Diagnosis and Management of Giant Retinal Tear

Giant retinal tears (GRTs) are full-thickness circumferential retinal tears that involve more than 3 clock hours (90 degrees) of the peripheral retina and develop in association with a posterior vitreous detachment. The reported incidence of GRT is about 0.09 per 100,000 persons. This condition is more common in males (72%), occurring at an average age of 42 years. GRTs are bilateral in 12.8% of patients over time,[1,2] although they rarely develop simultaneously. GRTs account for approximately 1.5% of rhegmatogenous retinal detachments (RD), and surgical management of an RD associated with a GRT may be challenging.

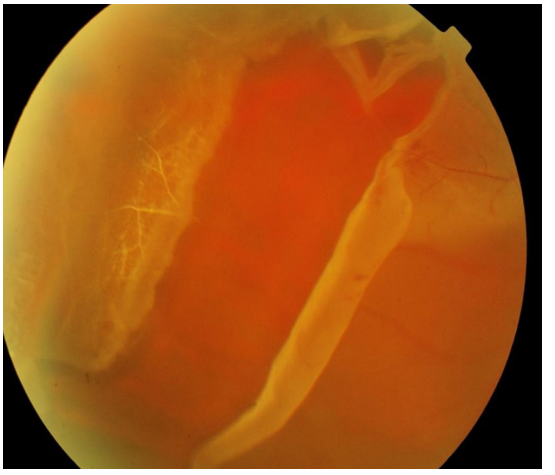
Pathogenesis

GRTs are caused by vitreous traction on the peripheral retina in the area of the vitreous base in association with peripheral vitreous condensation and liquefaction of the central vitreous. When subsequent transvitreal contraction of the cortical gel occurs, the retina tears along the vitreous base in a zipper fashion.[3]

In some cases, a GRT may result from the coalescence of multiple horseshoe-shaped tears that form along the posterior vitreous base during vitreous liquefaction and separation. With a GRT, the vitreous gel remains adherent to the anterior flap of the torn retina; this feature differentiates it from a retinal dialysis, in which the vitreous gel is attached to the posterior flap of the dialysis.[2] As such, the posterior flap of the GRT is freely mobile and has a tendency to fold over posteriorly.

Risk Factors

Risk factors for GRT may be ocular or systemic. Ocular risk factors include high myopia and closed globe injury, while systemic risk factors include young age, collagen vascular disorders (e.g., Stickler, Wagner, Marfan, and Ehlers-Danlos syndromes). However, the majority of GRTs (54%) are idiopathic.[1]



GIANT RETINAL TEAR. *GRT associated with macula-off retinal detachment in a 39-year-old man with high myopia (–10 D).*

Management Tips for GRT

Without RD. In the absence of an associated RD, demarcation of the GRT with laser photocoagulation with or without adjunctive cryotherapy may be considered. One should aim to apply at least 3 concentric rows of confluent white retinal burns along the edges of the GRT. It is important to apply the laser all the way to the ora serrata to reduce the risk of an RD. It is critical to thoroughly check the remaining retina to ensure there are no other breaks.

With associated RD. If an RD is present but the GRT is not inverted, a scleral buckle with cryotherapy alone may be an appropriate treatment and obviate the need for vitreous surgery. However, if the GRT is folded over on itself, management of the associated RD involves vitreous surgery.

Perfluorocarbon liquids. In such cases, injection of a perfluorocarbon liquid (PFCL) is used to unfold, flatten, and immobilize the posterior retina. A thorough shaving of vitreous around the GRT is crucial in relieving traction and thus preventing subsequent retinal redetachment.

Intraoperative posterior retinal slippage with associated posterior retinal folds may occur during the air-fluid exchange and removal of the PFCL. Several techniques have been described to reduce slippage, including meticulous drying of the retinal pigment epithelium along the edges of the GRT or a direct perfluorocarbon-silicone

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exchange. In order to optimize the likelihood of anatomic success, long-acting gas tamponade (such as C_3F_8) is often employed. However, adherence to face-down postoperative positioning may be difficult for some patients; in these cases, silicone oil tamponade may be used instead.

