

Treatment of Retinal Folds Using Different Approaches for Unfolding After Retinal Detachment Surgery

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Abstract

Purpose: To present two different surgical procedures for the treatment of retinal folds after retinal reattachment surgery.

Methods: Two different surgical techniques on two cases of retinal folds depending on their presentation time and position on the posterior pole.

Results: Case one and two had retinal folds involving macula, both required surgeries, on the first case injection of subretinal fluid (BSS) was used for unfolding, and in the second case, peripheral retinectomy and redetachment of the retina was performed. Visual symptoms resolution and flattening of the retina was achieved in both cases after follow-up period.

Conclusion: Surgical treatment of retinal folds involving macula must be addressed promptly to avoid visual impairment, conversely, extrafoveal folds can be appropriately managed with a conservative approach if visual acuity is correct.

Keywords: Retinal Folds; Unfolding; Buckle

Introduction

Retinal folds are an infrequent but severe complication of rhegmatogenous retinal detachment surgery, they have been described after primary vitrectomy, scleral buckling surgery, and even after pneumatic retinopexy with internal gas tamponade [1]. When retinal folds compromise the fovea, symptoms like decreased visual acuity, metamorphopsia, visual field defect or diplopia may develop, peripheral folds on the other hands may remain asymptomatic. OCT may be helpful on differentiate between partial thickness and full thickness folds, partial thickness folds can be found in the inner retina as corrugations and in the outer retina as hyperreflective lesions over the RPE protruding into the outer nuclear layer, meanwhile full-thickness folds can be seen as a complete separation of the neurosensory retina with a base-to-base photoreceptor apposition [2,3].

Different strategies have been reported to manage the anatomic alteration, and there is consensus that rapid action must be taken when compromising the macula due to the resulting visual impairment it can cause. We report two cases of symptomatic full thickness macular folds after retinal detachment surgery with different unfolding surgical techniques.

Case 1

51-year-old woman, myopic with an axial length of 26.2 mm and LASIK surgery, was derived from the emergency department for a 2-day history of left eye, macula-off, bullous retinal detachment with two small horseshoe tears at 6 hours. Pars plana vitrectomy associated with scleral buckle and 12% perfluoropropane gas tamponade was performed, post-operative face down position was indicated. One month after surgery the patient presented

metamorphopsia and BCVA 20/400 (ETDRS), IOP 20 mm/Hg, C1N2P1 cataract, and a full-thickness macular fold with extension towards the inferior temporal main blood vessels. Phacoemulsification and a second vitrectomy were indicated, in which subretinal balanced saline solution (BSS) was injected with a 41g needle until the macular fold was completely lifted, then perfluorocarbon was injected alternating with more subretinal BSS, as more volume of perfluorocarbon entered the eye, more anteriorly the fold was displaced, finally, a small retinotomy was performed and the injected subretinal fluid was drained, followed by fluid-air exchange and 12% perfluoropropane (C3F8), face position down was indicated postoperatively (Figure 1). Six months later, the patient presented BCVA 20/40 (ETDRS), IOP of 14 mmHg, normal anterior segment, and in fundus examination, retina was attached without any sign of retinal fold (Figure 3).

Case 2

A 61-year-old man, emmetrope, with type II diabetes without retinopathy, and a C1N2P1 cataract, presented with 8 days history of left eye, macula-off, bullous superior and inferior temporal retinal detachment secondary to giant temporal retinal tear, he underwent PPV with scleral buckle and 12% perfluoropropane (C3F8), post-operative face down position was indicated. A week after surgery, the patient presented visual acuity of hand motion and worsening of his cataract, however, the scleral buckle was correctly indented and the retina was attached, it was decided to wait for reabsorption of the gas and a new appointment was made in a month. In the next visit, visual acuity remained in hand motion and the cataract made impossible to see the fundus because of a dense nuclear and subcapsular component, phacoemulsification was performed that same day, visual acuity the day after improved to counting fingers but the patient manifest to see a central black line.

Two months after the primary retinal detachment surgery, the patient underwent VPP again, where an injection of subretinal BSS with a 41g needle in the periphery of the retinal fold was performed, then, retinectomy was made over the elevated retina with the intention of re-detaching the temporal retina from 6-12 hours for unfolding it, once deployed, perfluorocarbon was injected to stabilize retina, fluid-air exchange and laser endophotocoagulation was performed over the periphery, vitreous cavity was filled with Densiron, post-operative face up position was indicated (Figure 2). Five months later, and after Densiron removal was possible, the

patient referred no black line on his visual field, BCVA was 20/400 (ETDRS), IOP was 18 mm/Hg, intraocular lens and scleral buckle were in the correct position, and retina was attached and flattened with a pale line over the previous fold (Figure 4).

