Inferior sclerotomies without subretinal fluid drainage for exudative retinal detachment in diffuse retinal pigment epitheliopathy

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PURPOSE. *To evaluate the efficacy of inferior sutureless sclerotomies without subretinal fluid drainage for the treatment of bullous exudative retinal detachment secondary to diffuse retinal pigment epitheliopathy.*
METHODS. *A retrospective interventional case series of eyes treated with two inferior posterequatorial full-thickness sclerotomies without subretinal fluid drainage. Patients were placed in an upright position 24 hours after surgery. Main outcomes were visual acuity and retinal reattachment rate.*
RESULTS. *Three eyes with recent diagnoses of diffuse retinal pigment epitheliopathy and bullous inferior retinal detachment were included in the study. In all cases, a very thick sclera was evident during surgery. The day after surgery the retina was completely attached in the three eyes. Preoperative visual acuity was light perception, 20/200, and counting fingers. After surgery, visual acuity improved to 20/200, 20/70, and 20/50, respectively. No intra- or postoperative complications occurred.*
CONCLUSIONS. *The performance of inferior sutureless sclerotomies without a draining procedure in cases of diffuse retinal pigment epitheliopathy with inferior bullous retinal detachment is a simple and effective technique. It achieves retinal reattachment the day after surgery, allowing laser photocoagulation of the leaking lesions disclosed in fluorescein angiography. (Eur J Ophthalmol 2008; 18: 965-71)*

KEY WORDS. *Bullous retinal detachment, Central serous chorioretinopathy, Diffuse retinal pigment epitheliopathy, Sclerotomy, Subretinal fluid drainage*

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INTRODUCTION

Diffuse retinal pigment epitheliopathy (DRPE) is a severe form of central serous chorioretinopathy (CSC) which is characterized by multifocal exudative lesions in the posterior pole and frequently complicated by a bullous retinal detachment with shifting subretinal fluid in the inferior periphery (1).

DRPE affects middle-aged men and is predominantly bilateral, in contrast to classic CSC (2). In some cases, it has been associated with systemic corticoid therapy (3). Indocyanine green angiography has shown primary choroidal hyperpermeability with secondary retinal pigment epithelium dysfunction (4).

Several treatments for this condition have been described, such as argon laser therapy, verteporfin photodynamic therapy (PDT), and surgery. PDT has been used in a few cases with good short-term results, but there are no reports of long-term follow-up or recurrences with this treatment (5, 6).

Although argon-laser photocoagulation of active focal lesions has been recommended to achieve earlier resolu-

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tion, this treatment cannot be applied when there is a bullous retinal detachment, which takes several months to spontaneously resolve (7, 8). During this period, VA remains so low that it is quite incapacitating for the patient. Moreover, the persistence of subretinal fluid (SRF) with a high fibrinous content may induce the development of a subretinal fibrotic scar that could result in a permanent loss of vision (1). For these reasons drainage of SRF has been recommended. Multiple surgical techniques have been attempted for subretinal fluid drainage, including external drainage with or without pars plana vitrectomy and internal drainage by means of retinotomy (7-11).

To our knowledge, this study provides the first description of a simple and safe surgical technique for DRPE complicated by bullous exudative retinal detachment: two inferior sutureless sclerotomies without subretinal fluid drainage.

METHODS

This is a retrospective interventional case series study of three eyes diagnosed with DRPE complicated by a bullous exudative retinal detachment.

After discussion of the therapeutic options, surgery was proposed to reattach the retina in order to apply argon laser photocoagulation to the leaking points disclosed in the fluorescein angiography (FA). Written informed consent was obtained from each patient.

Initial evaluation included Snellen best-corrected visual acuity (BCVA), tonometry and fundus examination using indirect ophthalmoscopy, slit lamp, FA, and OCT.

