

Late-Onset Progressive Strabismus Associated With a Hydrogel Scleral Buckle

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A hydrophilic implant for scleral buckling was developed in 1980.¹ Advantages include softness and elasticity, no dead spaces, ability to gradually absorb and release antibiotics, and stimulating production of a fibrous capsule around the implant. Short-term follow up studies in rabbits showed no clinical or histologic complications.^{1,2} Long-term complications of the hydrogel scleral buckle have emerged in the last 10 years.³⁻⁶ These included fragmentation, subconjunctival bulging, intraocular erosion, migration, and restriction of extraocular movement. We recently encountered a patient with progressive restrictive strabismus beginning 8 years after retinal detachment repair with a MIRAgel (hydrogel; MIRA, Uxbridge, MA) scleral buckle. Worsening complaints of diplopia and discomfort led to strabismus surgery. Untreatable retinal detachment resulted in enucleation.

CASE REPORT

An 80-year-old man presented with complaints of binocular diagonal diplopia and ocular discomfort for several months. History included an uncomplicated cataract extraction bilaterally, with an intraocular lens implantation in each eye, 10 years previously and a retinal detachment repair in the right eye with a MIRAgel scleral buckle 8 years previously.

Visual acuity was 20/50 in the right eye and 20/25 in the left eye. He measured 6 PD of right hypertropia and 4 PD of right exotropia at distance and near fixation. Ocular rotations showed overaction of the right inferior oblique muscle and mild underaction of the right superior oblique muscle with no other limitations. The head-tilt test was mildly positive to the right without cyclotorsion. Ocular tensions were normal bilaterally as was the slit-lamp examination. Dilated fundus examination indicated that the retina was attached in each eye with indentation from the scleral buckle. The patient was treated with a small vertical and horizontal prism correction in his glasses with subjective fusion.

One year later, diplopia had returned. The exotropia remained unchanged, but the right hypertropia had increased to 8 PD in primary gaze and 10 PD in left gaze. Overaction of the right inferior oblique was moderate, and moderate limitation in downgaze of the right eye was observed for the first time. The vertical prism correction in the glasses was increased slightly, and the patient noted subjective fusion.

The diplopia recurred again 1 year later, and the right hypertropia was now 22 PD. Depression of the right eye below the midline was not possible. The right inferior oblique overaction was marked with 30 PD right hypertropia in left gaze. On dilated fundus examination, intrusion of the scleral buckle was not noted. Surgical correction was recommended.

During surgery, the forced-duction test showed marked restriction to downgaze of the right eye. Attempts to expose the muscles resulted in observation of a large encapsulated scleral exoplant. After opening the capsule, the MIRAgel buckle appeared translucent and swollen to four to five times normal size. Maneuvers to remove the buckle resulted in fragmentation to the slightest touch.

Continued dissection to remove the exoplant resulted in the appearance of a thinned area of sclera with choroidal exposure and leaking liquid vitreous. No retinal prolapse or detachment was noted. The overlying segment of buckle was replaced to act as a tamponade, and the overlying Tenon's capsule and conjunctival tissue were closed securely.

The following day, the patient was evaluated by his retinal surgeon who found a "kissing" choroidal detachment in the right eye. Treatment, including reoperation to close the scleral perforation, was unsuccessful. Several months later, the right eye was enucleated.

DISCUSSION

Scleral buckling with exoplant material, such as solid silicone and silicone sponge, has been associated with complications such as extrusion, pressure necrosis with erosion through the sclera, infection rates reported from 2.7% to 18%,² and restrictive strabismus with diplopia during a period several months after surgery. This can occur with any scleral buckling surgery. In an attempt to eliminate or minimize these problems, a hydrogel material was developed by Refojo et al.¹ Favorable qualities of the new material included softness, elasticity, nonabsorbability, absence of dead spaces, ability to be sterilized with heat, and ability to absorb and gradually release antibiotics. Short-

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term follow up studies in rabbits indicated no clinical or histologic signs of significant toxicity or inflammation.^{1,2}

In 1992, Marin³ reported seven patients in whom long-term complications developed from swelling of the hydrogel buckling implant (MIRAgel) 7 to 11 years after surgery. Hasslinger,⁷ the director of research and development at MIRA Inc, denied knowledge of any reported complications secondary to the placement of MIRAgel implants. Since then, there have been several reports of long-term problems in patients who have had hydrogel used for scleral buckling repair of their retinal detachments.^{3-6,8} The implants were often removed because of excessive scleral indentation and subconjunctival intrusion or extrusion. On removal, the hydrogel appeared friable and swollen with dehiscence of the scleral bed (as in the case of implants), vitreous hemorrhage, and loss of vision in some cases.

A patient reported by Hwang and Lim⁴ had limitation of adduction and infraduction with diplopia 8 years after scleral buckling with MIRAgel, and this condition worsened over time. After the scleral buckle was removed, the patient became orthophoric in primary gaze with mild remaining restriction of adduction and infraduction.

Braunstein and Winnick⁶ reported a patient with complications 13 years after uneventful scleral buckling procedure using MIRAgel. Diplopia and orbital swelling were noted, and infraduction of the operated eye was limited. These findings mimicked a periorbital mass lesion. During surgery to remove the buckle, the hydrogel material was noted to be 4.5 times its normal size. Removal of the buckle resulted in elimination of diplopia.

Our case report patient did well for 8 years after retinal detachment repair. He then presented with increasing horizontal and vertical diplopia as well as increasing re-

strictions to ocular motility. We now know that hydrogel implants are often well tolerated for a number of years, but they have the potential to cause late problems. Special care must be taken in attempting to remove these implants because the surgery is difficult and tedious, the material fragments easily, and scleral erosion and perforation have been noted as in the case of our patient. In some cases, it may be best to leave the implant in place rather than put the eye at additional risk. This decision depends on the effect of the scleral buckle and the situation. If surgery becomes unavoidable, the strabismologist should consider obtaining the assistance of a retinal surgeon. It seems advisable to have banked sclera, tissue, glue, etc, available in these types of surgeries in case there is a need to close any sclera defects encountered.

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