To buckle or not? In eyes undergoing vitreous surgery for GRT-associated RD, the value of adding a scleral buckle remains controversial. Some surgeons feel that its use is associated with an increased risk of retinal slippage during the air-fluid exchange. However, others believe that buckling is an essential part of the surgical management, as it helps to relieve the traction at the edges of the GRT and provides support for the rest of the vitreous base. When proliferative vitreoretinopathy (PVR) is present, a combined approach involving vitrectomy as well as a scleral buckle is commonly employed.[4]

Phakic patients. With the availability of improved vitreoretinal surgical instrumentation, such as curved and illuminated endolaser probes and wide-angle viewing systems that allow surgeons to better visualize the operative field, phakic lens-sparing surgery has become more common. Also, the use of chandelier illumination aids scleral depression and clearing of the anterior vitreous without traumatizing the lens.

Sparing the lens enables more accurate intraocular lens (IOL) calculations for subsequent cataract surgery compared with the inaccurate biometry that is common when an RD is present. The main disadvantage of lens-sparing surgery is the increased technical difficulty of clearing the anterior vitreous without damaging the lens.

However, in the presence of a visually significant cataract that interferes with retinal repair, cataract removal is necessary. Concurrent phacoemulsification may be considered or, alternatively, pars plana lensectomy that leaves the peripheral anterior capsule intact for subsequent placement of a sulcus IOL. Another option is to remove the capsule and plan for secondary IOL placement at a later date. An IOL is not usually inserted at the same time as retinal repair.

Prognosis

Risk factors for retinal redetachment include traction at edges of the GRT; missed breaks; development of PVR; and, in highly myopic eyes, macular hole formation. PVR may occur in 40% to 50% of GRT-associated detachments and is seen more commonly in traumatic and chronic RDs.[5]

Management of Fellow Eye Without a GRT

Although the fellow eye is at risk for developing a GRT, prophylactic treatment remains controversial. Higher-risk fellow eyes include those with high myopia, Wagner or Stickler syndrome, and progressively increasing areas of white-without-pressure (WWOP) with a sharp posterior margin and increased vitreous condensation. (WWOP refers to areas of the retina that appear whitened even without the pressure of scleral indentation; this condition is often associated with retinal or vitreous degeneration.)

There is no consensus on the need for prophylaxis, type of treatment, and area of treatment (ora/equator, lattice degeneration/areas of WWOP, or 360 degrees). Some authors advocate prophylactic 360-degree cryotherapy posterior to the ora serrata in the fellow eye of persons with Stickler syndrome,[6] while others have suggested prophylactic buckling along with cryopexy.[7] Prophylactic 360-degree laser photocoagulation can also be considered, especially in eyes with multiple risk factors.

Conclusion

A GRT is a potentially blinding condition, but early treatment can improve the visual prognosis. Modern vitrectomy tools and techniques, including wide-angle viewing systems, chandelier illumination, and PFCLs, have increased the success rates of GRT-associated RD repair.

1 Ang GS et al. *Invest Ophthalmol Vis Sci.* 2010; 51(9):4781-4787.

2 Shunmugam M et al. *Surv Ophthalmol.* 2014; 59(2):192-216.

3 Freeman HM et al. *Trans Am Acad Ophthalmol Otolaryngol.* 1970;74(1):59-74.

4 Lakhanpal RR, Hariprasad SM. *Ophthalmic Surg Lasers Imaging Retina.* 2015;46(2):155-157.

5 Glaser BM. *Ophthalmology.* 1986;93(9):1193-1197.

6 Ang A et al. *Ophthalmology.* 2008;115(1):164-168.

7 Freeman HM. *Mod Probl Ophthalmol.* 1979; 20:267-274.

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