Through a 180º conjunctival peritomy, a sub-Tenon dissection was performed with isolation of medial, inferior, and lateral rectus muscles. A full-thickness sclerotomy with a Beaver blade was performed posterior to the equator at 5 and 7 o'clock. Bipolar diathermy was applied at the margins of the sclerotomy and on the underlying choroidal tissue in order to retract it and keep the sclerotomy open after surgery. In one eye drainage of SRF with a 27 gauge needle through one of the sclerotomies was attempted, but it was unsuccessful due to the high viscosity of the SRF. In the other two eyes, no drainage was attempted. In all three eyes, the sclerotomies were left unsutured and the closure of the conjunctiva was performed with an 8/0 polyglycolic acid suture.

The patient was placed in an upright position for 24 hours to improve spontaneous fluid drainage during the postoperative period.

RESULTS

Three eyes of two patients with recent diagnoses of DRPE and bullous inferior retinal detachment were included in the study (Tab. I). Optical coherence tomography through the detached retina showed a subretinal space that was cloudy owing to its fibrinous content (Fig. 1). In all eyes, FA showed hyperfluorescent foci at the posterior pole as well as early hypofluorescent areas which remained hypofluorescent in the late frames of the angiogram (Fig. 2). This hypofluorescence was due to a fibrinous deposit in the subretinal space, which was confirmed by OCT (Fig. 3).

In all cases, a very thick sclera was evident during surgery (Fig. 4). There was no evidence of diffuse leakage from the bed of the sclerotomy in any of the three eyes, not even in the eye where we attempted drainage with a 27-g needle. No intraoperative complications were detected. Reattachment of the retina and improvement in vision were achieved in the three eyes the day after surgery.

Case 1

A healthy 42-year-old man with no history of corticosteroid intake complained of decreased vision in the right eye. BCVA was counting fingers in the right eye and 20/70 in the left eye. No anterior chamber or vitreous inflamma-

TABLE I - PATIENT DETAILS

Case	Age	Gender	Corticosteroid intake	Laterality	Preoperative VA	Evidence of SRF	Postoperative retinal reattachment	Posoperative VA	Follow-up, mo
1	42	Male	No	Right eye	Counting fingers	Yes	Day 1	20/50	42
2	56	Female	Yes	Right eye	Light perception	Yes (OCT)	Day 1	20/200	2
				Left eye	20/200	Yes (OCT)	Day 1	20/70	2

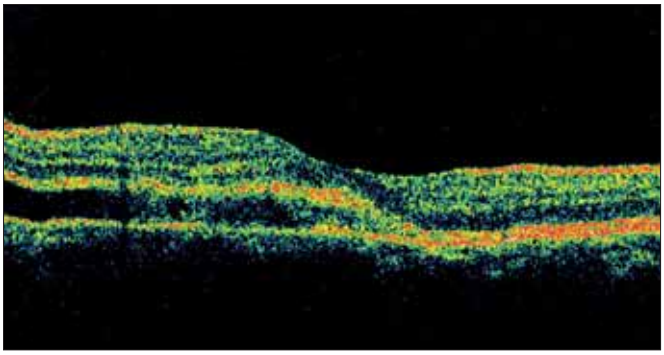

Fig. 1 - *Optical coherence tomography through the detached retina demonstrated a cloudy subretinal space due to its fibrinous content.*

tion was detected. Fundus examination of the right eye showed both a whitish subretinal area temporal to the fovea consisting of a fibrin deposit and an inferior bullous exudative retinal detachment (Fig. 5). In the left eye, there was a central serous retinal detachment, and the FA disclosed leaking hyperfluorescent foci in the posterior pole near the superotemporal vascular arcade, which were treated with argon laser photocoagulation.

Two inferior postequatorial full-thickness sclerotomies at 5 and 7 o'clock were performed on the right eye without external drainage. A very thick sclera was evident during surgery and no suture was applied to the sclerotomies. The patient was placed in an upright position to improve spontaneous fluid drainage through the sclerotomies during the postoperative period.

By the first postoperative day, the retina had reattached and a fibrinous subretinal plaque temporal to the fovea was observed. Two weeks after surgery, FA was performed and laser therapy was applied to the leaking points. Postoperative BCVA was 20/200 in the right eye. Three years later, the retina remained attached and BCVA was 20/50 in the right eye and 20/30 in the left eye.

