Additionally, a patient or individual with a nonferromagnetic passive implant is allowed to enter the room associated with an MRI system operating at 3-Tesla or less immediately after the implantation of the medical product.

For a passive implant that does not state a "wait" period in the *Instructions for Use* (IFU) or product labeling, there is no need to delay the MRI examination for the patient. To date, very few passive implants indicate a wait period in the IFU or product labeling.

For patients with implants that are “weakly ferromagnetic” but rigidly fixed or otherwise anchored in the body (e.g., orthopedic implants or other similar devices), these patients may undergo MRI exams immediately after implantation of the device.

The information above specifically pertains to magnetic field-related force and torque and, thus, further consideration must be given to RF-induced heating for an implant or device.

Special Note: If there is concern regarding the integrity of the tissue with respect to its ability to retain the implant in place or if the implant cannot be properly identified, the patient or individual should not be exposed to the MR system.

SUPPORTING REFERENCES

Bueker A, et al. Real-time MR fluoroscopy for MR-guided iliac artery stent placement. J Magn Reson Imag 2000;12:616-622.

Campbell-Washburn AE, Tavallaei MA, Pop M, et al. Real-time MRI guidance of cardiac interventions. J Magn Reson Imaging 2017;46:935-950

Manke C, Nitz WR, Djavidani B, et al. MR imaging-guided stent placement in iliac arterial stenoses: A feasibility study. Radiology 2001;219:527-534.

Maralani PJ, Schieda N, Hecht EM, Litt H, Hindman N, Heyn C, Davenport MS, Zaharchuk G, Hess CP, Weinreb J. MRI safety and devices: An update and expert consensus. J Magn Reson Imaging 2020;51:657-664

Rutledge JM, et al. Safety of magnetic resonance immediately following Palmaz stent implant: A report of three cases. Catheter Cardiovasc Interv 2001;53:519-523.

Sawyer-Glover A, Shellock FG. Pre-MRI procedure screening: recommendations and safety considerations for biomedical implants and devices. J Magn Reson Imaging 2000;12:92-106.

Shellock FG. Guidelines for the Management of the Post-Operative Patient Referred for a Magnetic Resonance Procedure. Signals, No. 47, Issue 3, pp. 14, 2003.

Shellock FG. Magnetic Resonance Procedures: Health Effects and Safety. CRC Press, LLC, Boca Raton, FL, 2001.

Shellock FG, Crues JV. MR procedures: Biologic effects, safety, and patient care. Radiology 2004;232:635-652.

Shellock FG. Reference Manual for Magnetic Resonance Safety, Implants, and Devices: 2020 Edition. Biomedical Research Publishing Group, Los Angeles, CA. 2020

Shellock FG. Chapter 18, MRI Issues for Implants and Devices. In, MRI Bioeffects, Safety and Patient Management. FG Shellock and JV Crues, Editors. Biomedical Research Publishing Group, Los Angeles, CA, 2022.

Teitelbaum GP, et al. MR imaging artifacts, ferromagnetism, and magnetic torque of intravascular filters, stents, and coils. Radiology 1988;166:657-664.

Teitelbaum GP, et al. Ferromagnetism and MR imaging: Safety of cartoid vascular clamps. Am J Neuroradiol 1990;11:267-272.

Teitelbaum GP, Ortega HV, Vinitski S, et al. Low artifact intravascular devices: MR imaging evaluation. Radiology 1988;168:713-719.

Teitelbaum GP, et al. Evaluation of ferromagnetism and magnetic resonance imaging artifacts of the Strecker tantalum vascular stent. Cardiovasc Intervent Radiol 1989;12:125-127.

05/2025