

Effects of Magnetic Resonance Imaging Fields on Gold Eyelid Loads

John W. Canady, MD*

Jon Meine, BS†

Sue Ann Thompson, PhD‡

W. T. C. Yuh, MD, MSEE§

Magnetic resonance imaging is frequently used for visualization of soft tissues of the head and neck. It was the purpose of this study to determine whether gold eyelid weights, used for treatment of lagophthalmos in facial palsy, would be deflected at high magnetic strengths during imaging. Ex vivo study of six incrementally increasing weights at two magnetic strengths was performed. There was no deflection of any of the gold eyelid loads at either 0.5-tesla or 1.5-tesla magnetic strengths. We conclude that patients with gold eyelid weights are not at risk of damage from movement of the prostheses during magnetic resonance imaging examination.

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From the *Section of Plastic and Reconstructive Surgery, Departments of Surgery and Otolaryngology—Head and Neck Surgery, and Section of Hand/Microvascular Surgery, Department of Orthopedics, †University of Iowa College of Medicine, Iowa City, and Departments of ‡Otolaryngology—Head and Neck Surgery, and §Radiology, University of Iowa Hospitals and Clinics, Iowa City, IA.

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Address correspondence to Dr Canady, E230, General Hospital, University of Iowa Hospitals and Clinics, Iowa City, IA 52242.

Biomedical implants located in or near special sensory areas of the body, such as the eye or ear, can potentially present a serious risk to patients undergoing magnetic resonance imaging (MRI) if they change positions at high-field strengths. Previous work has shown that no deflection of stapedectomy prostheses [1] occurs with MRI, but the Fatio eyelid spring was moved during testing [1]. No previous studies have examined the effect of MRI on gold weights used for treatment of lagophthalmos in facial palsy. Because gold eyelid weights and eyelid springs are both frequently used to treat this condition [2, 3], it was of interest to determine if gold eyelid loads are moved during an MRI examination.

Material and Methods

Six different weights of eyelid loads (Meddev Corp, Los Altos, CA) were evaluated. The lid loads were 1 × 4.5-mm curved bars made of 99.99% pure gold. Each bar had three holes appropriately spaced to allow suture fixation and growth of fibrous tissue to prevent migration.

The lid loads were suspended by a 15-mm cotton filament threaded and tied through the center hole of the prosthesis. The lid loads were lowered and stabilized in the portals of two different superconducting magnets, 0.5 tesla and 1.5 tesla, respectively. The portal of the MRI system is the location of the greatest magnetic field strength, and any deflection would be expected to have the greatest chance to occur at this position. The eye weights were observed for deflection upon release. Deflection in any spatial plane was considered to be positive.

Results

No deflections were observed for any of the eyelid weights at either of the two MRI field strengths tested (Table).

Discussion

Because MRI is often effectively used for visualization of soft tissues of head and neck structures, it is of interest to determine the safety of prosthetic devices that may be used in this area, especially those close to delicate structures such as the eye. Ocular damage during MRI examination was reported to be due to movement of an intraocular ferromagnetic foreign body [4]. Retinal tacks made of martensitic stainless steel have been shown to be deflected by MRI and have the

Deflection of Eyelid Weights in Magnetic Resonance Imaging Scanning

Mass (gm)	Deflection (tesla)	
	0.5	1.5
0.6	0	0
0.8	0	0
1.0	0	0
1.2	0	0
1.4	0	0
1.6	0	0

potential to cause injury to the eye [5]. A recent review provides an up-to-date list of metallic implants, materials, and devices that have been studied, and the results of deflection tests during MRI [6]. However, this report did not list any studies of gold eyelid weights used in the treatment of facial palsy.

Lagophthalmos is a condition in which the eyelid cannot be completely closed due to injury or paralysis of the facial nerve. One method of treatment consists of either placing a wire spring or a weight within the eyelid to facilitate closing [2, 3]. It has been previously reported that the Fatio eyelid spring wire is deflected 90 degrees or more [1] with the 1.5-tesla magnet. In our study, we have determined that there was no deflection of any of the gold eye weights placed in the portals of either the 0.5-tesla or the 1.5-tesla magnets. This may suggest that, in considering a

choice of prostheses for treatment of lagophthalmos, consideration should be given to whether the patient may need to be subjected to MRI scanning at a future time. The choice must be balanced by the consideration that although gold does not move during MRI, it does block part of the image. At least two or more views are necessary to see all of the tissue around the prosthesis. Our study concludes that the gold eyelid weights are not deflected and may be used safely during MRI examination.

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