Case 2

A 56-year-old woman with a history of metastatic breast cancer complained of decreased vision in both eyes for 7 days. The patient had a history of lumbar radiculopathy that had been treated with seven intramuscular cortisone injections. BCVAs were light perception in the right eye and 20/200 in the left eye. No anterior chamber or vitreous inflammation was detected. Fundus examination showed a bilateral, exudative, bullous, inferior retinal detachment affecting the macula (Figs. 2 and 6). FA of her right eye showed an area above the superotemporal vascular arcade that was hypofluorescent due to the presence of a subretinal plaque of fibrin. The same phenomenon was found in the left eye, in addition to multiple hyperfluorescent leaking points at the posterior pole. No choroidal metastases were detected either by FA or fundus examination. One week after discontinuation of corticosteroid treatment, no changes in BCVA or fundus appearance were observed.

Two postequatorial full-thickness sclerotomies were per-

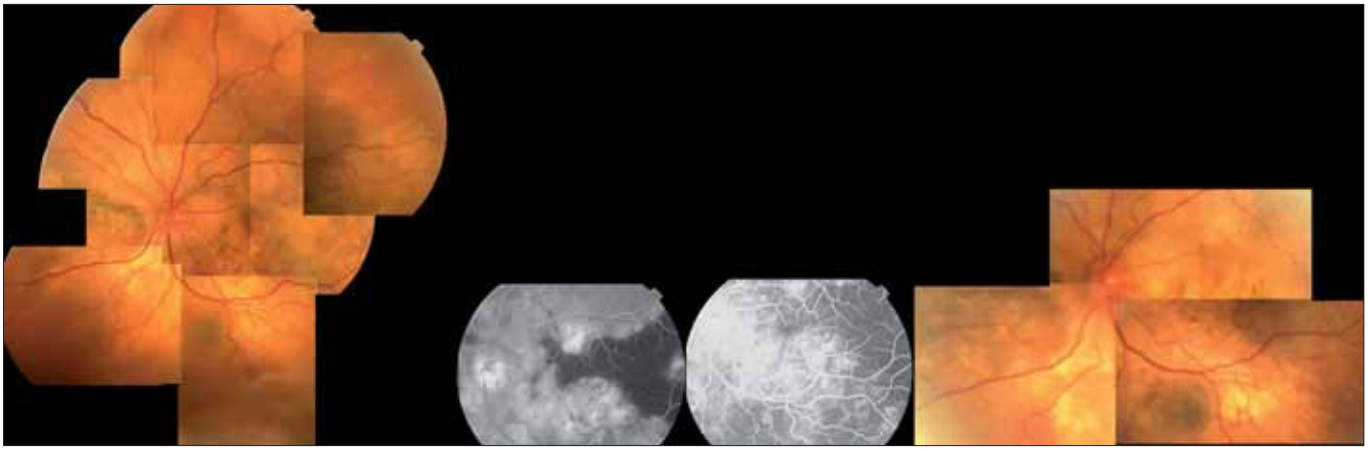

Fig. 2 - *Case 2.* Left eye. Left: *Color fundus photograph showing a yellow-white subretinal deposit in the posterior pole and an inferior retinal detachment; visual acuity (VA) 20/200.* Center: *Fluorescein angiography showing a hypofluorescent plaque temporal to the fovea with persistent hypofluorescence in the late frames of the angiogram. This fluorescein blockage was cause by a fibrin deposit. Multiple hyperfluorescent spots with late pooling into the subretinal space are also evident at the posterior pole.* Right: *Fundus appearance 1 week after surgery with a complete retinal reattachment; VA 20/70.*

