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Persistent Diplopia in Primary Position after Pars Plana Vitrectomy with Encircling Band in Rhegmatogenous Retinal Detachment

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Purpose: To evaluate the incidence of persistent diplopia in primary position after encircling band procedures with pars plana vitrectomy (PPV) and to report the outcomes.

Design: Observational, retrospective study.

Participants: One hundred sixteen patients who underwent successful rhegmatogenous retinal detachment (RRD) at our center from 2009 through 2014.

Methods: We studied all patients with RRD who underwent successful PPV with an encircling band. Patients reporting diplopia more than 2 months after retinal surgery were identified and evaluated by our strabismus colleagues.

Main Outcome Measures: Outcome measures included near and far deviation in prism diopters, degree of anisometropia, and visual acuity.

Results: Six of 116 patients reported persistent diplopia in primary position (5.2%). The diplopia most often was related to vertical microdeviations from 3 to 5 prism diopters, and it was managed adequately with prisms. The deviation remained unchanged during the follow-up, except in 1 patient.

Conclusions: Persistent diplopia associated to PPV with an encircling band has a low incidence and a small angle of deviation, and in our cases, it could be corrected successfully with prisms. *Ophthalmology Retina 2017;■:1–4 © 2017 by the American Academy of Ophthalmology*

Encircling silicone bands frequently are used in combination with pars plana vitrectomy (PPV) in the management of rhegmatogenous retinal detachment (RRD). This is a common procedure for most patients with preoperative proliferative vitreoretinopathy (PVR), multiple retinal breaks, giant retinal tears, or high-risk retinal detachment.[1] Various studies have reported the frequency of complications after scleral buckling surgery; however, specific information about the incidence of postoperative diplopia associated with the use of encircling silicone band alone is limited, and to our knowledge, there is no published evidence when encircling band and PPV are used in the same operation. The aim of this study was to evaluate the incidence of persistent diplopia after encircling band procedures associated with simultaneous PPV in the treatment of RRD and to report the outcomes.

Methods

This retrospective study was based on anonymized data from a database meeting the Spanish Organic Data Protection Law 15/1999. Given the anonymous character of this database and the retrospective nature of the study, the institute's committee ruled that it was not necessary to obtain informed consent from the patients and also to obtain the committee's approval for this study.

We retrospectively reviewed all patients treated from 2009 through 2014 who underwent successful surgery for RRD at our center. Only those patients who underwent PPV combined with the use of an encircling silicone band were selected. Reoperations were excluded because they could be considered a confounding factor as a result of additional manipulation. Patients with postoperative macular pathologic features, confirmed by OCT or fundus examination, also were excluded because they may trigger a dragged-fovea diplopia syndrome.[2] Those with other buckling elements were excluded because the diplopia may not be attributed to the use of an encircling band alone. Eventually, 6 of the 116 patients (5.2%) included in the study showed persistent diplopia in primary position. These patients were followed up retrospectively.

The operations were carried out by the same 2 surgeons (J.N-S. and one non-author). The procedure consisted of a 23-gauge 3-port PPV combined with a circumferential silicone band 3.2 mm in width (Labtician Ophthalmics, Oakville, Canada). This was placed under the rectus muscles at 9 to 10 mm of the limbus and was fixated to the sclera with 1 mattress suture in each quadrant. As a rule, the width of the indentation extended from the ora to the equator.

Phacoemulsification of the lens with implantation of an intraocular lens, intravitreal gas tamponade, or the use of either laser photocoagulation or cryotherapy were optional and left to the discretion of the surgeon. Cryotherapy was used when endolaser photocoagulation was not effective to create a dense white scar, which usually was restricted to cases with extensive anterior PVR. The use of an encircling band was indicated in the following situations: presence of multiple breaks or retinal degenerations, giant retinal tears of more than 180°, presence of PVR grade C or superior, RRD associated with infectious or noninfectious posterior uveitis, and infantile or posttraumatic RRD.

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The kind of anesthesia in each procedure was recorded. To discern the myotoxic effect of local anesthetics, a distinction was made between general and peribulbar anesthesia. Patients reporting diplopia more than 2 months after retinal surgery were identified and were evaluated posteriorly by our strabismus colleagues. Ocular deviation was measured in prism diopters in primary and gaze positions. Muscle restrictions were assessed with the Hess screen charts. Best-corrected visual acuity was determined with the Snellen card test, and anisometropia was estimated as the difference in spherical equivalent refraction between both eyes. Correction prisms were prescribed in primary position if the angle of deviation remained constant after 2 consecutive examinations 2 months apart.

