MRI Safety Guidelines for Commonly Used Otologic Implants in the United States

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ABSTRACT

Objective: To review information on MRI safety for commonly used otologic implants including stapes, ossicular chain reconstruction, and middle ear prostheses.

Methods: A literature review of the National Library of Medicine's online database was performed with focus on MRI safety of otologic implants.

Results: The Baha system and Ponto Pro compression device are MRI safe. The Sophono Alpha 1 is contraindicated for MRI use as it involves an implanted magnet which ultimately osseointegrates into the skull.

CONCLUSIONS

MRI imaging. We suspect that the majority of physicians are unfamiliar with MRI safety status of otologic implants. The ideal implant would be both inherently and functionally safe with no artifact properties. There is a trend toward manufacturing non-ferromagnetic implants. There are some MR-compatible implants into the skull and the practicing physician should be aware of these exceptions. Although MRI at 1.5T is better at imaging, it is better at imaging patients with cochlear implants with non-removable magnets. Studies have shown no adverse events in patients who used compression devices at the time of MRI imaging. A revision stapedectomy with an MRI-safe implant is recommended in patients with the mis-manufactured 1987 stapes prosthesis who absolutely need an MRI.

Patients are provided with MRI safety information cards for cochlear implants, osseointegrated cochlear stimulators, and middle ear implantable hearing devices. Regardless of the presence of data sources, the MRI facility contact the manufacturer of the device as there may be necessary precautions to take when performing an MRI. There are no safety cards given for stapes prosthesis and partial ossicular chain reconstruction implants.

We hope to provide a source that answers the question of MRI safety of commonly used otologic implants in the United States based on current information available in the literature. This source and routine MRI safety information on implantable devices should be cautiously used by medical professionals based on source reliability and accuracy.

With the current trend of magnetic resonance imaging, soon we will need updated reviews on MRI safety of otologic implants in stronger magnetic fields. In the meantime this review can serve as a simple reference for current MRI safety standards for otologic implants in the United States in fields up to 1.5 Tesla field strength.

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Magnetic susceptibility ranges from -1 for superconductors to 10 for ferromagnetic materials. Human tissue magnetic susceptibility is very low in the range of 10^-6. We hope to provide a source that answers the question of MRI safety of commonly used otologic implants in the United States based on current information available in the literature. This source and routine MRI safety information on implantable devices should be cautiously used by medical professionals based on source reliability and accuracy.

METHODS

A literature review of the National Library of Medicine's online database was performed with focus on MRI safety of routinely used otologic hearing devices. The search was restricted to the more commonly used otologic implants including stapes and metallic middle ear prostheses. All stapes prosthesis and total ossicular chain reconstruction implants are MRI safe. The Sophono Alpha 1 is contraindicated for MRI use as it involves an implanted magnet which ultimately osseointegrates into the skull.

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MRI safety status of otologic implants depends on their magnetic potential. Knowledge of the MRI safety guidelines for the commonly used otologic implants based on the United States guidelines on MRI safety and contraindications are important as Europe and other parts of the world.

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