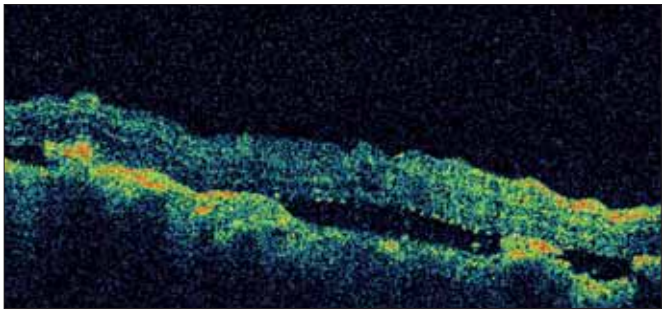

Fig. 3 - *Optical coherence tomography. Fibrinous plaque in the subretinal space.*

formed in the right eye at 5 and 7 o'clock. Drainage of SRF with a 27-g needle was attempted through the inferotemporal sclerotomy, but no SRF could be drained because of the high viscosity of the fluid. No drainage was attempted through the other sclerotomy. In the left eye, sclerotomies were performed with no drainage.
In both eyes, a very thick sclera was observed when performing the sclerotomies. The sclerotomies were left unsutured and the patient was placed in an upright position to improve spontaneous fluid drainage during the postoperative period.

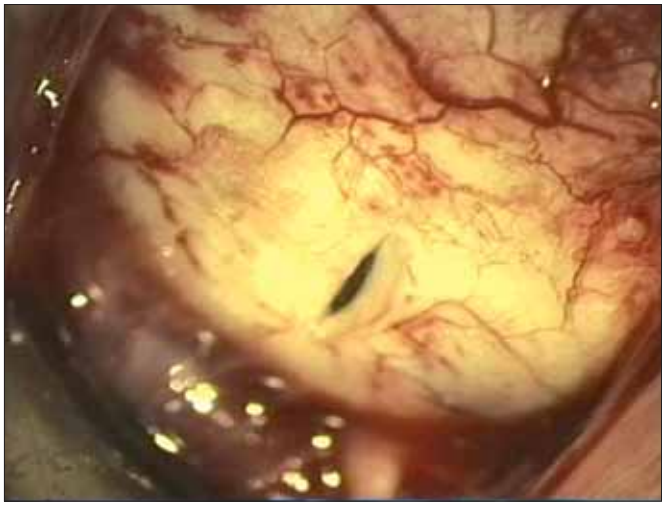

Fig. 4 - *Case 2. Right eye. The scleral thickness on the sclerotomy site.*

On the first postoperative day, the retina was reattached in both eyes. This occurs not only in the right eye, where an unsuccessful attempt was made to drain the SRF, but also in the left eye, where no drainage through the sclerotomy was attempted. BCVA on the first postoperative day was 20/200 in the right eye and 20/70 in the left eye. The

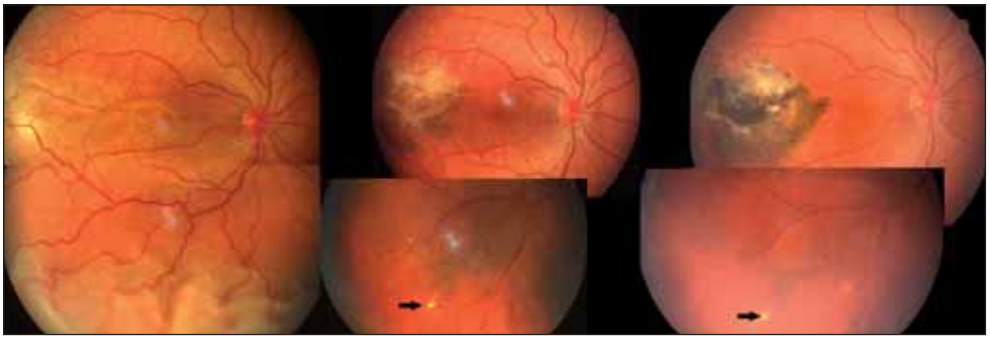

Fig. 5 - *Case 1.* Left: *Preoperative fundus appearance showing a yellow-white subretinal exudation temporal to the fovea and an inferior bullous retinal detachment; visual acuity (VA) counting fingers.* Center: *Fundus appearance 2 weeks after surgery; VA 20/200.* Right: *Fundus appearance 3 years after surgery. The retina remained attached and a fibrous scar temporal to the fovea is evident; VA 20/50.*