Figure 1: A) Intraoperative macular fold visualization, B) Unfolding retina with subretinal injection of BSS with 41g needle, C-D) PFCL injection alternating with higher volume of subretinal BSS, E) Partial flattening of the retina under PFCL and extrafoveal retinotomy to aspirate subretinal fluid, F) Complete flattening of macular fold after fluid-air exchange.

Figure 2: A) Subretinal injection of BSS under retinal fold, B-C) Retinectomy and redetachment of fold involved retina from 6-12 hrs, D) Retinal unfolding and stabilization with PFCL, F) Fluid-air exchange and endophotocoagulation of retinal periphery, G) Vitreous cavity filled with Densiron.

Figure 3: A) Fundus photography and OCT pre-surgery, BCVA 20/400 ETDRS, B) Fundus photography and OCT 6 months post-surgery, BCVA 20/40 ETDRS.

Figure 4: A) Fundus photography and OCT pre- surgery, BCVA Counting finger with central black lineal scotoma, B) Fundus photography and OCT 5 months post-Densiron removal, BCVA 20/400 ETDRS.

Discussion

Pathogenesis of retinal folds are multifactorial and have been described with almost every surgical approach. Risk factors can be identified before surgery, throughout surgery and during the postoperative period. At preoperative stage, main risk factors are superior bullous retinal detachment, giant retinal tears or dialysis, retinal detachment compromising the macula and the chronicity of the detachment, time from diagnosis to surgery is important as the subretinal fluid following an acute retinal detachment may be reabsorbed more efficiently by the RPE compared to higher viscosity fluid reported on chronic retinal detachment,

thus preventing retinal remodelling and fold formation. During intraoperative stage, large amount of residual subretinal fluid is the most important risk factor [1], combined with large volume of gas tamponade and high scleral buckle positioning, this allows redundancy and slippage of detached retina because of the axial length increased with circumferential surface reduction at the inner wall, intraoperative hypotony may play a role as well [4]. Finally at postoperative stage, head position up, results in compression of the subretinal fluid into the attached posterior retina [5].

Conservative management with observation should be considered when the retinal fold does not involve macula, as reported by dell'Omo, *et al.* [15] who prospectively followed natural history of 20 patients with OCT and Autofluorescence, report made by Saatci, *et al.* [6] and Ahn, *et al.* [7] showed spontaneously resolve although BCVA was poor in both cases at the end of follow up, Ruiz-Moreno, *et al.* [8] also reported, not flattening but spontaneous migration to the superior temporal arcade of an extrafoveal full-thickness retinal fold one year postoperatively, BCVA was 20/25 at the end of follow up, without the black line reported on the visual field.

Indication of surgery in both of our cases was taken based on the experience of many authors supporting the surgical management of full-thickness folds involving macula to prevent visual impairment related to photoreceptor loss and outer retinal layers atrophy [9-12], all published cases reported mild to high improvement. Because of the high variability in the results of these reports and the lack of big series publications, the exact timing of surgical intervention and the intraoperative steps to achieve retinal unfolding and visual recovery are not well defined, it has been described as the most frequent technique, the subretinal injection of balanced saline solution (BSS) to release adherence of the folded retina from the surface of the EPR [9,10,13], peeling of the internal limiting membrane (ILM) and/or epiretinal membrane (ERM) to remove excessive superficial traction, redetachment of the folded retina [14], use of perfluorocarbon liquid (PFCL) to stabilize retina and dispel residual subretinal fluid [10,12] and endotamponade with silicone oil or gas to prevent detachment or refolding of the retina. In our first case we decided to use a combination of subretinal BSS and perfluorocarbon to iron the retina before aspiration of subretinal fluid, In the second case, retinectomy and re-detachment of the macular fold were indicated due to the rigidity of the retina

secondary to long-standing evolution time, we also decided not to perform ERM peeling in order not to generate new holes in an already ischemic retina. If there hadn't been a delay in the diagnosis of the fold, the combination of less aggressive techniques could have been more appropriated, we decided to use Densiron and face up position to keep the retina flat and avoid a complete re-detachment since the resolution of the fold was not clear, manifested as a pale white line at the end of the surgery.

Conclusion

Retinal folds after retinal detachment surgery are a rare complication, the correct diagnosis of this pathology employing OCT is essential to determine the nature of the anatomic alteration and subsequent management. Currently few publications serve as a guide to address this situation, different experiences reported, supports surgical intervention in full-thickness macular folds, while observation is recommended in cases of extrafoveal folds. Given the complexity of this pathology, special emphasis should be placed on preventing its occurrence by controlling the risk factors previously described.

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