To review published data about postoperative diplopia associated to RRD, a Cochrane and PubMed search within the last 25 years was carried out using the following Medical Subject headings (MeSH) terms: *diplopia* and either *vitrectomy* or *retinal detachment* or *scleral buckling*, with a filter restricting the search fields to the title or abstract. Forty-three articles were retrieved, and the reference lists of those selected were examined for additional articles.

Results

In total, 6 of the 116 patients (5.2%) included in the study showed persistent diplopia in primary position. Baseline characteristics of the 6 patients are shown in Table 1. One patient demonstrated a giant retinal tear of more than 180° (silicone oil tamponade was used), another showed an extensive PVR, and the rest showed multiple breaks and retinal degenerations (1 patient had 7-diopter myopia). Two patients underwent surgery in the first 24 hours because their macula was attached (macula on).

All patients reported diplopia shortly after the operation, and except in 1 patient (patient 1), the deviation remained constant throughout the study. Far and near deviation is reported in primary position as base-in, base-out, base-up, or base-down prism diopters on the right eye. Five patients demonstrated vertical microdeviations, which ranged from 3 to 5 prism diopters, whereas another patient was exotropic requiring 12 prism diopters of base-in prism for neutralization. As stated above, prism correction was prescribed if deviation remained unchanged after 2 consecutive examinations. In 4 patients, prism correction was independent of the distance (Table 2).

Corrective prisms relieved the symptoms in all patients, and no patient reported adaptation problems. Diplopia spontaneously disappeared in patient 5 after 24 months. All patients were followed up for at least 1 year (range, 12−48 months), and 3 patients underwent cataract surgery during the follow-up. Postoperative anisometropia ranged from 0.5 to 2.75 diopters. Approximately 70.7% of the 116 patients underwent surgery using general anesthesia, including 5 of the 6 patients with postoperative diplopia.

Discussion

Scleral silicone bands are used widely in combination with PPV in the management of high-risk[1] or phakic[3,4] RRD. However, as with other scleral buckling elements, they are associated with several surgical complications, such as persistent diplopia, choroidal detachment, high intraocular pressure, and ocular pain,[5,6] which accounts for the reluctance of some surgeons to use them.

Persistent postoperative diplopia has a variable incidence that ranges from 1.5%[7] to 25%[8] in primary position. It may occur because of multiple, nonexclusive mechanisms such as ischemia, trauma, local anesthetic myotoxicity, macular damage, adhesions between muscle and sclera, or mechanical effect of the buckling element.[2,8−14] All of them may lead to either a sensorial disturbance or a restrictive phenomenon, causing postoperative diplopia. Symptoms are usually evident within a few days after surgery and are independent of the final visual acuity and the involvement of the macula.[12,13]

Treatment of persistent diplopia after RRD surgery usually follows a stepwise approach: prism correction can control symptoms for up to one third of patients, but strabismus surgery, buckle removal, or both may be required if this should fail.[13] In the series published by Langmann et al,[15] the incidence of diplopia in primary position associated with the use of an encircling band was 7%. Fison and Chignell[13] found only 1 case among 311 eyes that underwent conventional RRD surgery (the total number of encircling band procedures was not mentioned). However, PPV does not seem to induce ocular motility disturbances,[13] although this could be considered controversial.[12,16]

Among our patients, the incidence of diplopia after PPV combined with an encircling silicone band was 5.2%, which was similar to that reported by Langmann et al.[15] This low value may be explained by the fact that up to 70.7% of patients underwent surgery under general anesthesia,

Table 1. Baseline Characteristics of Patients with Persistent Diplopia in Primary Position

Patient No.	Gender	Age (yrs)	High Myopia	Pseudophakia	Previous Trauma	Macular Involvement	Rhegmatogenous Retinal Detachment Type
1	Male	45.1	No	No	No	Yes	Giant tear
2	Female	64.3	No	No	No	Yes	Normal
3	Female	68.9	No	No	No	No	Normal
4	Female	45.7	Yes	No	No	No	Normal
5	Male	48.3	No	No	Yes	Yes	Normal
6	Female	79.7	No	Yes	No	Yes	PVR>grade B*

PVR = proliferative vitreoretinopathy.
*grade B corresponds to surface retinal wrinkling, rolled edges of the retina, retinal stiffness, and vessel tortuosity in the Proliferative Vitreoretinopathy Classificacion of the Retina Society Terminology Committee.