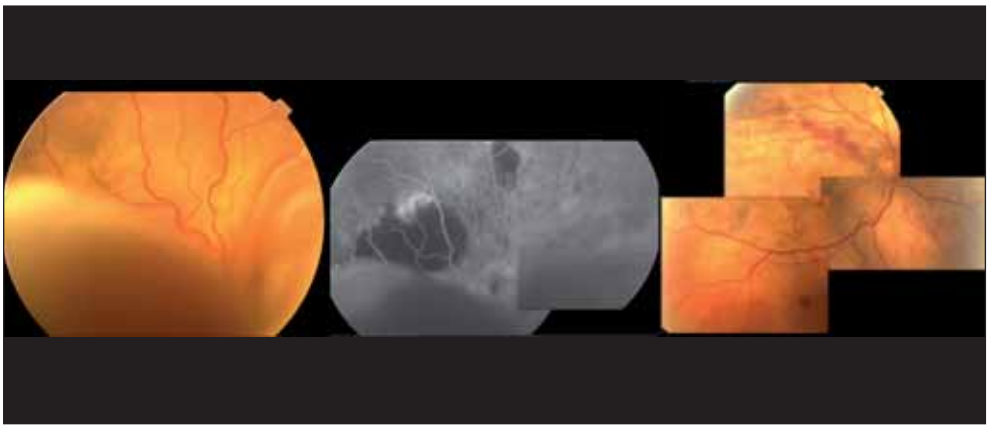

Fig. 6 - *Case 2.* Right eye. Left: *Fundus preoperative appearance showing a severe bullous inferior retinal detachment involving the posterior pole; visual acuity (VA) light perception.* Center: *Fluorescein angiography showing a hypofluorescent plaque in the superotemporal area due to a fibrin deposit. An inferior retinal detachment is also evident.* Right: *Fundus appearance 1 week after surgery showing a reattached retina. A mild subretinal hemorrhage is evident adjacent to the superotemporal plaque of subretinal fibrin; VA 20/200.*

only postoperative complication detected was a mild subretinal hemorrhage close to the superotemporal fibrin plaque in the right eye, which resolved spontaneously.
No choroidal metastasis was detected in either eye following retinal reattachment or during a follow-up of 2 months.

DISCUSSION

DRPE is a severe form of CSC characterized by multifocal exudative lesions in the posterior pole and bullous retinal detachment with shifting SRF in the inferior periphery (1).
The differential diagnosis includes rhegmatogenous retinal detachment and multiple causes of serous retinal detachment like Vogt-Koyanagi-Harada syndrome, severe hypertensive choroidopathy, posterior scleritis, multifocal choroiditis, metastatic tumor, and uveal effusion syndrome (9).
FA discloses, in early phases, one or multiple hyperfluorescent foci in the posterior pole due to dye leakage from the choroid, followed in later phases by pooling of the dye into the subretinal space (1, 12). OCT through the exudative lesions discloses a domelike detachment of thickened retina and a cloudy subretinal space due to its fibrinous content (2).
The natural evolution is toward spontaneous resolution, although nearly 50% of patients have shown recurrent disease, and they ultimately developed scars at the posterior pole or in the inferior periphery (2). Discontinuation of corticosteroids, if they are used, usually results in spontaneous retinal reattachment and VA improvement, but only after 10 to 16 weeks (7, 13).
Several treatments have been used for this condition, including argon-laser photocoagulation, PDT, and surgery. Argon laser photocoagulation to leaking points identified during FA has been recommended to achieve earlier resolution; however, when there is a bullous retinal detachment this treatment cannot be applied. In these cases, drainage of SRF has been indicated, and this procedure should be carried out as early as possible in order to minimize the accumulation of subretinal fibrinous content and thereby reduce the risk of ingrowth of fibroblast and the formation of subretinal fibrotic scar (1).
SRF drainage has been attempted with multiple techniques. Benson et al (11) described 4 cases of DRPE, and were the first to perform both scleral buckling and external drainage of SRF in a single eye. Nevertheless, they described postoperative surgical complications, such as retinal incarceration, which made a vitrectomy necessary. Kang et al obtained retinal reattachment in one eye with transscleral drainage of SRF, gas injection, radial scleral buckling, and focal laser photocoagulation. However, the disease recurred and internal drainage had to be performed by means of pars plana vitrectomy, retinotomy, and fluid–air exchange (9). A case of retinal reattachment has also been described using a device designed to facilitate controlled external drainage (10). This device provides an approach to the subretinal space by penetrating the eye wall obliquely. However, it is not commercially available and it requires skillful handling.
Pars plana vitrectomy has also been described as a treatment option for retinal detachment in DRPE. Adan et al have reported a case of external drainage through the sclera associated with perfluorocarbon liquid injection through the pars plana (7). The same procedure was applied by Chen et al in one case (8). Although retinal reattachment was achieved in these two cases, a pars plana vitrectomy is a complex surgical technique with a high risk of complications.
To our knowledge, this is the first case series describing retinal reattachment in DRPE patients within 24 hours following inferior sclerotomies without SRF drainage. This surgical technique is easier to perform than those previously described because no draining procedure and no scleral suture is required.
In 1983, Gass (14) proposed a physiopathologic mechanism for uveal effusion syndrome, comparing it with CSC. He hypothesized that the abnormal thickness of the sclera may compromise choroidal vascularization, favoring the accumulation of extravascular proteins in the choroid and the ciliary body. This would increase the oncotic pressure in the suprachoroidal space and lead to fluid migration into that space, producing a ciliochoroidal detachment with secondary alteration of the retinal pigment epithelium and allowing water and proteins to move into the subretinal space. Since there are no lymphatics in the eye, intraocular extravascular proteins are removed anteriorly through Schlemm's canal and aqueous veins and posteriorly by transscleral diffusion and through the emissary canals into the orbital tissues. He concluded that partial thickness sclerotomies without drainage might improve subretinal fluid reabsorption, suggesting it as the best treatment for choroidal exudative detachment in the uveal effusion syndrome. The accumulated evidence to date would support Gass' hypothesis.

