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Long term observation of hydrogel buckle intrusion without vision loss

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ABSTRACT

Hydrogel buckle intrusion due to progressive swelling is a known complication, which usually requires surgical intervention due to vitreous hemorrhage, retinal detachment, or progressive encroachment into the optic nerve or macula. Hydrogel buckle surgery with successful retinal detachment repair was performed in this one-eyed physician in 1990, and there was slow progressive intrusion towards the macula and optic nerve without surgical intervention for 30 years and with visual acuity maintained at 20/40.

1. Introduction

Progressive swelling of hydrogel buckle material (MIRAgel, MIRA Inc., Waltham, MA) used previously for retinal detachment has resulted in complications including progressive intrusion of the buckle material into the eye, a blind and painful eye, anterior extrusion and exposure of the buckle through the conjunctiva and tenons layer, recurrent detachment, vitreous hemorrhage, ptosis, strabismus, optic nerve compression, granuloma formation, and buckle expansion resulting in protrusion of the globe mimicking orbital pseudotumor or orbital cellulitis.[1–4] Hydrogel buckles were developed because of a potential advantage in a soft, conformable, and easily manipulated buckle material with an ability to absorb antibiotic to minimize secondary buckle infection. However, late progressive buckle swelling resulting in severe complications has led to the withdrawal of this buckle material off of the market. The complications often required complicated retinal and orbital surgeries to remove markedly swollen buckle material, which became friable and gelatinous. When intruded into the eye, this resulted in a severe posterior ruptured globe, which often resulted in progressive blindness and phthisis bulbi despite surgical intervention. Due to the concern of loss of vision in this only eye of this patient with progressive intrusion from an inferiorly placed hydrogel buckle, careful monitoring with observation every 4 months was recommended, and although gradual posterior progression was noted, surgical intervention has not been required for 30 years and with maintenance of good vision.

1.1. Case report

A 73-year-old physician presented with a history of blindness in his right eye after unsuccessful surgery for retinal detachment in 1952 at the age of 21 years. His left eye developed a macula on retinal detachment in 1990 at age 59. The retinal detachment was located inferiorly with a retinal break at 7:30. A segmental hydrogel buckle was secured inferonasal within the bed of a scleral flap and an encircling tire was placed to cover the hydrogel buckle with successful retinal reattachment. He had cataract surgery with posterior chamber intraocular lens placement in 2002 and did well until 2004, 14 years after the placement of the scleral buckle. He noted mild blurred vision. Examination at that time revealed a visual acuity of 20/20, no evidence of extrusion, an attached retina and progressive intrusion of the inferior hydrogel buckle towards the macula to within one disc diameter of the optic disc. Although there has been gradual progressive intrusion, this has not progressed into the optic nerve or the macula. The patient was able to still practice medicine for the rest of his career and still maintains stable 20/40 vision 30 years after hydrogel buckle placement (Fig. 1).

2. Discussion

Progressive swelling of hydrogel buckles can lead to intrusion into the eye and recurrent retinal detachment, vitreous hemorrhage, posterior globe rupture, impingement on the optic nerve and macula, and phthisis. In this patient without intervention for 30 years after placement of the hydrogel buckle, none of these potential complications

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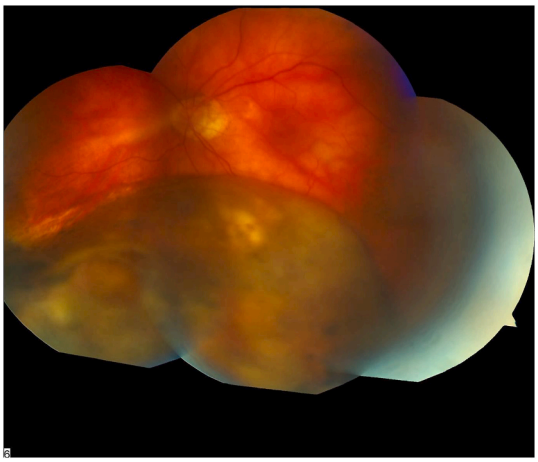

Fig. 1. Fundus photograph showing marked intrusion of the swollen hydrogel buckle inferiorly without vitreous hemorrhage or retinal detachment. Note the buckle effect does not compress the central macula or the optic nerve.

developed, although there was gradual posterior extension of the buckle intrusion.

Successful surgical management of hydrogel buckle intrusion or extrusion have been reported, but complete loss of vision and recurrent retinal detachment and a posterior globe rupture can often lead to total blindness despite attempted surgical removal of the hydrogel buckle or recurrent retinal detachment. Successful surgery in our experience has involved complete dissection of scar tissue, the scleral flap, conjunctiva and tenons layer to allow smooth removal of the entire hydrogel buckle with the use of the cryoprobe.[5] The swollen hydrogel buckle can easily fragment and cannot be grasped with a forceps.

Complications of hydrogel buckles typically present 5–15 years after surgery.[6,7] The largest study of patient's with MIRAgel extraction included 467 eyes of 457 patients found that 34% of eyes implanted with MIRAgel developed symptomatic swelling serious enough for explant at a median post implantation period of 13.3 years (range of 4.5–23.7 years).[8] In a study of 23 eyes prior to MIRAgel scleral explant removal the common reasons for removal were palpable mass under the eyelid (48%), pain and discomfort (35%), visualization of the buckle eroding through the conjunctiva (26%), diplopia (30%), complete immobility (17%), and signs of infection (17%).[9]

The decision to remove a hydrogel buckle must consider the patient's age, status of the other eye, and overall health. In addition, the severity of the complication must be assessed. If there is vitreous hemorrhage, recurrent retinal detachment, exposure of the hydrogel buckle through the conjunctiva or intrusion of the buckle into the eye, then surgical intervention must be performed. This case demonstrates that posterior buckle intrusion without impingement on the optic nerve or macula can be managed with careful observation. This can be successful as a long-term strategy with successful maintenance of vision for 30 years after hydrogel buckle placement with useful vision at 90 years old.

3. Conclusion

Hydrogel buckles with progressive swelling and enlargement into a gelatinous and continuously enlarging mass results in severe complications including proptosis, strabismus, intrusion of the buckle into the globe, compression on the macula or optic nerve, recurrent retinal detachment or vitreous hemorrhage. Because of the difficulty in removal of the buckles, there is a high risk of loss of vision in attempted removal, although many retina specialists recommend removal of all hydrogel buckles. This case a one-eyed patient with a hydrogel buckle with follow-up of 30 years demonstrates that buckle intrusion can be successfully observed as long as there is not impingement of the buckle on the optic nerve or into the macula.

Patient consent

The patient consented to publication of the case in writing.

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Authorship

All authors attest that they meet the current ICMJE criteria for authorship.

Declaration of competing interest

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