Scleral Buckling for Rhegmatogenous Retinal Detachment

An alternative to vitrectomy in uncomplicated cases.

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In this issue of Retina Today, *Andres Amaya Espinosa, MD; Gina Baron Mendoza, MD; Maria Alejandra Toro Millan, MD; and Natalia Camacho Espinosa, MD, provide surgical pearls for performing scleral buckling for rhegmatogenous retinal detachment as an alternative to vitrectomy in uncomplicated cases..*

We extend an invitation to readers to submit pearls for publication in Retina Today. *Please send submissions for consideration to Ingrid U. Scott, MD, MPH (iscott@psu.edu); or Dean Eliott, MD (dean_eliott@meei.harvard.edu). We look forward to hearing from you.*

—Ingrid U. Scott, MD, MPH; and Dean Eliott, MD

Rhegmatogenous retinal detachment (RRD) has been managed by several methods, from pneumatic retinopexy to pars plana vitrectomy (PPV). Scleral buckling, however, remains the surgical procedure of choice for RRD without proliferative vitreoretinopathy (PVR).[1]

In 1929, Jules Gonin, MD, postulated that a retinal break was the cause of RRD; he limited treatment by surrounding the area of the break after drainage of subretinal fluid. With this procedure, he attained a 57% reattachment rate.[2] Gustav Guist, MD; and Karl Lindner, MD, applied multiple scleral trephines posterior to the estimated position of the break, which raised their reattachment rate to 70%.[2] Eleven years later, Bengt Rosengren, MD, added an air tamponade, and the bubble was positioned in the area of the break. Subsequently, the reattachment rate increased to 77%.[2]

During the 1950s, Charles Schepens, MD, introduced the circular buckle, which represented a maximum barrier for the leaking break with extensive coagulation to secure the anterior retina. With this technique, more than 80% of retinas were reattached.[3] In 1960, Harvey Lincoff, MD, replaced diathermy with cryopexy, diminishing complications and increasing the anatomical success to more than 88%.[3]

With rapid advances in instrumentation and the improved success rates of vitrectomy, there has been a growing trend towards the use of primary vitrectomy for RRD without PVR.[4] We present several cases of primary RRD that were treated with scleral buckling and cryopexy. Drainage of subretinal fluid and pneumatic retinopexy were also performed in some patients.

TECHNIQUE

Our technique begins with a 360° peritomy. Rectus muscles are repaired and indirect ophthalmoscopy is performed to locate the retinal break. Then a scleral incision is created for drainage of subretinal fluid, which is performed in cases of bullous retinal detachments or inferior detachments. Once the drainage is done, cryopexy is achieved in the exact location of the break. To finish the procedure, a band is placed at 360°, inducing an appropriate indentation. If the break is in the superior quadrants, C_3F_8 (0.4 cc) is injected into the vitreous cavity. It is therefore recommended that the patient be positioned upright to place the gas bubble against the retinal break.

STUDY RESULTS

Forty-three eyes of 43 patients were treated with scleral buckling and cryopexy. Nine eyes were pseudophakic and 34 were phakic. Twenty-nine patients had macular involvement (67.4%), and 34 had a unique break (79%).

Thirty-nine eyes (90%) required the use of C_3F_8. No intraoperative complications were observed. Postoperative complications included two redetachments (4%) that necessitated PPV. Anatomic success was achieved in 95.3% of eyes (Figure 1). Results are shown in Table 1.

DISCUSSION

Several controlled trials since 1995 were reviewed to compare the anatomic results and efficacy of scleral buckling, vitrectomy, cryopexy, and pneumatic retinopexy for the management of primary RRD.[4] Research shows that PPV and scleral buckling are the main techniques used.[4]

PVR develops in 5.3% to 11.5% of patients after vitrectomy for primary RRD and raises the possibility of reoperation from 13.2% to 24.5%. PVR develops in 1.9% of patients after scleral buckling, and reoperation is required in 7.3% of patients.[5-7]