Based on his theory, we also postulated that an unusually thick sclera might also constitute a barrier to transscleral diffusion of a dense protein-rich SRF produced by an abnormal, highly permeable choroid, inducing the development of a bullous retinal detachment in DRPE. If this is true, sclerotomies could reduce scleral resistance and allow for retinal reattachment.

We performed sclerotomies in three eyes of two patients with DPRE and bullous retinal detachment. As has been described in uveal effusion syndrome, a very thick sclera was observed during surgery in all three eyes. Despite no drainage of SRF, the performance of inferior sutureless sclerotomies achieved retinal reattachment and VA improvement and allowed laser photocoagulation of the leaking lesions disclosed in FA.

A number of mechanisms may be involved in the drainage of SRF after the performance of a sclerotomy. Bipolar diathermy was applied at the margins of the sclerotomy and on the underlying choroidal tissue in order to retract it and keep the sclerotomy open after surgery. This maneuver could have caused small choroidal ruptures. These choroidal microruptures, in combination with the postoperative upright positioning of the patient, may facilitate SRF drainage. On the other hand, sclerotomies, by reducing scleral resistance, may also reduce choroidal vasculature compromise, decreasing choroidal hyperpermeability, which is the source of the dense SRF typical of this disease.

Although the mechanism of disappearance is unknown, most of the SRF disappeared 24 hours after surgery in the three eyes.

We cannot state with certainty that this treatment will prevent the recurrence of bullous retinal detachment in these eyes. Only one of the three eyes in the study had a long follow-up. During 3 years of follow-up there were several relapses of DRPE but a bullous retinal detachment did not recur.

Although the sclerotomies may close within a short time after surgery, the reduction of scleral resistance most likely persists, just as it does following partial thickness sclerotomies in the uveal effusion syndrome, thus preventing the reappearance of a bullous retinal detachment.

More cases and a longer follow-up are necessary to evaluate the influence of this surgical procedure in the natural evolution of the disease.

In summary, our experience suggests that inferior sutureless sclerotomies without an associated draining procedure followed by an upright positioning of the patient during the early postoperative period represents a simple surgical technique that can achieve retinal reattachment in patients with bullous retinal detachment due to DRPE.

Proprietary interest: None.

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