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§

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

<table>
<thead>
<tr>
<th>Mass (gm)</th>
<th>0.5</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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 Fatto 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.

References

1 Schatz C, Shelton C, Brown B. Ex vivo evaluation of ferromagnetism for metallic ocular and middle-ear prosthesis exposed to a 1.5-T MR imager. Radiology 1990;177:271 (Abstract)
3 May M. Gold weight and wire spring implants as alternatives to tarsorrhaphy. Arch Otolaryngol Head Neck Surg 1987;113:656–660