TABLE 1: SURGICAL RESULTS IN 43 PATIENTS

Macula Involvement	Eye	Location of Break(s)	Lens Status	Drainage of Subretinal Fluid	Gas	Refractive Error Induced (D)	Intraoperative or Postoperative Complications
Macula off	Right	Temporal	Phakic	No	Yes	-1.75	No
Macula off	Right	Superotemporal	Pseudophakic	No	Yes	-2.25	No
Macula off	Left	Posterior to equator	Phakic	No	Yes	-1.25	Redetachment
Macula off	Left	Superotemporal	Phakic	Yes	Yes	-1.25	No
Macula off	Left	Superior (2), inferior (1)	Phakic	No	Yes	-2.5	No
Macula off	Left	Superonasal	Phakic	No	Yes	-0.5	No
Macula on	Right	Superonasal	Phakic	No	Yes	-0.75	No
Macula off	Left	Superonasal	Pseudophakic	No	Yes	-2.25	No
Macula off	Right	Superonasal	Pseudophakic	No	Yes	-0.75	No
Macula off	Right	Superonasal	Phakic	No	Yes	-1.5	No
Macula off	Right	Superonasal	Pseudophakic	Yes	Yes	-1.75	No
Macula on	Right	Superotemporal	Pseudophakic	No	Yes	-0.75	No
Macula on	Right	Superior	Phakic	No	Yes	-3	No
Macula off	Left	Inferior	Pseudophakic	Yes	Yes	-1.25	No
Macula off	Left	Superonasal	Phakic	No	Yes	-1.75	No
Macula off	Left	Inferotemporal	Pseudophakic	Yes	Yes	-1.25	No
Macula off	Right	Superotemporal	Phakic	Yes	Yes	-0.75	No
Macula off	Left	Superior (2), temporal(1), inferior (1)	Phakic	Yes	Yes	-1.25	No

Postoperative complications after PPV include infection, retinal tear and/or detachment, intraocular hemorrhage, cataract or acceleration of preexisting cataract, and elevated intraocular pressure. Scleral buckling is an extraocular procedure with less risk of intraocular complications. Complications of scleral buckling include accidental subretinal fluid drainage (6%), choroidal hemorrhage (5%), subretinal hemorrhage (6%), retinal incarceration, vitreous hemorrhage (7%), hyphema, choroidal detachment, ocular movement disorders, and explant exposure.[5-7]

A prospective, randomized, multicenter study, the Scleral Buckling versus Primary Vitrectomy in Rhegmatogenous Retinal Detachment Study,[8,9] compared both techniques in 416 phakic and 265 pseudophakic patients. Results showed that when scleral buckling was performed in phakic eyes, there was no risk of cataract formation; however, every time vitrectomy was performed in phakic eyes, a cataract

TABLE 1 (CONTINUED)

Macula Involvement	Eye	Location of Break(s)	Lens Status	Drainage of Subretinal Fluid	Gas	Refractive Error Induced (D)	Intraoperative or Postoperative Complications
Macula off	Left	Superior	Phakic	Yes	Yes	-1.50	No
Macula off	Right	Superotemporal	Phakic	No	Yes	-2.00	No
Macula on	Left	Inferotemporal	Phakic	Yes	Yes	-1.00	No
Macula off	Right	Superotemporal (2)	Phakic	Yes	Yes	-2.25	Redetachment
Macula off	Left	Inferotemporal	Phakic	Yes	No	-1.75	No
Macula off	Right	Temporal	Phakic	Yes	No	-1.00	No
Macula on	Left	Superonasal	Pseudophakic	No	Yes	-0.75	No
Macula on	Left	Inferotemporal	Phakic	Yes	Yes	-1.75	No
Macula off	Left	Superonasal	Phakic	Yes	Yes	-3.25	No
Macula off	Right	Superotemporal	Phakic	Yes	Yes	-3.00	No
Macula on	Left	Inferonasal	Phakic	Yes	Yes	-3.75	No
Macula off	Right	Superotemporal	Phakic	Yes	Yes	-1.50	No
Macula off	Right	Superonasal	Phakic	Yes	Yes	-4.00	No
Macula off	Right	Inferotemporal (2)	Phakic	Yes	No	-5.00	No
Macula on	Left	Inferotemporal (2)	Phakic	Yes	No	-1.25	No
Macula on	Right	Superotemporal (3)	Phakic	No	Yes	-4.25	No
Macula on	Left	Superior	Phakic	No	Yes	-1.25	No
Macula on	Right	Inferotemporal	Phakic	Yes	Yes	-0.75	No
Macula on	Left	Inferonasal	Phakic	Yes	Yes	-0.50	No
Macula on	Right	Superior	Phakic	No	Yes	-3.00	No
Macula off	Left	Superotemporal	Phakic	No	Yes	-2.25	No
Macula off	Right	Superonasal	Pseudophakic	No	Yes	-0.50	No
Macula off	Left	Superotemporal	Phakic	Yes	Yes	-1.75	No
Macula on	Right	Superonasal	Phakic	Yes	Yes	-1.50	No
Macula off	Left	Superior	Phakic	No	Yes	-2.75	No

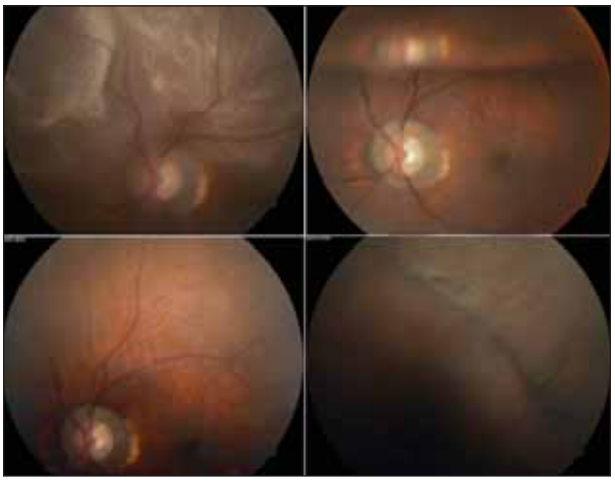

Figure 1. A 48-year-old patient diagnosed with a retinal detachment in the left eye and 20/400 visual acuity; after scleral buckle, cryopexy, and pneumatic retinopexy, the retina was completely attached and final visual acuity was 20/30.

could develop or a pre-existing cataract could progress. Nevertheless, the success of reattachment as an anatomic outcome was very similar with both techniques.[8,9]

Bernhard et al[10] conducted a study of 52 eyes with retinal detachment due to dialysis that underwent a segmental buckling procedure. At 1 year, the retina was completely reattached after 1 surgical procedure in 87% of patients.

In 2007, Azad et al[11-12] evaluated 61 phakic eyes with primary RRD that were randomized to undergo scleral buckling (group 1) or PPV (group 2). At 6 months, the primary reattachment rate was 80.6% in group 1 and 80% in group 2. Although primary vitrectomy achieved anatomic and functional success rates similar to scleral buckling, the main disadvantage of vitrectomy was the high incidence of postoperative cataract formation. Visual rehabilitation also occurred earlier with scleral buckling than with vitrectomy.

In a study of 63 patients who underwent vitrectomy for primary RRD, reattachment rate after the first surgery was 92.1%.[13] There was a high incidence (53.8%) of cataract progression in phakic eyes. No other serious complications, such as PVR, were observed. These results indicate that vitrectomy is an effective surgical technique to treat primary RRD. Vitrectomy combined with cataract surgery may also be a valuable surgical option in selected cases to maintain long-standing visual rehabilitation.[13]

Our series of 43 patients showed an anatomic success rate of 95.3%, similar to the 87% to 97% for scleral buckling and 80% to 92.1% for posterior vitrectomy previously published. Combining scleral buckling and cryopexy with pneumatic retinopexy may offer several advantages in selected cases, particularly in eyes with no drainage of subretinal fluid or superior breaks. Advantages of this technique are low morbidity, slight reaction to intraocular inflammation, lack of serious intraoperative and postoperative complications, and early visual rehabilitation. These advantages occur due to the minimally invasive and extraocular nature of this procedure, which may be the first resource for the management of uncomplicated RRD. Posterior vitrectomy can still be considered as a second option if scleral buckling fails to reattach the retina.

In conclusion, despite the increasing popularity of primary vitrectomy, scleral buckling with cryopexy is an effective and relatively safe option for the initial treatment of patients with uncomplicated RRD and is a fine alternative to posterior vitrectomy. ■

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